FINAL

ERIE COUNTY CONSERVATION LEAGUE FIRING RANGE REMOVAL SITE EVALUATION REPORT

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PLUM BROOK STATION SANDUSKY, OHIO

Prepared for:

NASA Glenn Research Center
Plum Brook Station
3899 E. Scheid Road
Sandusky, Ohio 44870

Prepared by:

Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

March 31, 2020

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ACRONYMS

°C	Degrees Celsius
°F	Degrees Fahrenheit
µg/L	Micrograms per Liter
ACM	Asbestos-containing Material
AMSL	Above Mean Sea Level
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ArcGIS	Aeronautical Reconnaissance Coverage Geographic Information System
ASTM	American Society for Testing and Materials
bgs	Below Ground Surface
BKG	Background
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	Chemical of Concern
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbon
CY	Cubic Yard
dbh	Diameter at Breast Height
DERR	Division of Environmental Response and Revitalization
DNAP	Division of Natural Areas and Preserves
DOW	Division of Wildlife
ECCL	Erie County Conservation League
Eco-SSL	Ecological Soil Screening Level
ECWD	Erie County Water Division
EJP	Environmental Justice Plan
EMS	Environmental Management System
Envirosafe	Envirosafe Services of Ohio, Inc.
EPC	Exposure Point Concentration
ESL	Ecological Screening Level
ESV	Ecological Screening Value
EU	Exposure Unit
FE	Federal Endangered
FGDC	Federal Geographic Data Committee
FSC	Federal Species of Concern
FT	Federal Threatened
ft	Feet
ft^2	Square Feet
FY	Fiscal Year
gpm	Gallons per Minute
GRC	John H. Glenn Research Center
HASP	Health and Safety Plan
HMW	High Molecular Weight
HQ	Hazard Quotient
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IRA	Interim Removal Action
km	Kilometer

ACRONYMS (Continued)

LBP	Lead-Based Paint
LCL	Lower Control Limit
LDR	Land Disposal Restriction
LF	Linear Feet
LMW	Low Molecular Weight
LOQ	Limit of Quantitation
Lpm	Liters per Minute
MCL	Maximum Contaminant Level
MDC	Maximum Detected Concentration
MDC	Maximum Detected Concentration
MDL	Method Detection Limit
mg/cm^2	Milligrams per Square Centimeters
mg/kg	Milligrams per Kilogram
MK	Morrison–Knudsen
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act
NFA	No Further Action
NTCRA	Non-Time Critical Removal Action
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
ORAM	Ohio Rapid Assessment Method
ORC	Ohio Revised Code
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station
PBT	Persistent, Bioaccumulative, and Toxic
PEM	Palustrine Emergent
ppm	Parts per Million
PRG	Preliminary Remediation Goal
PSS	Palustrine Scrub-Shrub
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCP	Quality Control Plan
RCI	Reactivity, Corrosivity, and Ignitability
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
ROI	Region of Potential Influence
RPD	Relative Percent Difference
RSE	Removal Site Evaluation
RSL	Regional Screening Level

ACRONYMS (Continued)

SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SE	State Endangered
SI	Site Investigation
SL	Screening Level
SMP	Species Management Plan
SOR	Sum-of-Ratios
SPT	State Potentially Threatened
SRV	Sediment Reference Value
SSIC	State-Special Interest/Concern
SSL	Soil Screening Level
ST	State Threatened
SVOC	Semivolatile Organic Compound
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	Time Critical Removal Action
TNT	Trinitrotoluene
TR	Target Cancer Risk
95UCL	95 Percent Upper Confidence Limit
UCL	Upper Control Limit
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VAP	Voluntary Action Program
VOC	Volatile Organic Compound
VSI	Visual Site Inspection
WQC	Water Quality Criteria
XRF	X-Ray Fluorescence

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EXECUTIVE SUMMARY

This Removal Site Evaluation (RSE) Report presents the results from the Site Investigation (SI) and the RSE activities conducted in 2016 and 2019 at the Erie County Conservation League (ECCL) Firing Range located within the National Aeronautics and Space Administration (NASA) Plum Brook Station (PBS) in Sandusky, Ohio. The purpose of the RSE was to assess the potential threat to human health and the environment, and to determine if there is a need for further action. This RSE Report was prepared following the requirements presented in the *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* (USEPA 1993) and is equivalent to an Engineering Evaluation/Cost Analysis. Thus, this RSE Report documents the historical and 2019 sampling results, the streamlined human health and ecological risk assessments, the basis for removal action, and the recommended removal action to attain unrestricted reuse conditions at the ECCL Firing Range.

Site Background

The ECCL Firing Range is currently an inactive firing range. The ECCL leased approximately 57 acres of land from NASA on the eastern side of PBS at the intersection of U.S. Highway 250 and Fox Road, south of Sandusky, Ohio. The ECCL facility is not located within the 8-ft security fence; however, a perimeter fence was installed to restrict public access in February 2019. The facility was thought to have closed on or about August 18, 2007 (SAIC 2010).

Multiple environmental investigations have been conducted at the NASA PBS for numerous sites including the ECCL Firing Range. In 2016, an SI of the ECCL Firing Range was conducted; the SI Report (Leidos 2018a) recommended further sampling to determine the nature and extent of contamination in soils at the ECCL Firing Range.

Removal Site Evaluation Sampling and Streamlined Risk Assessment

The RSE sampling event was conducted in July and August 2019. A total of 140 soil, 9 sediment, 3 groundwater, and 3 asbestos samples were collected, including 19 duplicates (16 for soil, 2 for sediment, and 1 for groundwater) during the RSE. Sample locations were selected based on SI analytical results in order to further evaluate potential risk to ecological receptors and human health and further define the extent of contamination. Soil samples collected during the RSE were analyzed for metals and/or polycyclic aromatic hydrocarbons (PAHs) and carbazole. Sediment samples collected during the RSE were analyzed for metals. Surface water samples collected during the RSE were analyzed for metals and semivolatile organic compounds (SVOCs). Due to insufficient groundwater yield at most temporary monitoring wells, a limited number of groundwater samples were collected from the temporary monitoring wells installed during the RSE and were analyzed for metals and PAHs. The soil, sediment, surface water, and groundwater SI and RSE sample analytical results and streamlined risk assessment conclusions provide evidence to conclude that the nature and extent of contamination at the ECCL Firing Range has been sufficiently defined for these media. Soil vapor was not investigated during the RSE per Ohio Environmental Protection Agency guidance because no volatile organic compounds (VOCs) were identified as potential Chemicals of Potential Concern (COPCs) based on SI analytical results.

Streamlined risk assessments were conducted in accordance with the U.S. Environmental Protection Agency's (USEPA's) guidance on conducting non-time critical removal actions (NTCRAs) [USEPA 1993], and the screening values were selected to allow for unlimited use and unrestricted exposure. Soil and sediment SI and RSE sample results were compared to background values, USEPA residential regional screening levels (RSLs), and USEPA ecological screening values (ESVs). Surface water and groundwater

sample results were compared to USEPA RSLs, USEPA maximum contaminant levels (MCLs), and Ohio water quality criteria (WQC).

The human health risk evaluation concluded no chemicals of concern (COCs) requiring remediation are present in soil at the ECCL Firing Range Drainage Ditch and Former Clubhouse and Garage, or in the sediment at the ECCL Firing Range Pond East and Pond West B. However, COCs requiring remediation in soil are present in the ECCL Firing Range Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and in sediment in Pond West A (see **Figures ES-1 and ES-2**). The human health risk evaluation concluded no COCs requiring remediation are present in the surface water and groundwater at the ECCL Firing Range.

The ecological evaluation concluded no COCs requiring remediation are present in soil at the ECCL Firing Range Drainage Ditch and Former Clubhouse and Garage, in sediment at the ECCL Firing Range Pond East and Pond West B, or in surface water. However, the ecological risk evaluation concluded that there is a threat of unacceptable ecological exposure to soil at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and to sediment at Pond West A.

The site was surveyed for asbestos-containing material (ACM) by a certified Asbestos Hazard Evaluation Specialist to determine the presence or absence of surface ACM and ACM-impacted surface soils. Two bulk samples of suspect ACM (roofing shingle) observed on the surface of the Trap and Skeet Range and one surface soil sample were collected from the soil surface of the location of the suspect ACM materials. Results for the three samples collected were non-detect for ACM.

Basis for Removal Action

In accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), a removal action is selected when one or more of eight criteria [as listed in Section 300.415(b)(2)(i-viii) of the NCP] are satisfied. At the ECCL Firing Range, the contaminated soil at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and the contaminated sediment in Pond West A, create the site conditions that satisfy the following criteria as listed in the NCP: (1) actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants; (2) hazardous substances, pollutants, or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release; and (3) high levels of hazardous substances, pollutants, or contaminants in soils largely at or near the surface that may migrate. There is also potential for wildlife exposure to contaminated soils at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and contaminated sediment at Pond West A. Thus, the removal action objective is to minimize the risk and hazard associated with soil and sediment contamination (primarily lead and carcinogenic polycyclic aromatic hydrocarbons [cPAHs]) at specific areas within the Pistol Range (East), Pistol Range (West), Rifle Range, Trap and Skeet Range, and Pond West A exceeding residential RSLs, in order to protect human and ecological receptors. While chemical-, action-, and location-specific applicable or relevant and appropriate requirements (ARARs) are not formal requirements for removal action under the NCP, the recommended removal action will comply with such ARARs as a conservative measure.

Recommended Removal Action

The recommended removal action includes the following: (1) remove soil from the earthen backstop berm, target area, and discharge area at the Pistol Range (East) such that residential RSLs are attained for lead and antimony contamination in soil; (2) remove soil from the earthen backstop berm, target area, and discharge area at the Pistol Range (West) such that residential RSLs are attained for lead and antimony contamination in soil; (3) remove soil from the earthen backstop berm and target area at the Rifle Range such that residential RSLs are attained for lead, antimony, and cPAH contamination in soil; (4) remove soil

from the Trap and Skeet Ranges such that residential RSLs are attained for lead, antimony, arsenic, and cPAH contamination in soil; and (5) remove sediment from the southern portion of Pond West A such that residential RSLs are attained for lead contamination in sediment (see **Figures ES-1 and ES-2**). Completion of the removal action will allow potential future unrestricted reuse at the ECCL Firing Range. The removal action at the ECCL Firing Range will be conducted in a two-phased approach to efficiently attain the removal action objective. It is estimated that the removal action field activities will be completed over a duration of approximately 8 months. The estimated removal quantities include approximately 45,466 tons of soil; 624 tons of sediment; and 108 tons of construction debris.

The estimated removal quantities include portions of the soil contained in the backstop berms and range floors of the Pistol Range (East), Pistol Range (West), and Rifle Range; the discharge area of the Pistol Range (East) and Pistol Range (West); and the contaminated portion of the Trap and Skeet Ranges. The estimated sediment removal quantity only includes the southern portion of Pond West A (refusal at less than 1 ft during RSE). The construction debris is limited to the 65 concrete retaining blocks located on the northern slope of the Rifle Range backstop berm; old fencing, gates, and signage located at the Fox Road entrance to the Rifle and Pistol Ranges; and limited debris located in the Trap and Skeet Ranges. The volume estimates are based on visual and land surveys and ArcGIS mapping.

Depending on the waste characterization results, soil/sediment disposal may be conducted at a non-hazardous waste landfill such as the local Erie County Landfill or a Resource Conservation and Recovery Act (RCRA) Subtitle C Treatment and Disposal facility, such as the Envirosafe Services of Ohio, Inc. (Envirosafe) facility. If the waste characterization sampling determines the waste to be non-hazardous, it is anticipated that the excavated soil and sediment from the ECCL Firing Range will be disposed of offsite at the Erie County Landfill. If the waste characterization sampling determines the waste to be hazardous due to toxicity characteristic leaching procedure (TCLP) results, soil disposal will occur by one of two soil disposal options. Option 1 involves mixing the excavated soil/sediment with an appropriate amendment to render it non-hazardous for disposal. Following confirmation TCLP sampling to ensure that the soil waste is non-hazardous, it is anticipated that the soil will be transported offsite for disposal at the Erie County Landfill, approximately 5 miles from NASA PBS. Option 2 involves transporting the hazardous waste directly to an offsite RCRA Subtitle C facility such as the Envirosafe facility in Oregon, Ohio, approximately 60 miles from NASA PBS.

Following completion of removal activities at each range at the site, confirmation soil sampling will be conducted at the Rifle and Pistol Range target excavation locations and Trap and Skeet Ranges excavations at the ECCL Firing Range. The Trap and Skeet Ranges will be subdivided into a grid due to their very large size prior to soil removal. Discrete confirmation samples will be collected from below the total depth at each excavation area/grid (i.e., floor) and along the exterior side walls of the excavations. Samples will be collected and analyzed either for lead only, lead and other metals (antimony, arsenic, or copper), lead and PAHs, or only PAHs, depending on the preliminary remediation goals (PRGs) for each excavation area. The confirmation soil sampling will determine whether the removal action was fully successful in attaining residential RSLs. Depending on the initial confirmation results, the potential need for extending the excavation footprint will be evaluated. Due to shallow refusal (less than 1 ft) in Pond A, no confirmation sediment samples are anticipated.

Following completion of removal activities at the site, site restoration will be completed to include backfilling excavated areas with clean fill material obtained from a NASA-approved location and/or uncontaminated soil material from the firing range berms; the top 6 inches of the backfilled areas will be backfilled with clean topsoil obtained from a NASA-approved location for vegetation re-establishment. Following completion of backfilling activities, the backfilled area will be seeded with NASA-approved seed mixture, and a post-removal inspection will be conducted. Erosion controls will be removed once at

least 70% grass growth is observed during weekly inspections. A Removal Action Completion Report will be prepared to document in detail the removal activities at the ECCL Firing Range.

Removal Action Budgetary Cost Estimate

The estimated total cost for removal action and reporting under Soil Disposal Option 1 (amendment and non-hazardous waste disposal) at the ECCL Firing Range site is $8,380,099. The estimated cost for removal action and reporting under Soil Disposal Option 2 (hazardous waste disposal) is $18,335,261. The parameters, assumptions, and estimated costs to implement the proposed removal action are provided in detail later in this report.

In accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cost-estimating guidance (USEPA 1988), an order-of-magnitude cost estimate is expected to be within +50 to -30% of the actual project cost. However, a Class 3 estimate (as defined by American Society for Testing and Materials [ASTM] E2516-11, "Standard Classification for Cost Estimate Classification System") was prepared for budget authorization and to form the initial control estimate against which all actual costs and resources can be monitored. The Class 3 cost estimate presented in Appendix H involved deterministic estimating methods and a high degree of unit cost line items with an accuracy range of +20% to -10% and the inclusion of a 10% contingency for constructability, over-excavation quantities, etc. Please note that changes in the cost elements may accrue as a result of new information and data collected during the detailed planning phase of the removal action. Major changes would be documented in the form of a memorandum in the Administrative Record file for NASA PBS.

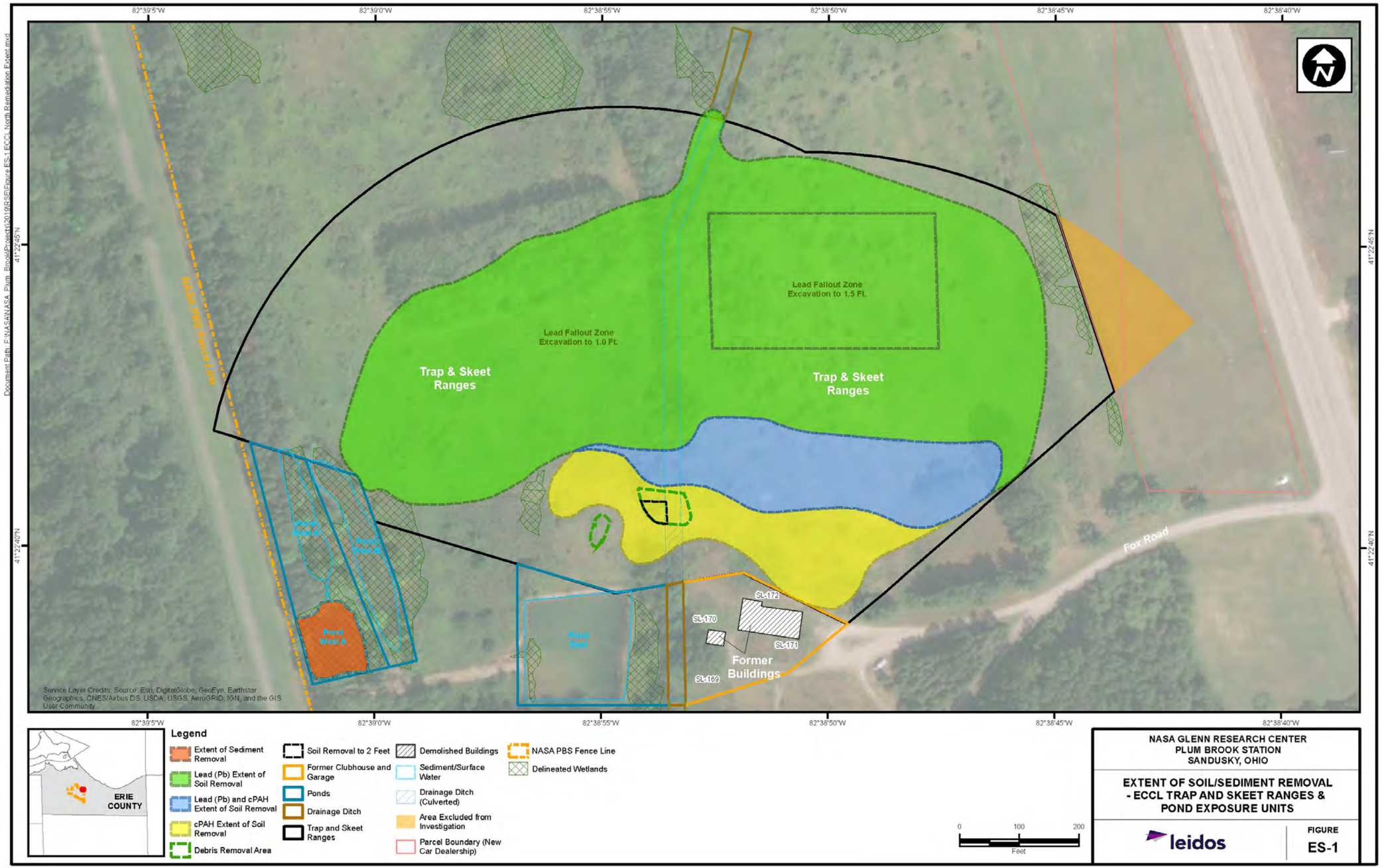

Figure ES-1. Extent of Soil/sediment Removal- ECCL Trap and Skeet Ranges and Pond Exposure Units

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Figure ES-2. Extent of Soil Removal- ECCL Rifle and Pistol Ranges Exposure Units

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1. INTRODUCTION

Leidos has prepared this Removal Site Evaluation (RSE) Report on behalf of the National Aeronautics and Space Administration (NASA) Plum Brook Station (PBS) in Sandusky, Ohio (**Figure 1**). This report summarizes RSE activities conducted at the Erie County Conservation League (ECCL) Firing Range. The scope of the RSE intends to address contamination at the entire ECCL Firing Range site.

This RSE Report presents contaminated areas at the ECCL Firing Range and a recommendation for removal. The RSE was developed in accordance with U.S. Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (Ohio EPA) guidance. Investigative activities were conducted in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [specifically the non-time critical removal process], and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). RSE activities at the ECCL Firing Range included a review of existing site information and data available in previously published reports as well as data collected during the RSE sampling event.

The remainder of this report consists of Section 2, Site Description; Section 3, Environmental Release Assessment; Section 4, Streamlined Risk Assessment; Section 5, Basis for Removal Action; and Section 6, Removal Action Objectives and Goals. Section 7 provides references used in the preparation of this RSE Report. Tables are located at the end of their respective sections and figures are located after Section 7.

This RSE Report summarizes sample data collected by Leidos in 2016 and 2019. The purpose of the RSE is to assess the potential threat to human health and the environment, and to determine if there is a need for a non-time-critical removal action (NTCRA). The objectives of the RSE are as follows:

- Identify and characterize sources of contamination at the ECCL Firing Range;
- Determine whether sources of contamination at the site pose a viable threat to human health and the environment;
- Identify the presence of potential migration pathways of contamination at the ECCL Firing Range; and
- Recommend an NTCRA at the ECCL Firing Range, if needed.

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2. SITE DESCRIPTION

The following sections provide site description information for PBS and the ECCL Firing Range, including location, site history, physical setting, land use, and related environmental setting information.

2.1 PLUM BROOK STATION DESCRIPTION

PBS is located in southern Erie County, Ohio, approximately 3 miles south of Sandusky, Ohio, and approximately 50 miles west of the NASA John H. Glenn Research Center (GRC) at Lewis Field in Cleveland, Ohio (**Figure 1**). The PBS facility encompasses approximately 6,470 acres (Leidos 2018b) and is depicted in two adjacent U.S. Geological Survey (USGS) 7.5-minute series topographic maps: Sandusky Quadrangle (northern portion of facility) and Kimball Quadrangle (southern portion of facility). Most of PBS is in Perkins and Oxford Townships, with some lands in Huron and Milan Townships. The site boundaries are Bogart Road to the north, Mason Road to the south, U.S. Highway 250 to the east, and County Road 43 to the west. The northernmost point is at latitude 41°23'39"N and the southernmost point is at 41°20'04"N. The westernmost point is at longitude 82°43'12"W and the easternmost point is at 82°38'39"W (MK 1994). **Figure 2** shows the location of NASA PBS on the USGS topographic maps (both quadrangles combined).

PBS is situated in an area known for its agricultural productivity and is bordered by farmland, some of which is leased to local farmers by NASA. The area surrounding PBS is largely rural and agricultural, with some recent development. Some food processing facilities are located in the area, including dairy and meat processing operations. Tourism and recreation are important economic influences in the Sandusky area. The Erie County Perkins School District currently uses certain former NASA facilities, located near the former PBS main gate on Columbus Avenue and outside the fenced area, for transportation and storage purposes. Intensive commercial development, consisting of highway-oriented uses (e.g., motels, restaurants, and service stations) and shopping malls, predominate immediately to the north and east along U.S. Highway 250 and its intersections with Bogart Road and State Highway 2 in Sandusky. A U.S. Army Reserve Center is situated adjacent to the southeastern corner, just off Mason Road (Leidos 2018b).

An 8-ft security fence surrounds approximately 5,845 acres of PBS (Leidos 2018b). Most of the land at PBS consists of forestland and old fields with several streams that run across the property. An estimated 75% of NASA's property at PBS is considered unused. The remaining land is used for offices, test facilities, roads, and infrastructure. Public access is restricted at PBS and access to the site is obtained through the security guard house located on East Scheid Road, newly constructed in 2016. The guard house is staffed by armed guards 24 hours per day (Leidos 2016). The former main gate located on Columbus Avenue is only open for emergency access by Perkins Township Police and Fire Departments, and exiting traffic at peak afternoon hours. During each 8-hour shift, a security guard patrols the inside perimeter road (Patrol Road) of the facility. Persons gain access to the station by showing the guard a badge that authorizes entry.

2.2 PLUM BROOK STATION HISTORY

PBS is operated as a satellite facility (or component installation) of the NASA GRC. Use of PBS by the Federal Government began in 1941 when the U.S. Army established the Plum Brook Ordnance Works (PBOW) for the manufacture of munitions and related materials, including trinitrotoluene (TNT), dinitrotoluene, and pentolite (MK 1994). The PBOW facility consisted of 9,009 acres inland, 1.35 acres for two pumping stations on Lake Erie, and approximately 700 buildings. Munitions production took place from 1941 to 1945, after which buildings and production lines were decontaminated and decommissioned. Between 1941 and 1945, it is estimated that more than one billion pounds of ordnance were manufactured.

In 1956, the National Advisory Committee for Aeronautics (NACA) [later NASA] obtained 500 acres in the northern portion of the site for construction of a nuclear test reactor (MK 1994). This reactor was the first of 15 test facilities eventually constructed and operated by NASA during the period from 1958 to 1973. Between 1958 and 1960, NASA demolished hundreds of buildings, renovated approximately 41 buildings, and utilized 99 magazines (Gray & Pape 2008). In 1963, NASA acquired an additional 6,000 acres of the PBOW and took control over what is now referred to as PBS (MK 1994). From 1967 through 1971, NASA purchased approximately 2,000 acres outside of the fence line from local farmers as "buffer."

On April 18, 1978, NASA declared approximately 2,152 acres of PBS as excess. This excess included approximately 1,500 acres outside the fence and was sold as farmland (Leidos 2018b). The 46 acres outside of the fence in the northeastern corner of the PBS facility near the former main gate guard house on Columbus Avenue were conveyed to the Perkins Township Board of Education for use as a bus transportation area. In addition, the 2,152 acres of PBS declared as excess included a 604-acre parcel in the western part of the fenced area known as "Parcel 59." This area, although declared excess, was not transferred and remains under NASA control. Three additional parcels have since transferred, including Parcel 4 (3.0951 acres) in March 2016, Parcel 63 (Former Taylor Road Wastewater Treatment Plant, 11.5 acres) in June 2016, and Rye Beach Pump Station (1.35 acres) in December 2014 (Leidos 2018b). According to the Environmental Resources Document (Leidos 2018b), NASA presently controls approximately 6,740 acres; this included approximately 5,845 acres within the fence line and 895 acres outside of the fence, which were leased for agriculture.

At present, NASA operates PBS as a space research facility in support of the GRC. Most of the aerospace testing facilities built in the 1960s at PBS have been demolished, or are currently on standby or inactive status. Additional tenants at PBS include the U.S. Department of Agriculture (USDA), the U.S. Department of the Interior, the Federal Bureau of Investigation, and the Ohio Air National Guard. Additional details regarding the site history are presented in the *Preliminary Assessment/Visual Site Inspection Report for NASA Plum Brook Station* (PA/VSI; Tech Law 1998).

2.3 ECCL FIRING RANGE DESCRIPTION

ECCL leased approximately 57 acres of land from NASA on the eastern side of PBS at the intersection of U.S. Highway 250 and Fox Road, south of Sandusky, Ohio. The ECCL facility is not located within the 8-ft security fence; however, a perimeter fence was installed in February 2019 to restrict public access. The ECCL facility is currently an inactive firing range. The facility was thought to have closed on or about August 18, 2007 (SAIC 2010). **Figure 3** shows the location of the ECCL Firing Range.

According to the 2010 Preliminary Assessment (PA) [SAIC 2010], the ECCL facility included the following:

- A club house and adjacent garage;
- Three trap and two skeet fields;
- A 25-yard pistol range (east);
- A 50-yard pistol and rifle range (west);
- A high-power rifle range with firing benches at 100 and 200 yards, respectively; and
- An archery range and elevated archery stand.

A 250-gallon aboveground diesel storage tank was located on a concrete pad near the garage for fueling maintenance equipment; no leaks or spills have been reported. There is no documentation for the tank removal. A shallow, man-made pond (approximately 2 to 3 ft deep and approximately 10,000 square feet

[ft^2]) is south-southwest of the Trap and Skeet Ranges, approximately 275 ft west of the former ECCL club house (SAIC 2010).

The pistol/rifle ranges consisted of a firing stand, an earthen mound backstop (to contain bullets and fragments), and side berms (to contain ricochets). The trap range consisted of five shooting positions and one structure, the "traphouse," from which the targets are thrown by a machine called a "trap." Shooting positions at the skeet ranges are arranged along an arc between two structures, the "high house" and the "low house," where targets are released. All firearms were discharged to the north. Trees and bushes are located at various places along the northern and western sides of the range and along the drainage ditch. Access to the pistol and rifle ranges was restricted to range members only through fencing. A locked gate and some adjacent fencing remain at the southern access road; however, current access to other sides of the ranges is not restricted to the public. Access to the skeet and trap ranges was formerly open (no fencing).

Ammunition fired at the ECCL facility includes standard ball shot (<#6) and jacket ammunition (<0 caliber). Clay targets (e.g., White Flyer® Standard AA Pitch Trap/Skeet Target) were historically used at the Trap and Skeet Range; however, biodegradable "E-birds" have been used since approximately 2002 (SAIC 2010).

According to the 2010 PA, it is believed that reclamation of lead-impacted soils was conducted at the firing range in approximately 2000; however, no documentation of this removal activity is available (SAIC 2010). A relatively recent change in site conditions was identified during the Site Investigation (SI) Sampling and Analysis Plan (SAP) review of aerial photographs of the property. A historical aerial photograph from 2010 indicates soil excavation activities were conducted at the rifle range sometime after 2006. Activities included removal of shallow soil from the range floor and the entire western lateral berm. Structures previously located at the Trap and Skeet Ranges also were removed sometime between 2006 and 2010 (SAIC 2011). The club house and garage were demolished sometime between July 2012 and October 2015, based on review of more recent aerial photographs (Leidos 2019a). However, no documentation of these removal activities is available.

A car dealership was constructed in 2016 on the two adjacent parcels between the ECCL site and U.S. Highway 250 (Leidos 2018a).

The ECCL trap and skeet fields are currently composed of a mixture of open flat, grassy areas and areas of heavy shrub/scrub vegetation, with some mixed deciduous forest around the northern and southern drainage ditches and western ponds, in the northern portion of the trap range and eastern portion of the range. The rifle/pistol ranges are surrounded by earthen berms (mostly shale bedrock), which are vegetated with weeds and shrub/scrub vegetation and grassy areas on the pistol range floors. The rifle range floor is currently exposed, weathered shale bedrock from previous excavation activities and several areas covered with *Rosa multiflora* (Multiflora rose).

Current site photographs of the ECCL Firing Range are included as **Appendix A**.

2.4 ENVIRONMENTAL SETTING

The following sections summarize the environmental setting for PBS, including climate, topography, water resources, hydrology, geology, soil, and demographics.

2.4.1 Climate

At PBS, the climate is continental in character and influenced by proximity to Lake Erie, which is approximately 6 kilometers (km) [4 miles] to the north. Summers are moderately warm and humid with temperatures occasionally exceeding 32 degrees Celsius (ºC) [90 degrees Fahrenheit (ºF)]. Winters are cold and cloudy with temperatures falling below -18ºC (0ºF) an average of 5 days per year. Annual temperature extremes typically occur after late June and in January. First frost typically occurs in October.

Based on long-term statewide weather records, Ohio receives an average of 38 inches of precipitation per year. Of these, about 10 inches (26%) become runoff, which moves immediately to surface water bodies like streams and lakes. Twenty-six of the 38 total inches enter the soil surface through infiltration. Twenty of these 26 inches go into soil storage and later are returned to the atmosphere by the combination of evaporation and transpiration (Ohio State University 2013). Accordingly, the Ohio Department of Natural Resources (ODNR) estimates average annual water loss for the area, which includes PBS, to be between 22 and 23 inches (Harstine 1991). The 2-year, 24-hour rain event was estimated at 6.4 centimeters (2.5 inches) for the part of the United States containing Erie County (USDA 1963). Daily high and low temperatures and precipitation data are published in a Cooperative Data Report for this location. More detailed climatological data for PBS can be obtained from the National Weather Service, which utilizes climate normal for the Cleveland, Ohio, weather station at Cleveland Hopkins International Airport (less than 50 miles east of PBS). **Table 2-1** provides a climate data summary for Cleveland, Ohio, based on data obtained from the National Weather Service at http://www.weather.gov/cle/CLENormals.

The predominant wind direction is south to southwest throughout the year. Wind direction was measured via an onsite wind monitoring tower in 2008 (Green Energy Ohio 2009).

2.4.2 Topography

PBS is situated on land that was once a lake bottom formed from glacial melt waters. The area is relatively flat and slopes gently northward. The average slope of the land is less than 6%. Topographic relief across NASA PBS is approximately 50 ft, with higher elevations (±675 ft above mean sea level [AMSL]) present along the south-southwestern facility boundary and lower elevations (±625 ft AMSL) present along the northern facility boundary (MK 1994). The lowest ground surface elevations at NASA PBS are associated with the two primary surface water drainage features: Plum Brook (north central portion of facility) and Pipe Creek (northwestern portion of facility). The general topography of PBS and the surrounding area is shown in **Figure 4**. The color shading in the figure is generated from 3-meter accurate Digital Elevation Model data obtained from the USDA. Elevation data are represented in feet AMSL.

The topography at the ECCL Firing Range is relatively flat, with the exception of the firing range impact berms. Section 2.3 provides a description of the firing range impact berms.

2.4.3 Wetlands and Waterways

Erie County drains northward into Lake Erie. Seventeen distinct watershed areas are in the county. The primary watersheds include Mills Creek and Pipe Creek to the west, the Huron River in the central part of the county, Old Woman Creek in the east-central part of the county, and the Vermilion River on the eastern edge of the county. The other watersheds are drained by small creeks (USDA 2006).

A total of 11 streams pass through or originate at PBS and converge into Ransom Brook, Storrs-Hemminger Ditch, Plum Brook, or Sawmill Creek – all of which flow to the north and Lake Erie (MK 1994). Overland drainage from the ECCL facility generally flows north to Dautch Ditch. In addition, the firing ranges are underlain with drain tile, which conveys drainage from the site to Dautch Ditch (SAIC 2010). Dautch Ditch

is an ephemeral canal/drainage ditch that originates onsite and flows approximately 2.5 miles northeast before merging with Sawmill Creek, which flows approximately 2 additional miles northeast and drains into Lake Erie. The Huron River and its branches, located approximately 3.5 miles east of the ECCL facility, are the major streams in the vicinity of the site. **Figure 5** illustrates the primary surface water drainage features at PBS. The ECCL Firing Range is not within a 100-year floodplain.

In 2011 and 2012, comprehensive wetlands and waterways delineations were conducted at PBS, including the ECCL Firing Range site. The wetland delineations were completed in accordance with methods described in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012). Results of the delineations were presented in the *Wetlands and Other Waters Delineation Report* (EnviroScience 2012). Wetlands also were categorized using version 5 of the Ohio Rapid Assessment Method (ORAM) for Wetlands.

According to the *Wetlands and Other Waters Delineation Report*, a total of 421.958 acres of waterways and wetlands were delineated within PBS, including 1,050 wetlands; 373 waterways totaling 308,726 linear feet [LF]; and 15 ponds totaling 14.908 acres (EnviroScience 2012). The 2012 delineated wetland boundaries and ORAM quality scores were not been verified by the U.S. Army Corps of Engineers (USACE) or Ohio EPA, respectively. Prior to the start of any project that may disturb protected waters, boundaries and quality scores must be verified by the above agencies, and corresponding permits and approvals must be authorized by USACE and/or Ohio EPA before the activity can commence.

Four ponds are located within the ECCL Firing Range site (EnviroScience 2012). Three are shallow wetlands (approximately 2 to 2.5 ft in depth) on the western portion of the site classified as palustrine emergent (non-tidal wetlands dominated by erect, rooted, herbaceous vegetation). One deeper pond (currently 2.5 to 5 ft in depth and approximately 10,000 ft^2) is located south-southwest of the Trap and Skeet Ranges and is classified as pond habitat. The deeper pond was man-made during the construction of the firing range berms. A wetland delineation survey of the ECCL Firing Range site was completed in July 2019 under Task 8, to verify wetland boundaries within the ECCL Firing Range site. Results of the wetland delineation survey were reported in the October 24, 2019, *Final Wetland and Other Waters Delineation Report* (EnviroScience 2019) and summarized in Section 3.2.2. Twelve wetlands were identified within the study area, accounting for approximately 4.357 acres of wetland onsite. The 2019 delineation survey verified the boundaries of the four ponds previously delineated. Additional wetlands were identified within the ECCL Firing Range perimeter fence; however, none of the wetlands are located within the proposed removal extents shown on **Figures 15 through 18**. A preliminary jurisdictional determination was requested by NASA for the USACE to verify wetland boundaries if further excavation is needed during the removal action.

2.4.4 Soil

PBS is situated in the Ohio Lake Plain physiographic region. The soil is light-textured and often sandy with moderate to slightly acid pH. Four general soil type units are present according to USDA mapping conducted in 2006 for the Erie County Soil Survey (USDA 2006). These four general soil types are Pewamo-Bennington, Hornell-Fries-Colwood, Milton-Millsdale-Castalia, and Kibbie-Colwood-Elnora. The general distribution of soil types present at PBS is illustrated in **Figure 6**.

Pewamo-Bennington soil can be found in the southeastern tip of PBS, Hornell-Fries-Colwood soil is located in the south-middle section of the station, Milton-Millsdale-Castalia soil can be found south of Taylor Road, and Kibbie-Colwood-Elnora soil makes up the western and northern sections of PBS.

Pewamo-Bennington soil is very deep, level to gently sloping, very poorly drained, and somewhat poorly drained soil that formed in till or in lacustrine deposits and till. Hornell-Fries-Colwood soil is moderately deep and deep, level to gently sloping, somewhat poorly drained to very poorly drained soil formed in till or lacustrine deposits overlying shale. Milton-Millsdale-Castalia soil is moderately deep, level to moderately steep, very poorly drained and well-drained soil that formed in till, lacustrine deposits, and residuum derived from limestone or dolostone, or in beach or eolian deposits intermixed with limestone fragments overlying limestone or dolostone. Kibbie-Colwood-Elnora soil is very deep, level to gently sloping, moderately well drained to very poorly drained soil that formed in lacustrine deposits or glaciofluvial deposits.

The thickness and composition of glacial till vary widely within Erie County. Soil formation in the till is generally only a few feet thick. Where these till layers were very thin or eroded away, soil formed in older, harder till. The clay content of the till is highest near Lake Erie and lowest near bedrock areas where glacial ice sheets eroded and transported some of the coarser local material (USDA 2006).

Soil at the ECCL Firing Range consists primarily of sandy clays, silty clays, and sand/silt mixtures underlain by shale bedrock. Surface soil (up to 1 ft below ground surface [bgs]) generally consists of silty sand. In areas of heavier vegetation, the silty sand is combined with organic rich topsoil. At depths greater than 1 ft bgs, the soil consists of a variety of silty clays, sandy clays, and sand/silt mixtures that overlay weathered shale bedrock. Weathered shale, when encountered, is observed at depths ranging from approximately 2 to 4 ft bgs with varying thickness across the site. Competent shale bedrock, when encountered, was documented to occur most often between 2.5 and 5 ft bgs; however, bedrock also was encountered at less than 1 ft bgs within portions of the ECCL Rifle Range area based on the boring logs presented in **Appendix B**.

2.4.5 Geology and Hydrogeology

The bedrock in northern Ohio consists of Devonian and Silurian age carbonates (limestone and dolomite) and clastics (shale, siltstone, and sandstone) [USDA 2006]. These units uncomformably overlie older sedimentary sequences of Ordovician and Cambrian age rocks, which in turn uncomformably overlie pre-Cambrian basement rocks. PBS is situated along the eastern flank of the Findlay Arch, where bedrock dips gently to the east. The bedrock formations become progressively younger from west to east. Depth to the bedrock at PBS varies from 0.7 to 7.6 meters (2 to 25 ft) with scattered bedrock outcrops.

The four Devonian age formations that comprise the upper bedrock surface across PBS, from youngest to oldest, include:

- Ohio Shale (black, thin-bedded with bituminous and carbonaceous material);
- Plum Brook Shale/Prout Limestone (light gray, calcareous);
- Delaware Limestone (buff, earthy, fossiliferous, interbedded with brown crystalline dolomite); and
- Columbus Limestone (brown to gray, fine crystalline, fossiliferous, with tan to buff gray sandy dolomite at base).

The Columbus and Delaware Limestone Formations are the upper bedrock surface in the northern and western portions of PBS, and the Plum Brook Shale/Prout Limestone and Ohio Shale Formations are the upper bedrock surface in the eastern and southern portions (MK 1994). The Ohio Shale Formations occur in the eastern portion of PBS and are assumed to be representative of the bedrock formation in the vicinity of the ECCL facility. **Figure 7** presents the bedrock geology and **Figure 8** presents the bedrock topography at PBS. Bedrock at the ECCL Firing Range consists of the Ohio Shale and was encountered at depths ranging from less than 1 to 5 ft bgs, as presented in the boring logs included in **Appendix B**.

Regional groundwater flow is to the north-northeast toward Lake Erie. Local groundwater flow generally follows regional flow with local variations due to topography. Groundwater in the limestone formations typically occurs in joints and along bedding planes, and in karst-solution features. Aquifer yields vary from up to 1,893 liters per minute (Lpm) [500 gallons per minute (gpm)] in limestone to 38 Lpm (10 gpm) or less in unconsolidated materials (IT 2002). **Figure 9** illustrates the general bedrock groundwater potentiometric surface across the NASA PBS facility based on 2008 data obtained from ODNR.

At PBS, the groundwater has been divided into three zones based on location and yield. Zone 1 occurs in the northern and northwestern portions of the station. It has been characterized as yielding from 379 to 1,893 Lpm (100 to 500 gpm) from karstic limestone approximately 30 meters (100 ft) below grade. Zone 2 is in the northern portion of PBS and has yields of 57 Lpm (15 gpm) or less from limestone approximately 91 meters (300 ft) below grade. Zone 3, where the ECCL Firing Range is located, is located in the eastern and southern portions of the site in predominantly shale bedrock. In addition to being found in the shale, groundwater is located in thin sand and gravel horizons interbedded with silt and clay deposits. Most Zone 3 wells are poor yielding, many of them providing less than 11 Lpm (3 gpm) [Shaw 2008]. Twelve temporary monitoring wells were installed at the ECCL Firing Range in August 2019; 10 of the 12 wells did not yield groundwater, and the 2 wells that did yield groundwater (MW-9 and MW-12) were poor yielding, as presented in the well development records in **Appendix B**.

The two main water-bearing zones at PBS are the overburden and the bedrock. Recent groundwater investigations conducted by USACE determined that groundwater in the overburden occurs in discontinuous pockets during dry time periods. During these periods of low precipitation, only limited contaminant migration occurs due to less infiltration. During wetter periods, the general groundwater flow direction in the overburden is to the north-northeast, largely mirroring surface topography. The flow also corresponds somewhat to the topography of the top of the bedrock. In contrast, the bedrock water-bearing zone is saturated year round and flow occurs through secondary porosity (i.e., fractures). The rate of groundwater flow in the bedrock is controlled by the frequency, orientation, density, and connectivity of the fractures.

2.4.6 Water Resources

The Erie County Health Department does not allow the use of surface water (e.g., river, stream, creek, drainage ditch) for a private drinking water system, in accordance with Ohio Administrative Code (OAC) 3701-28; however, a pond, spring, or cistern tank could be used as a source for a private water system. The majority of residents of Erie County receive water from public utilities whose primary sources are surface water (Shaw 2008). The Erie County Water System provides safe drinking water to more than 9,000 homes and businesses throughout Erie County. All of the water that is distributed is purchased from the cities of Sandusky, Huron, and Vermilion, and Northern Ohio Rural Water, which have their own facilities for treating water from Lake Erie. Erie County then distributes the water through a network of 12 pump stations; 11 water towers; 1,000 valves; and 200 miles of 4- to 16-inch water mains (Erie County Water Division 2018). Erie County's primary groundwater source is the limestone and dolomite aquifer found in the western end of the county (Shaw 2008). Groundwater wells in the central and eastern portions of the county tap lower-yielding shale and sandy zones in the overburden (IT 2002).

Potable water used at the former ECCL facility was supplied by the City of Sandusky (SAIC 2010). Residences to the north and east of PBS are connected to city, county, or rural services. A few wells within the vicinity of PBS were determined to be used for private and public consumption; however, none within the facility boundary are used (Shaw 2008). Six known private wells are located within 1 mile downgradient from PBS. The nearest known downgradient private well is approximately 256 meters (840 ft) northeast of the facility boundary. Owners of five of these wells agreed to participate in a well survey and sampling event conducted by USACE in September 2003. The survey found that none of these

five wells were being used as a source of drinking water during this time. Three of the wells were being used for watering lawns and gardens, one was being used to irrigate an herb farm, and the remaining well was not used for any purpose (Shaw 2008).

Groundwater at PBS is not used as a potable water source. Groundwater investigations were conducted by USACE and NASA on a site-by-site basis at areas of concern (AOCs) throughout PBS. Approximately 187 monitoring wells have been installed by USACE. Temporary monitoring wells were installed at the ECCL Firing Range in August 2019 and abandoned at the completion of groundwater sampling. The 2006 Baseline Human Health Risk Assessment of Groundwater indicated that naturally occurring constituents (petroleum hydrocarbons, hydrogen sulfide, and total dissolved solids) in groundwater were of a higher risk than TNT contaminants associated with past Department of Defense activities (Shaw 2006); therefore, USACE completed the Groundwater Remedial Investigation/Feasibility Study with a No Further Action (NFA) Decision Document. Ohio EPA did not concur with the NFA Decision Document (Covering TNT Areas and Red Water Ponds Areas) and stated the contamination from Department of Defense-related activities posed an unacceptable risk, requiring a mechanism to prohibit the use of groundwater (Ohio EPA 2015). Between 2014 and 2015, 122 monitoring wells were abandoned by USACE (CB&I 2014; CB&I 2015). At the time of this report, NASA is working toward adding land use instruction that limits the use of groundwater in the future.

2.4.7 Biotic Resources

Much of the information in this section was taken from the 2002 and 2017 *Protected Species Management Strategy for NASA GRC at Lewis Field and Plum Brook Station* (ODNR 2002, EnviroScience 2017) and the *Biological Inventory of Plum Brook Station* (ODNR 1995). The PBS site is part of a regional ecosystem encompassing Sandusky, parts of Lake Erie, and several Lake Erie Islands. The threatened and endangered species present at PBS during the 2016 survey are listed in **Figure 10**.

2.4.7.1 Flora

The ODNR Division of Natural Areas and Preserves (DNAP) conducted a botanical survey of PBS in 1994. During that survey, 327 species of vascular plants were cataloged, of which 12 were listed by DNAP as Ohio rare species. In 2001, DNAP conducted a follow-up survey in which 312 of the species found in 1994 were identified and 219 new additions were made. During the 2016 field survey, all plant communities previously described throughout 2001 were updated or confirmed to reflect their present ecological condition. PBS occupies an area that is known to have been an extensive prairie complex prior to the European settlement of the area. Many species that are associated with Ohio prairies were located during both surveys.

Using data obtained from the 2001 Science Applications International Corporation (SAIC) surveys (ODNR 2002) and 2012 wetland delineation (EnviroScience 2012), all plant communities, including wetlands plant communities, were classified according to the Federal Geographic Data Committee (FGDC) Vegetation Classification Standard (FGDC 1997). The following 12 formations and 13 alliances were identified at PBS during the 2016 survey:

- Forest Formations
  - Formation: I.A.8.N.c. Conical-crowned temperate or subpolar needle-leaved evergreen forest
  - Formation: I.B.2.C.b. Orchards and groves (fruit and nut trees)
  - Formation: I.B.2.N.a. Lowland or submontane cold-deciduous forest
    - *Mixed (oak-dominated) deciduous successional forest*
    - *Mesic, mixed deciduous successional forest*
    - *Mixed deciduous successional forest*

        - *Populus deltoides successional forest*
    - Formation: I.B.2.N.e. Seasonally flooded cold-deciduous forest – successional communities
        - Mixed cold-deciduous seasonally flooded forest
    - Formation: I.B.2.N.e. Seasonally flooded cold-deciduous forest – successional communities
        - Mixed cold-deciduous seasonally flooded forest
    - Formation: II.B.2.N.e. Seasonally flooded cold-deciduous woodland – successional communities
        - Mixed cold-deciduous seasonally flooded woodland

- Shrubland Formations
    - Formation: III.B.2.N.b. Temperate cold-deciduous shrubland – successional communities
        - Dry mid-successional cold-deciduous shrubland
        - Dry late-successional cold-deciduous shrubland
    - Formation: III.B.2.N.c. Intermittently flooded cold-deciduous shrubland
        - Intermittently flooded mid-successional cold-deciduous shrubland
        - Intermittently flooded late-successional cold-deciduous shrubland

- Herbaceous Vegetation Formations
    - Formation: V.A.5.C.b. Landscaped urban/suburban/rural (residential yards, nurseries)
        - Landscaped/maintained grounds surrounding buildings
    - Formation: V.A.5.N.c. Medium-tall sod temperate or subpolar grassland
        - Maintained grassland
    - Formation: V.B.2.N.a. Tall temperate or subpolar perennial forb vegetation – successional community
        - Dry early successional herbaceous field
    - Formation: V.B.2.N.c. Intermittently flooded temperate perennial forb vegetation – successional community
        - Intermittently flooded early successional herbaceous field
    - Formation: V.C.2.N.a. Permanently flooded temperate or subpolar hydromorphic rooted vegetation
        - *Nelumbo lutea* permanently flooded herbaceous community.

Six vegetative communities were identified in the ECCL Firing Range that include four upland communities (open field, barren, scrub-shrub, and forest) and two wetlands communities (Palustrine Emergent [PEM] and Palustrine Scrub-Shrub [PSS]) [EnviroScience 2019].

The 2001 biological survey reported 20 species of rare vascular plants at PBS. Four of these, thin-leaf sedge (*Carex cephaloidea*), short's hedge-hyssop (*Gratiola virginiana*), rough rattlesnake root (*Nabalus aspera*), and grove sandwort (*Moehringia lateriflora*), could not be relocated in 2016. Grove sandwort was not found in 2001, although the species was reported from a 1994 survey. Six species listed in 2001 are no longer on the state list. Two of these species, shortbeak sedge (*Carex brevior*) and Nottoway Valley brome (*Bromus nottowayanus*), were listed as "added" in 2001; northern panicgrass (*Panicum boreale*) and Blue Ridge carrionflower (*Smilax herbacea var. lasioneura*) were listed as threatened; and large St. John's wort (*Hypericum majus*) and butternut (*Juglans cinerea*) were listed as potentially threatened. In 2016, five new state rare species were discovered. One of these new species was bayberry (*Myrica pennsylvanica*), which had been noted in 2014 during a different survey. The nativity of this species has been debated. Many new populations of already known rare plants also were discovered in 2016. The results of this survey demonstrate that PBS is one of the most important refuges for rare plant species and prairie remnants in northern Ohio (EnviroScience 2017). **Table 2-2** lists the flora documented at PBS from 1994 to 2016. The 2016 survey findings for listed species are summarized below:

- No federally listed plant species were found on NASA PBS in 2016.
- State-endangered plant species found included *Hypericum gymnanthum* and *Myrica pennsylvanica*.
- State-threatened plant species found included *Dichanthelium lindheimeri*, *Euthamia remota*, *Helianthus mollis*, *Juncus greenei*, and *Solidago speciosa* var. *speciosa*.
- State potentially threatened species found included *Aristida purpurascens*, *Baptisia lactea*, *Carex alata*, *Gentianopsis crinita*, *Hedeoma hispidum*, *Rhexia virginica*, *Sagittaria rigida*, *Scleria triglomerata*, and *Viola lanceolata*.

The 2019 wetland delineation survey at ECCL indicated the wetland (W-07-028) contained populations of two plant species listed as potentially threatened in the state of Ohio: Virginia meadow-beauty (handsome-Harry; *Rhexia virginica*) and bog white violet (*Viola lanceolata*), located along the eastern edge of the eastern pond (EnviroScience 2019).

2.4.7.2 Fauna

Animals inventoried at PBS during the 2001 and 2016 surveys for the *Protected Species Management Strategy* included birds, amphibians, reptiles, fish, lepidoptera, and bats. A total of 125 bird species were identified during the 2001 summer birding season, including 11 species that were considered to be late migrants through the area and 7 species that were classified as visitors only. A general analysis of the results indicates very little change in the species diversity on the station since the 1994 surveys conducted for the Biological Inventory of PBS (ODNR 2002). The birds identified in the 2016 survey were very similar to those found in 1994 and 2001. A total of 120 species were identified of which 6 were considered visitors and 11 were classified as migrants (EnviroScience 2017).

In 2001, amphibians and/or reptiles were recorded from 116 localities in PBS. Animals were no longer found at 15 localities from 1994, but animals were found at 29 new locations. Twenty-one species have been found, including two salamanders, six frogs, one lizard, five turtles, and seven snakes. Two new native species, the milk snake and blue-tail skink, were found as well as an introduced species, the red-eared slider. The gray tree frog has been deleted from the list. In addition, the area lies within the range of 19 other species, and it is possible that one or more of these may yet be discovered here (ODNR 2002). The 2016 survey detected a total of 20 species at over 200 localities. The species include two salamanders, seven frog species, four turtle species, and seven snake species. Of those 20 species, two are listed as species of concern, and one, the *Opheodrys vernalis (Smooth Greensnake)*, is endangered (EnviroScience 2017).

During the fish survey conducted in support of the 1995 Biological Inventory of PBS, 3,028 individuals, representing 13 species and 1 hybrid, were collected, compared to 2,156 individuals, representing 15 species and 1 hybrid, which were collected in 2001. The small, intermittent nature of the streams in the study area, coupled with extensive channel modifications and habitat degradations, has resulted in lower species diversity than would be found in more pristine headwater streams of similar size. With the exception of the brook stickleback, all of the species captured in this study were common species statewide, exhibiting high degrees of tolerance to habitat and water quality degradations. A small population of sticklebacks was discovered in a small, shallow pool below a culvert in one of the tributary ditches feeding into Pipe Creek in 1993. This population was still there in 2001 (ODNR 2002), but they were no longer detected in 2016. The 2017 report confirmed the low fish diversity reported in the 1994 and 2001 reports (EnviroScience 2017).

In a 1994 summer survey of PBS, 41 species of butterflies were recorded. During the summer of 2001, 53 species of butterflies were recorded. Three species observed in 1994 were not seen in 2001. However, 14 species not recorded in 1994 were found in 2001. As of 2001, the surveys conducted that year raised

the number of species recorded from Erie County from 59 to 70 (ODNR 2002). The 2016 survey recorded 45 butterfly species, none of which were listed as federally or state-listed rare, threatened, or endangered species. There were 14 species recorded in either 1994 or 2001 that were not seen in 2016, and there were three new species recorded in 2016 (EnviroScience 2017).

After an extensive survey of PBS during the summer of 2001, a total of 450 species of moths were recorded. A previous survey in 1994 recorded 385 species of moths. At the time of the 2001 moth survey, six species were listed as uncommon, three species were rare, and three species were of special interest. One species on ODNR's Ohio Endangered Wildlife List was recorded (ODNR 2002). The 2016 survey detected 455 species of moths of which 332 had been previously detected and 123 were new to the facility. No federally or state-listed rare, threatened, or endangered species were identified during the 2016 survey (EnviroScience 2017).

Distribution, diversity, and relative abundance of the Chiropterans (bats) at PBS were studied from April through September 2001. Methodology included visual and acoustical surveying of the grounds and buildings; the mist netting of wooded, riparian, and open sites; and radio tracking of selected bats within the station. Eight species of bats totaling 238 were captured at 17 of the 21 mist net sites at PBS. No evidence of the Indiana bat was found in 2001. Several maternity colonies utilized by three different species were located (ODNR 2002).

In 2010 and 2012, additional bat mist netting surveys were conducted. In 2010, bats were captured at each of four mist net sites, with a total of five species of bats recorded. The results of this survey were found to be qualitatively similar to the more extensive mist netting survey conducted in 2001 (West 2010) and described above. In 2012, bat mist netting was conducted at eight sites on PBS; a total of six bat species were captured during the mist netting effort. Acoustic detection of bat calls also was used during the 2012 bat survey. Like the 2010 bat survey, the results of the 2012 survey were found to be very similar to those of the 2011 bat mist netting survey conducted at PBS (West 2012). Consultations with the ODNR Division of Wildlife (DOW) in November 2018 and with the United States Fish and Wildlife Service (USFWS) in February 2019 indicated the project is within the vicinity of records for the Indiana bat (*Myotis sodalis*), a state endangered and federally endangered species. Presence of the Indiana bat has been established in the area, and therefore additional summer surveys would not constitute presence/absence in the area (USFWS 2019). If suitable habitat occurs within the project area and trees must be cut, the DOW recommended cutting (i.e., live trees and/or snags ≥3 inches diameter at breast height (dbh) occur between October 1 and March 31.

In 2009 and 2010, various bird surveys were conducted onsite by USDA's Wildlife Services and National Wildlife Research Center (Seamans et al. 2011). As part of this effort, passerine and diurnal raptors were surveyed during their fall (2009) and spring (2010) migratory periods. In the fall of 2009, 40 species of passerines and 10 species of diurnal raptors were identified. In the spring of 2010, 51 species of passerines and 13 species of diurnal raptors were identified. In addition, in 2010, USDA conducted a breeding bird survey, which found 54 species of such birds at PBS (Seamans et al. 2011).

In 2012, a survey for a candidate species for the Federal endangered (FE) species list, the Eastern Massasauga rattlesnake (*Sistrurus catenatus*), was conducted. The survey sites chosen for this effort were specific to the habitat requirements of the Eastern Massasauga, so the survey could not be considered a comprehensive snake or reptile survey. However, although no Eastern Massasauga rattlesnakes were found onsite, three species of snakes were recorded during the survey (Lipps 2012).

In 2017, a bee survey was completed in a milkweed field and the adjacent abandoned prairie at the intersection of Taylor and Maintenance Roads. The results identified eight known species of bees. There were also 18 bees whose species could not be identified (Eppig 2018).

As of 2007, the bald eagle is no longer included on the Federal or State of Ohio threatened and endangered species lists; however, eagles still receive Federal protection under the Bald and Golden Eagle Protection Act of 1940. As of December 2019, a bald eagle nest remains active near the site of the original 2002 nest southwest of the former K-Site facility (off Ransom Road). From 2012 to 2013, a 12-month bald eagle point count survey was conducted at PBS in support of the National Environmental Policy Act (NEPA) planning process for a proposed wind farm onsite (Leidos 2018b). A suspected second active nest is located near the magazines (Building No. 9189).

A site-wide species survey occurred at PBS in the fall of 2016 (EnviroScience 2017). The *Final Protected Species Management Strategy for NASA Glenn Research Center at Lewis Field and Plum Brook Station, Volumes I–III* (EnviroScience 2017) is an update to the original 2002 report (ODNR 2002). Three federally listed species have been recorded to occur at PBS, but only one was noted in the 2016 surveys. In addition, 5 state endangered, 3 state threatened, and 21 state species of interest or concern have been noted since 1994 (EnviroScience 2017). However, no rare or endangered species were observed at the ECCL Firing Range (EnviroScience 2019). **Table 2-2** lists the fauna and flora documented at PBS from 1994 to 2016.

2.4.7.3 Unique and Important Habitats

PBS contains vast natural resources in the form of a complex mosaic of plant communities in various successional stages and hydrologic regimes. Much of PBS is undeveloped natural areas or recovering natural areas previously used for agriculture. The size and diversity of natural habitats at PBS support a large number of plant and animal species (ODNR 1995, 2002; EnviroScience 2017). Many of these areas contain rare plants species and rare plant communities, including rare prairie species and remnant oak savannas (EnviroScience 2017).

At PBS, eight core sites containing areas of special vegetation significance were identified as priority areas for management in Volume III of the *Protected Species Management Plan* (NASA 2007; EnviroScience 2017). These include specific sites with identified populations of rare or state-listed plant species as of the species surveys conducted in 2001 in support of the *Protected Species Management Plan*. The 2017 report, based on 2016 survey efforts, is an update to that original report. These core sites can be small and local, or somewhat extensive in area, but in all cases their distinguishing characteristic is they support a growth of rare plants or can be restored to a condition that supports rare plants. The loss of the most important sites likely would mean the irretrievable loss of the local rare plants, many of which are exceptionally rare or state-listed and found nowhere else in the region or state (Leidos 2016).

In response to the management recommendations put forth in the *Protected Species Management Plan*, the PBS Species Management Plan (SMP) was created in 2007 (NASA 2007). The SMP discusses current management goals, as well as targets for 1, 2, 5, and 10 years into the future, based on data from the *Protected Species Management Plan* and additional recommendations from environmental personnel. The goals outlined in the SMP are updated every fiscal year (FY) as a series of specific objectives and targets that measure compliance with GRC's Environmental Management System (EMS) metrics for stewardship for natural resources at PBS (NASA 2012b). As of FY 2019, PBS has been in compliance with EMS targets for species management (Leidos 2018b).

Most listed species found at PBS were plants, and these species are typically associated with the prairie areas at the site. Some species depend on an intermediate disturbance regime to prevent them from being outcompeted and overshaded by more aggressive species. Therefore, to maintain and improve populations of rare species at PBS, maintaining an intermediate disturbance regime is key. Essentially, this includes mowing, brush hogging, tree clearing, and burning activities that should be limited to early spring or late fall to avoid impacts to listed species, such as nesting birds, roosting bats, rare plants, or reptiles and amphibians. Stream restoration at PBS could consist of reattaching the streams to their floodplains to allow

for better processing of nutrients and sediment. However, this would not likely improve fish populations onsite. Wetland enhancement should be completed, mainly by invasive species control and management of succession. Invasive species are a major factor in the degradation of wetlands at PBS. Wetland restoration is not required; however, it may be considered as part of the restoration of rare plant communities. Though likely containing wetlands communities prior to agricultural development, the extensive drainage ditch system now maintains many areas in a much drier state. Removal or alteration of some of these drainage systems would facilitate the restoration of native plant communities and a proliferation of rare species that reside in or otherwise utilize wetlands (EnviroScience 2017).

2.4.8 Demographics

The population in Erie County in the 2016 Census estimate was 75,107 with 37,679 total housing units (Leidos 2018b). The largest city is Sandusky with a population of approximately 25,000 (Leidos 2018b). The population distribution within a 2-mile radius of the PBS boundary is listed in **Table 2-3**.

No permanent resident population exists within PBS boundaries, including the ECCL Firing Range or within 200 ft of an area of observed contamination. As of March 2018, total NASA employment at PBS is approximately 170 (Leidos 2018b). Of these employees, approximately 24 are civil servants and the remainder are contractor employees. Other government agencies have 20 to 30 personnel stationed onsite. The Perkins Local School District has 2,167 students enrolled, and the Sandusky City School District has 3,301 students enrolled (Ohio Department of Education 2017). However, it is known that no one lives, or attends school, on PBS or anywhere near suspected contamination caused by PBS operations within 2 ft of ground surface. Business and industrial populations are unknown.

The *Environmental Justice Plan for NASA Glenn Research Center* (EJP, SAIC 2013) characterized the actual and potential offsite environmental impacts of GRC PBS activities on minority and low-income populations. The findings of this EJP indicated no evidence of substantial offsite adverse impacts to human health or the environment resulting from present or reasonably foreseeable GRC operations at PBS. Further, the analyses found that no minority or low-income populations are, or are likely to be, disproportionately impacted as a result of operations at either site. Two of the 13 census tracts from the 2010 census that are within the 8-km (5-mile) region of potential influence (ROI) contain meaningfully greater minority populations (35.1% threshold). These identified minority communities are located approximately 3 miles to the north in the Sandusky urban area. No tracts within the ROI contain a meaningfully greater low-income population (32.6% threshold). The recommended removal action will have minimal effect on the surrounding community including minority communities and low-income communities.

Table 2-1. Climate Data Summary – Cleveland, Ohio

Month	Total Precipitation Normal (inches)	Mean Maximum Temperature Normal (°F)	Mean Minimum Temperature Normal (°F)	Mean Average Temperature Normal (°F)	Normal Snowfall (inches)
January	2.72	34.4	21.7	28.1	18.7
February	2.34	37.5	23.6	30.5	14.9
March	2.93	46.6	30.2	38.4	12.6
April	3.49	59.1	40.4	49.8	3.3
May	3.66	69.5	50.1	59.8	--
June	3.43	78.6	59.8	69.2	--
July	3.46	82.6	64.3	73.5	--
August	3.51	80.8	63.1	72.0	--
September	3.81	73.9	56.0	65.0	--
October	3.07	62.3	45.4	53.8	0.2
November	3.62	50.8	36.9	43.9	4.3
December	3.10	38.3	26.4	32.4	14.1
Sum/Average	39.14	59.5	43.2	51.4	68.1

Source: http://www.weather.gov/cle/CLENormals (accessed 9/20/2019)
°C = Degrees Celsius
°F = Degrees Fahrenheit

Table 2-2. Listed Fauna and Flora Species Occurrences at Plum Brook Station (1994 to 2016)

Species	Status	1994	2001	2010	2012	2016
Plants						
Thin-leaf sedge; *Carex cephaloidea*	SE		x			x
Least St. John's wort; *Hypericum gymnanthum*	SE	x	x			x
Bayberry *Myrica pennsylvanica*	SE					x
Field sedge *Carex conoidea*	ST	x	x			x
Panic grass *Dichanthelium lindheimeri*	ST					x
Great Lakes goldenrod *Euthamia remota*	ST					x
Short's hedge-hyssop *Gratiola virginica*	SPT		x			x
Ashy sunflower *Helianthus mollis*	ST	x	x			x
Greene's rush *Juncus greenei*	ST		x			x
Rough rattlesnake root *Prenanthes (Nabalus) aspera*	ST		x			
Deer's tongue arrowhead *Sagittaria rigida*	SPT		x			x
Purple triple-awned grass *Aristida purpurescens*	SPT		x			x
Prairie false indigo *Baptisea lactea*	SPT	x	x			x
Broad-winged sedge *Carex alata*	SPT	x				x
Fringed gentian *Gentianopsis crinita*	SPT					x
Rough pennyroyal *Hedeoma hispidum*	SPT		x			x
Grove sandwort *Moehringia lateriflora*	SPT	x				
Virginia meadow-beauty (handsome-Harry) *Rhexia virginica*	SPT	x	x			x
Tall nut-rush *Scleria triglomerata*	SPT	x	x			x
Showy goldenrod *Solidago speciosa var. speciosa*	SPT					x
Lance-leaved violet (bog white violet) *Viola lanceolata*	SPT	x	x			x
Bats						
Indiana bat *Myotis sodalis*	FE/SE				a	
Northern long-eared bat *Myotis septentrionalis*	FT/ST		x	x	x, a	
Big brown bat *Eptesicus fuscus*	SSIC		x	x	x, a	x, a
Eastern red bat *Lasiurus borealis*	SSIC		x	x	x, a	x, a

Table 2-2. Listed Fauna and Flora Species Occurrences at Plum Brook Station (1994 to 2016) (Continued)

Species	Status	1994	2001	2010	2012	2016
Hoary bat *Lasiurus cinereus*	SSIC		x	x	x	a
Silver-haired bat *Lasionycteris noctivagans*	SSIC		x			a
Little brown bat *Myotis lucifugus*	SSIC		x	x	x, a	a
Evening bat *Nycticeius humeralis*	SSIC		x			a
Tri-colored bat *Perimyotis subflavus*	SSIC		x		x, a	a
Birds						
Bald eagle *Haliaeetus leucocephalus*	FSC		x			x
Upland sandpiper *Bartramia longicauda*	SE	x				
Cattle egret *Bubulcus ibis*	SE	x				
Black-crowned night heron *Nycticorax*	ST	x	x			
Sharp-shinned hawk *Accipiter striatus*	SSIC					x
Henslow's sparrow *Ammodramus henslowii*	SSIC					x
Great egret *Casmerodius albus (Ardea alba)*	SSIC	x	x			x
sedge wren *Cistothorus platensis*	SSIC	x	x			x
Marsh wren *Cistothorus palustris*	SSIC					x
Least flycatcher *Empidonax minimus*	SSIC					x
Mourning warbler *Oporonis Philadelphia*	SSIC		x			x
Virginia rail *Rallus limicola*	SSIC		x			
Cerulean warbler *Setophaga cerulea*	SSIC					x
Blackburnian warbler *Setophaga fusca*	SSIC					x
Magnolia warbler *Setophaga magnolia*	SSIC					x
Yellow-bellied sapsucker *Sphyrapicus varius*	SSIC					x
Reptiles						
Smooth greensnake *Opheodrys vernalis*	SE	x	x			x
Blanding's turtle *Emydoidea blandingii*	ST	x				
Eastern foxsnake *Pantherophis vulpinus (gloydi)*	SSIC	x	x			x

Table 2-2. Listed Fauna and Flora Species Occurrences at Plum Brook Station (1994 to 2016) (Continued)

Species	Status	1994	2001	2010	2012	2016
Eastern box turtle *Terrapene carolina*	SSIC	x	x			x
Moths						
Spartina moth *Spartiniphaga inops*	SE		x			

Source: EnviroScience 2017

a = Acoustically Detected
FE = Federal Endangered
FSC = Federal Species of Concern
FT = Federal Threatened
SE = State Endangered
SPT = State Potentially Threatened
SSIC = State-Special Interest/Concern
ST = State Threatened
x = Detected

Table 2-3. Estimated Population Distributions in Plum Brook Station Vicinity

Distance (miles)	Population
0 to 0.25	600
0.25 to 0.50	450
0.50 to 1.0	2,150
1.0 to 2.0	5,500

Source: U.S. Census Bureau 2016

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3. ENVIRONMENTAL RELEASE ASSESSMENT

3.1 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

3.1.1 Preliminary Assessment

The ECCL facility was a firing range that has been in operation from the early 1950s through 2007. The *Final Preliminary Assessment of Erie County Conservation League Firing Range* (SAIC 2010) and the *Erie County Conservation League (ECCL) Firing Range Site Investigation Report* (Leidos 2018a) are the only previous documented investigations conducted at the ECCL Firing Range. The ECCL PA documented results of a visual inspection of current conditions of the site; identification of notable site features (e.g., topography, surface water drainage pathways, and surface/subsurface debris); and records review, including historical investigations at NASA PBS, historical maps, and aerial images. Historical images and photographs of site conditions at the time of the report are included in the document. The PA did not include environmental sampling. As a result, the PA report does not contain information regarding the potential nature and extent of contamination associated with historical firing range operations or current conditions beyond what would be expected at a facility of this type.

The PA documented changes to activities that have been conducted at ECCL over time. Specifically, soil excavation activities were conducted at the Rifle Range sometime after 2006. Activities included removal of the western lateral berm, scraping of the rifle range floor to shale bedrock, and removal of structures previously located at the Trap and Skeet Ranges (SAIC 2011).

Ammunition fired at the ECCL facility included standard ball shot (<#6) and jacket ammunition (<50 caliber) [SAIC 2010]. Clay targets (e.g., White Flyer® Standard AA Pitch Trap/Skeet Target) historically were used at the Trap and Skeet Range; however, biodegradable "E-birds" have been used since approximately 2002.

Probable substances of concern identified included lead deposited in the earthen backstops from bullets fired at the pistol/rifle ranges, lead shot from shotguns used at the Trap and Skeet Range, and polycyclic aromatic hydrocarbons (PAHs) associated with the clay targets. Additional potential substances identified included arsenic (present in lead shot), antimony (increases shot hardness), and copper and zinc (jacket alloy metal).

The PA reported areas of known or suspected contamination that included the pistol and rifle range impact berms (deposition of contaminants associated with discharged ammunition), the Trap and Skeet Ranges field (deposition of lead shot, fragmented clay targets, shell casings), and portions of the pistol and rifle range floor (deposition of bullet jackets). It was believed that reclamation of lead-impacted soils was conducted at the firing range approximately 10 years ago; however, no documentation of this removal activity is available.

According to the 2010 PA (SAIC 2010), the potential for a release to groundwater that would result in impacts on human receptors due to past activities at the site was not suspected. Due to low to moderate soil permeability, shallow depth to shale bedrock, presence of drainage tile beneath the firing ranges, and proximity of potable wells in the vicinity of the ECCL facility, it was unlikely that potential leaching of soil contaminants (e.g., lead) to groundwater represents a viable exposure pathway via ingestion.

Due to the presence of a surface water pathway (i.e., Dautch Ditch) and focused discharge via the drainage system onsite, there was strong potential for a release of site contaminants to surface water via runoff and discharge from the range drainage system. However, the overall threat to human receptors via ingestion

was expected to be low. No primary targets were identified because of expectations that the final discharge of any potential contaminants originating from the ECCL facility into Lake Erie (via Sawmill Creek) would result in undetectable concentrations due to dilution and attenuation (SAIC 2010).

The soil exposure pathway did not pose a primary threat to human receptor populations due to restricted access to the site pistol and rifle ranges and contact with the impact berm soils. However, the skeet and trap ranges may pose a greater risk to human receptors due to the unrestricted access to the shotgun ranges. In addition, no threat of a release of contaminants from soil to air due to the non-volatile nature of the contaminants in site soils (e.g., metals) existed, as well as to the presence of vegetative cover, which inhibits dust emissions (SAIC 2010). The PA concluded that due to site use, potential chemicals, and potential exposure pathways, additional investigation was warranted.

3.1.2 Site Investigation

The first investigation to collect detailed information (including analytical data) at the ECCL Firing Range was the SI conducted by Leidos in 2016. The SI was conducted under the approved October 2011 *Multi-Site Characterization Sampling and Analysis Plan* (SAIC 2011) and results presented in the *Erie County Conservation League (ECCL) Firing Range Site Investigation Report* (Leidos 2018a).

SI activities at the ECCL Firing Range included collecting 168 surface soil samples, 9 dry sediment samples, and 9 co-located sediment/surface water samples. Samples were analyzed for firing range metals (antimony, arsenic, copper, iron, lead, tin, and zinc) and semivolatile organic compounds (SVOCs) [Leidos 2018a]. Surface soil, sediment, and surface water analytical data were screened based upon the following criteria:

- USEPA Region 9 preliminary remediation goals (PRGs),
- Ohio EPA sediment reference values (SRVs),
- Ohio EPA ecological screening levels (ESLs),
- Ohio EPA regional screening levels (RSLs),
- Persistent, bioaccumulative, and toxic (PBT) chemicals, and
- Background values for NASA PBS (soil only).

These screening criteria were utilized to determine if contamination exists at concentrations indicative of an unacceptable risk to human health or the environment, and also to identify the required laboratory analytical reporting limits (RLs) [Leidos 2018a].

Ecological and human health risk screenings were conducted to identify potential risks and determine the need for additional evaluation. The ecological risk screening identified 23 chemicals of potential ecological concern (COPECs) in surface soil, 10 COPECs in sediment, and 3 COPECs in surface water. COPECs for soil, sediment, and surface water included at least one metal and SVOC (Leidos 2018a).

Human health risk screening identified multiple metals and SVOCs as chemicals of potential concern (COPCs) in soil. Arsenic and lead were identified as COPCs in sediment and lead was identified as a COPC in surface water (Leidos 2018a).

Results of the SI activities indicated that the surface soil, sediment, and surface water at the ECCL Firing Range have been impacted by previous site activities. Further evaluation was recommended to fully determine the potential risk to human health and ecological receptors, and to determine if media not included in this SI (subsurface soil and/or groundwater) have been impacted. Additional surface/subsurface

soil and sediment sampling were recommended to further delineate the vertical and horizontal extent of contamination at the ranges, ditches, and ponds. In addition, an interim removal action (IRA) was recommended for the Trap and Skeet Range and the Rifle/Pistol Firing Range Impact Berms with surface soil lead concentrations above the RSL. The recommended IRA may include additional pre-delineation sampling, treatability study, excavation of surface soil (Trap and Skeet Range 0 to 1 ft bgs), complete removal of impact and lateral berms, lead bullet screening, soil stabilization (i.e., soil treated with an amendment to immobilize the lead when soil becomes saturated), and offsite nonhazardous waste disposal. Verification and confirmation sampling would ensure the stabilized soil meets waste disposal criteria, and the soil has been removed to residential screening criteria. The recommended IRA also may include the excavation of the clay target and shotgun shell debris areas (including a portion of the drainage ditch), and burned traphouse debris (including asbestos-containing material [ACM] survey) within the Trap and Skeet Range (Leidos 2018a).

3.2 REMOVAL SITE EVALUATION

Leidos conducted RSE activities at the ECCL Firing Range in 2019, in accordance with the *Erie County Conservation League (ECCL) Firing Range Removal Action Project Work Plan* (Leidos 2019a) and the *Erie County Conservation League (ECCL) Firing Range Removal Site Evaluation Sampling and Analysis Plan* (Leidos 2019d). The objective of the work was to evaluate the mitigation of public exposure risk to hazardous substances due to ECCL Firing Range activities. NASA and Ohio EPA have agreed to address further investigations and remediation at the ECCL Firing Range under CERCLA. Phase 1 activities include the following tasks:

- Task 1 – Develop a Work Plan,
- Task 2 – Develop a Health and Safety Plan (HASP) and Quality Control Plan (QCP),
- Task 3 – Provide technical support for community outreach,
- Task 4 – Construct a site perimeter fence,
- Task 5 – Draft a SAP for the RSE,
- Task 6 – Conduct an RSE and develop this report,
- Task 7 – Develop an Action Memorandum, and
- Task 8 – Delineate wetlands at the ECCL Firing Range.

Tasks 1, 2, and 5 were completed with the submittals of the *Final Erie County Conservation League (ECCL) Firing Range Removal Action Project Work Plan* (Leidos 2019a); *Final Site Safety and Health Plan Addendum for Erie County Conservation League (ECCL) Firing Range Removal Action* (Leidos 2019b); *Final Erie County Conservation League (ECCL) Firing Range Removal Action Quality Control Plan* (Leidos 2019c); and *Erie County Conservation League (ECCL) Firing Range Removal Site Evaluation Sampling and Analysis Plan* (Leidos 2019d). Task 3 (provide technical support for community outreach) started in December 2018 with the mailing of letters to businesses and residents surrounding the ECCL Firing Range notifying them of NASA's environmental assessment activities at the ECCL Firing Range; Task 3 is ongoing. Task 4 (construct a site perimeter fence) was completed in February 2019. Data collection activities under Task 6 commenced in July 2019 and are included in this report. Task 8 (delineate wetlands at the ECCL Firing Range) was completed in July 2019; results of the wetland delineation are reported in the *Final Wetland and Other Waters Delineation Report*, dated October 24, 2019, and summarized in Section 3.2.2. Task 7 (develop an Action Memorandum) will follow the approval of this report, as necessary.

Phase 2 activities will be based on the conclusions and recommendations of this report and include:

- Phase 2 (Option 1)
  - Task 9 – Implement the NTCRA
  - Task 10 – Produce the NTCRA Completion Report.

3.2.1 RSE Site Characterization

The primary objectives of the RSE site characterization were to: (1) further evaluate the existing data documented in the ECCL Firing Range SI Report (Leidos 2018a) to determine where further investigation was required; (2) conduct a comprehensive investigation to determine horizontal and vertical nature and extent of contamination requiring removal for surface and subsurface soil, sediment, and surface water; and (3) determine if groundwater has been impacted by the historical operations at the ECCL Firing Range. The ECCL Firing Range was subdivided into exposure units (EUs) based on media type and historical use to focus the data collection to support the removal action and include:

- Drainage Ditch,
- Former Clubhouse and Garage,
- Pistol Range (East),
- Pistol Range (West),
- Rifle Range,
- Trap and Skeet Ranges,
- Ponds, and
- Groundwater.

A total of 140 soil, 9 sediment, 3 groundwater, and 3 asbestos samples were collected, including 19 duplicates (16 for soil, 2 for sediment, and 1 for groundwater) during the RSE. Sample locations were selected based on SI analytical results in order to further evaluate potential risk to ecological receptors and human health and further define the extent of contamination. X-ray fluorescence (XRF) field-screening technology was used to obtain real-time metal concentrations in soil samples and used to determine which samples were submitted for laboratory analysis. Photographs of site conditions and select sample locations are presented in **Appendix A**. Boring logs and well development records from each of the two sampling events (2016 and 2019) are provided in **Appendix B**. All sample results and analytical data packages are presented in **Appendix C**.

The RSE analytical data were validated following receipt to ensure that the precision and accuracy of the data were adequate for their intended use. Sufficient data were obtained to meet project objectives. A total of 2,800 discrete results were generated with 99.5% of the data deemed usable. Details of the data validation are provided below.

3.2.1.1 Data Validation

Analytical data for soil, sediment, and groundwater samples collected in July-August 2019 were validated following receipt to ensure that the precision and accuracy of the data were adequate for their intended use, as presented in **Appendix D**. Data presentation tables and analytical data packages are provided in **Appendix C**. The protocols used for validation include a systematic review of the data for compliance with established quality control (QC) criteria based on the following categories:

- Holding times,
- Blanks,
- Laboratory control samples,
- Surrogate recovery (organic methods),
- Internal standards (primarily organic methods)
- Matrix spike/matrix spike duplicates (MS/MSDs),
- Calibration,
- Serial dilutions/post-digestion spikes (inorganic methods),
- Sample re-analysis,
- Secondary dilutions, and
- Laboratory case narrative.

3.2.1.1.1 Analytical Detection Limits and Estimated Data

Within this report, detected concentrations below the limit of quantitation (LOQ) are shown with a 'J' flag. The LOQ is the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias. Measurements between the method detection limit (MDL) and the LOQ ensure the presence of the analyte with confidence, but their numeric values are estimates. Note that the analytical reports from the laboratory (TestAmerica) provided in **Appendix C** refer to the LOQ as the RL. Non-detected results reported by the laboratory are reported at the LOQ, followed by a 'U' flag.

The MDL is the smallest concentration of a substance that can be demonstrated to be different from zero or a blank concentration at a 99% confidence level. Although a result at or above the MDL indicates that the analyte is present, the absence of a result at or above the MDL is inconclusive (i.e., one cannot confidently state whether the analyte is present or absent) because the false negative rate at the MDL is 50%.

3.2.1.1.2 Data Validation Qualifiers and Data Usability

Consistent with the data quality requirements presented in the Quality Assurance Project Plan (QAPP) (Leidos 2019b), all project data and associated QC were evaluated and qualified per the outcome of the review. As a result of the data evaluation and validation, individual sample results were qualified, as necessary, to designate usability of the data toward meeting project objectives. The primary qualifiers used are defined as follows:

U = The analyte was analyzed for but was not detected above the level of the associated value.

J = Estimated concentration because the result was below the sample quantitation limit or quality control criteria were not met.

UJ = The analyte was analyzed for but not detected above the associated value; however, the reported value is an estimate and indicates uncertainty regarding accuracy or precision.

R = The sample result was rejected due to serious deficiencies in the ability to meet QC criteria. The presence or absence of the analyte could not be verified.

Data qualification was based on deviations from the cited methods, the criteria specified in the QAPP (Leidos 2019b), and using applicable USEPA guidance; data were qualified as estimated values or rejected based on the degree and impact of the non-conformance. This data quality assessment resulted in data that

are considered: (1) usable as a quantitative concentration (no qualifiers); (2) usable with caution as an estimated concentration (J, UJ); or (3) unusable due to non-compliant QC results (R).

Volatile Organic Compounds: Internal standard area counts were below 25% of the mid-point criteria for 2 soil samples and resulted in 13 VOC results qualified as unusable (R). Fifty-four soil results qualified as estimated (UJ, J) due to internal standard area counts below the lower control limits (LCLs). One soil result was qualified as estimated (J) due to MS/MSD recovery above upper control limits (UCLs). A total of 244 discrete VOC results were generated, of which 13 results were qualified unusable (5.3%) and 55 discrete data points were qualified as estimated, resulting in 94.7% of the VOC data deemed usable.

Semivolatile Organics: One SVOC result evaluated as part of the soil MS/MSD analyses had spiked recovery less than 10% and was therefore qualified as unusable (R). Five soil results were qualified as estimated (J) due to MS/MSD percent recoveries below control limits. One soil result was qualified as estimated (J) due to MS/MSD relative percent difference (RPD) results above control limits. Thirteen results were qualified as estimated (UJ) due to calibration discrepancies. A total of 480 discrete SVOC results were generated, of which 1 result was qualified unusable (0.2%) and an additional 17 discrete data points were qualified as estimated, with 99.8% of the SVOC data deemed usable.

Polynuclear Aromatic Hydrocarbons: Data for PAHs were qualified as estimated (J) based on MS/MSD percent recovery and RPD results exceeding control limits. Three soil results were qualified as estimated (J) due to MS/MSD percent recoveries below control limits and RPD results above control limits. A total of 1,664 discrete PAH results were generated, of which 3 discrete data points were qualified as estimated, with 100% of the PAH data deemed usable.

Inorganics: Data for metals results were qualified based on MS/MSD, internal standard, post-digestion spike, or serial dilution results. One metals result had a post-digestion spiked recovery less than 10% and was therefore qualified as unusable (R). Three results were qualified as estimated (J) due to post-digestion spike discrepancies (>10% but below control limits). Five results were qualified as estimated (J) due to serial dilution discrepancies. Fifteen results were qualified as estimated (J, UJ) due to MS/MSD percent recoveries above or below control limits. Four results were qualified as estimated (J) due to MS/MSD RPD discrepancies. A total of 412 discrete metals results were generated, of which 1 result was qualified unusable (0.2%) and an additional 19 discrete data points were qualified as estimated, with 99.8% of the metals data deemed usable.

3.2.1.1.3 Completeness, Representativeness, and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. Sufficient data were obtained to meet project objectives. A total of 2,800 discrete results were generated with 99.5% of the data deemed usable.

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that depends upon the proper design of the sampling program and proper laboratory protocol. Representativeness for this project was determined by assessing the combined aspects of the quality assurance program, QC measures, and data evaluations. Representativeness was achieved by following the sampling approach.

Comparability expresses the confidence with which one data set can be compared against another. The extent to which existing and planned analytical data shall be comparable depends upon the similarity of sampling and analytical methods. The procedures used to obtain the analytical data for this project were expected to provide comparable data.

The soil, sediment, surface water, and groundwater SI and RSE sample analytical results and streamlined risk assessment conclusions presented in Section 4 provide evidence to conclude that the nature and extent of contamination at the ECCL Firing Range have been sufficiently defined for these media.

3.2.1.2 Soil

Soil sample locations and activities from the SI and RSE are shown in **Table 3-1** and **Figures 11 and 12** and separated by the individual EUs (Former Clubhouse and Garage, Pistol Range [East], Pistol Range [West], Rifle Range, and Trap and Skeet Ranges). Soil samples collected during the RSE were field-screened utilizing XRF technology to obtain real-time metal concentrations and to determine which samples to submit for laboratory analysis; XRF results are recorded on the boring logs in **Appendix B**. Soil samples were not submitted for laboratory analysis for 19 locations (SL-209, SL-210, SL-211, SL-212, SL-222, SL-228, SL-240, SL-251, SL-254, SL-255, SL-256, SL-257, SL-258, SL-261, SL-262, SL-264, SL-267, SL-271, and SL-274) because the XRF results were less than 360 parts per million (ppm). These locations are not presented on the figures; however, the locations and XRF results are depicted on the boring logs in **Appendix B**. The 125 RSE soil samples submitted for laboratory analysis were analyzed for specific metals (as listed in **Table 3-1**) and/or PAHs and carbazole. Surface soil grab samples were collected by hand auger. Subsurface soil samples were collected either by hand auger, direct-push technology drill rig, or from trenches excavated in the firing ranges impact and lateral berms. SI and RSE sample results were compared to PBS-specific background values, USEPA residential RSL values, and USEPA ESVs. Results of the comparisons for the soil collected are discussed in Section 4.

3.2.1.3 Sediment

Sediment sample locations and activities from the SI and RSE are shown in **Table 3-2** and **Figures 11 and 12**. Sediment samples collected during the RSE were field-screened utilizing XRF technology to obtain real-time metal concentrations and to determine which samples to submit for laboratory analysis. RSE sediment samples submitted for laboratory analysis were analyzed for specific metals (lead and arsenic). Sediment grab samples were collected by hand auger or sediment hand corer. SI and RSE sample results were compared to PBS-specific background values, USEPA residential RSL values, and USEPA ESVs. Dry sediment samples were evaluated as soil for locations in the Drainage Ditch and Pistol Range (West) EUs. Results of the comparisons for the sediment collected are discussed in Section 4.

3.2.1.4 Surface Water

Surface water sample locations and activities from the SI are shown in **Table 3-3** and **Figures 11 and 12**. Additional surface water samples were not collected during the RSE. Surface water samples collected during the SI were analyzed for metals and SVOCs. SI sample results were compared to Ohio EPA water quality criteria (WQC) and Federal maximum contaminant levels (MCLs). Results of the comparisons for the surface water collected are discussed in Section 4.

3.2.1.5 Groundwater

Twelve temporary monitoring wells were installed at the ECCL Firing Range in August 2019 during RSE activities. The temporary wells were constructed of 1-inch-diameter polyvinyl chloride (PVC) casing with PVC screens ranging in lengths of 2.0 to 5.0 ft. Ten of the 12 wells did not yield groundwater, and the 2 wells that did yield groundwater (MW-9 and MW-12) were poor yielding, as presented in the well development records in **Appendix B**. Extremely low yield and high turbidity were observed during sampling. Groundwater samples collected from the ECCL Firing Range during the RSE were analyzed for metals (filtered and unfiltered) and PAHs. Groundwater sampling logs are presented in **Appendix B**.

Groundwater sample activities from the RSE are shown in **Table 3-4,** and locations of the 12 temporary monitoring wells are depicted in **Figures 11 and 12**.

3.2.1.6 Asbestos Survey

Leidos procured a subcontractor (Emerald Environmental, Inc.) to determine the presence or absence of surface ACM and ACM-impacted surface soils present at the ECCL Firing Range. Sampling of potential ACM material and soils was performed concurrently by a certified Asbestos Hazard Evaluation Specialist. Two bulk samples of suspect ACM (roofing shingle) observed on the surface of the Trap and Skeet Range and one surface soil sample was collected from the soil surface of the location of the suspect ACM materials. Asbestos sampling activities from the RSE are shown in **Table 3-5** and the sample locations are depicted in **Figure 11**. The samples were analyzed for asbestos content via USEPA Method 600/R-93/116 using polarized light microscopy. Results for the three samples collected were non-detect for ACM. The Pistol Range (East) and Pistol Range (West) also were surveyed; no potential ACM was observed and no samples were collected in either pistol range. A copy of the ACM Survey Report is contained in **Appendix E**.

3.2.1.7 Lead-Based Paint Screening

Leidos performed a visual inspection and field screening for lead-based paint (LBP) on surface debris. Field screening for LBP was conducted using a portable XRF analyzer. The presence of LBP helped to determine the need for adjacent and/or additional surface soil sampling. Screening results were recorded in field activity logs. For the purposes of the RSE, any material containing greater than 1 milligram per square centimeter (mg/cm^2) of lead is considered to be LBP as defined by Title X of the Housing and Community Development Act of 1992. No screening results were greater than 1 mg/cm^2. Therefore, no LBP or soil samples were required. Screening locations included barricade posts along the top of Pistol Range earthen berms, old fence posts, a former range gate, and a former shooting stand at the Pistol Range (East).

3.2.2 Wetland and Other Waters Delineation

As listed in Section 3.2, a wetlands delineation was completed at the ECCL Firing Range under Task 8. EnviroScience, Inc. performed a delineation of wetlands and other waters in July 2019 for the NASA PBS ECCL Firing Range Site project. The results of the study were reported in the *Final Wetland and Other Waters Delineation Report*, dated October 24, 2019. The study area had been delineated previously (EnviroScience 2012), but NASA required updated information as the previous delineation was completed more than 5 years ago. To avoid duplication and provide consistency, the report continues the naming convention for wetlands and sample plots from the previous study.

The study area consists of open field, barren, scrub-shrub, forest, and wetland vegetative communities. Twelve wetlands were identified within the study area, accounting for approximately 4.357 acres of wetland onsite. The onsite wetlands consist of PEM and PSS vegetative communities. No streams were identified within the study area; however, three ditches were identified, accounting for approximately 1,600 LF and 0.199 acres of additional waterway. One open water pond was identified within the study area, accounting for 0.671 acres. The surrounding land use consists of forest, scrub-shrub, old field, and open field vegetative communities as well as agricultural and commercial land use (EnviroScience 2019).

Wetlands and waterbodies are under the jurisdiction of Ohio EPA or USACE. No filling may occur within these areas without their written permission. If any of these wetlands or waterbodies will be impacted, coordination with Ohio EPA and USACE may be required and permits issued under the 2017 Nationwide Permit program or a 401 Water Quality Certification may be necessary (EnviroScience 2019).

3.2.3 Treatability Study

During the RSE field investigation, representative samples of contaminated soils were collected and submitted to KEMRON Laboratory to conduct treatability studies in support of the Removal Action Work Plan. Sample collection involved collecting approximately 2/3 ft^3 (5-gallon bucket) of contaminated soil from three elevated contaminated areas of the ECCL Firing Range. The three areas where the composite samples were collected are the Trap and Skeet Ranges (Sample ECCL SL0301, high-range lead concentrations between 85,000 and 100,000 ppm during the SI); Pistol Range East impact berm (Sample ECCL SL0302, mid-range lead concentrations at 35,000 ppm during the SI); and Pistol Range West impact berm (Sample ECCL SL0303, low-range lead concentrations at 13,000 ppm during the SI).

The untreated samples were homogenized and analyzed for pH, bulk unit weight (density), moisture content, paint filter test, total lead, toxicity characteristic leaching procedure (TCLP) lead, and TCLP final leachate pH; results are presented in **Appendix F**. The treatability study was conducted by mixing a specific volume of untreated sample with stabilization reagents at different dosing rates (percent by wet soil weight). The reagents evaluated include Free Flow 200®, Enviroblend® CS, and Calciment® (Dolomitic). After reagent mixing, the treated samples were analyzed for TCLP lead and pH concentrations to determine the optimal dosage rate for each reagent.

The results of the study indicated that all of the reagents were capable of reducing the leachability of lead, as determined by TCLP. However, the Free Flow 200® treated materials indicated that higher dosage rates of the reagent will likely be required to meet the treatment criteria compared to Enviroblend® CS and Calciment® (Dolomitic). A cost evaluation will be completed during the Removal Action Work Plan to determine the most cost-efficient reagent and dosage rate for each area.

Table 3-1. Soil Sample Activities

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
Former Clubhouse and Garage				
ECCL-SL-169	ECCLSL0169 ECCLSL9018	7/29/2019	0.0-1.0	TAL Metals/SVOCs/XRF
	ECCLSL0169R ECCLSL9018R	8/7/2019	0.0-1.0	VOCs
ECCL-SL-170	ECCLSL0170	7/29/2019	0.0-1.0	TAL Metals/SVOCs/XRF
	ECCLSL0170R	8/7/2019	0.0-1.0	VOCs
ECCL-SL-171	ECCLSL0171	7/29/2019	0.0-1.0	TAL Metals/SVOCs/XRF
ECCL-SL-172	ECCLSL0172	7/29/2019	0.0-1.0	TAL Metals/SVOCs/XRF
Pistol Range (East)				
ECCL-SL-142	ECCLSL0142	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-143	ECCLSL0143	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-144	ECCLSL0144	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-145	ECCLSL0145	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-146	ECCLSL0146	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-147	ECCLSL0147	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-148	ECCLSL0148	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-149	ECCLSL0149	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-150	ECCLSL0150	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-151	ECCLSL0151	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-152	ECCLSL0152	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-153	ECCLSL0153	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-154	ECCLSL0154 ECCLSL9017	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-155	ECCLSL0155	6/15/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-156	ECCLSL0156	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-157	ECCLSL0157	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-158	ECCLSL0158	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-159	ECCLSL0159	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-160	ECCLSL0160	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-161	ECCLSL0161 ECCLSL9016	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-162	ECCLSL0162	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-163	ECCLSL0163	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-164	ECCLSL0164	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-165	ECCLSL0165	6/15/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-166	ECCLSL0166	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-167	ECCLSL0167	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-168	ECCLSL0168	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-242	ECCLSL0276	8/8/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
ECCL-SL-244	ECCLSL0277	8/8/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-245	ECCLSL0278	8/8/2019	0.5-1.0	Lead/PAHs/XRF
	ECCLSL0279	8/8/2019	1.0-1.5	Lead/PAHs/XRF
ECCL-SL-246	ECCLSL0280	8/8/2019	4.5-5.0	Lead/PAHs/XRF
	ECCLSL0281	8/8/2019	5.0-5.5	Lead/PAHs/XRF
ECCL-SL-247	ECCLSL0282	8/8/2019	5.5-6.0	Lead/Antimony/PAHs/XRF
	ECCLSL0283	8/8/2019	6.0-6.5	Lead/Antimony/PAHs/XRF

Table 3-1. Soil Sample Activities (Continued)

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
ECCL-SL-248	ECCLSL0284	8/8/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-249	ECCLSL0285	8/8/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-250	ECCLSL0286	8/8/2019	0.0-1.0	Lead/XRF
ECCL-SL-252	ECCLSL0288	8/8/2019	0.0-1.0	Lead/XRF
ECCL-SL-272	ECCLSL0300	8/8/2019	0.0-1.0	Lead/XRF
ECCL-SL-273	ECCLSL0304	8/8/2019	0.0-1.0	Lead/XRF
Pistol Range (West)				
ECCL-SL-115	ECCLSL0115	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-116	ECCLSL0116	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-117	ECCLSL0117	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-118	ECCLSL0118	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-119	ECCLSL0119	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-120	ECCLSL0120	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-121	ECCLSL0121	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-122	ECCLSL0122	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-123	ECCLSL0123	6/14/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-124	ECCLSL0124 ECCLSL9014	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-125	ECCLSL0125	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-126	ECCLSL0126	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-127	ECCLSL0127	6/14/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-128	ECCLSL0128	6/14/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-129	ECCLSL0129	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-130	ECCLSL0130	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-131	ECCLSL0131	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-132	ECCLSL0132	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-133	ECCLSL0133	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-134	ECCLSL0134 ECCLSL9013	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-135	ECCLSL0135	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-136	ECCLSL0136	6/14/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-137	ECCLSL0137	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-138	ECCLSL0138	6/15/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-139	ECCLSL0139	6/15/2016	0-2	Firing Range Metals/SVOCs
ECCL-SL-140	ECCLSL0140 ECCLSL0140MS/MSD	6/15/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-141	ECCLSL0141 ECCLSL9015	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-225	ECCLSL0255 ECCLSL9026	8/8/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
ECCL-SL-226	ECCLSL0256	8/6/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
ECCL-SL-229	ECCLSL0258 ECCLSL9028	8/7/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-230	ECCLSL0259	8/7/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-231	ECCLSL0275	8/7/2019	0.0-1.0	Lead/Antimony/PAHs/XRF
ECCL-SL-232	ECCLSL0260	8/8/2019	1.0-1.5	Lead/Antimony/PAHs/XRF
	ECCLSL0261 ECCLSL9027	8/8/2019	1.5-2.0	Lead/Antimony/PAHs/XRF

Table 3-1. Soil Sample Activities (Continued)

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
ECCL-SL-233	ECCLSL0262	8/7/2019	1.0-1.5	Lead/Antimony/PAHs/XRF
	ECCLSL0263	8/7/2019	1.5-2.0	Lead/Antimony/PAHs/XRF
	ECCLSL9029			Lead/Antimony/XRF
ECCL-SL-234	ECCLSL0264	8/8/2019	0.5-1.0	Lead/Antimony/PAHs/XRF
	ECCLSL0265	8/8/2019	1.0-1.5	Lead/Antimony/PAHs/XRF
ECCL-SL-236	ECCLSL0266	8/6/2019	3.0-3.5	Lead/Antimony/PAHs/XRF
	ECCLSL0267	8/6/2019	3.5-4.0	Lead/Antimony/PAHs/XRF
ECCL-SL-237	ECCLSL0268	8/6/2019	3.0-3.5	Lead/Antimony/PAHs/XRF
	ECCLSL0269	8/6/2019	3.5-4.0	Lead/Antimony/PAHs/XRF
ECCL-SL-238	ECCLSL0270	8/7/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-239	ECCLSL0271	8/7/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-241	ECCLSL0273	8/6/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
ECCL-SL-243	ECCLSL0274	8/6/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
	ECCLSL9030			Metals/ XRF
ECCL-SL-265	ECCLSL0305	8/8/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-266	ECCLSL0306	8/8/2019	0.0-1.0	Lead/PAHs/XRF
Rifle Range				
ECCL-SL-082	ECCLSL0082	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-083	ECCLSL0083	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-084	ECCLSL0084	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-085	ECCLSL0085	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-086	ECCLSL0086	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-087	ECCLSL0087 ECCLSL9012	6/14/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-088	ECCLSL0088	6/13/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-089	ECCLSL0089 ECCLSL9010	6/13/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-090	ECCLSL0090	6/13/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-091	ECCLSL0091	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-092	ECCLSL0092	6/13/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-093	ECCLSL0093	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-094	ECCLSL0094	6/13/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-095	ECCLSL0095	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-096	ECCLSL0096	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-097	ECCLSL0097	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-098	ECCLSL0098	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-099	ECCLSL0099	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-100	ECCLSL0100	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-101	ECCLSL0101	6/13/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-102	ECCLSL0102 ECCLSL9009	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-103	ECCLSL0103	6/13/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-104	ECCLSL0104	6/13/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-105	ECCLSL0105	6/13/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-106	ECCLSL0106	6/13/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-107	ECCLSL0107	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-108	ECCLSL0108	6/13/2016	0-3	Firing Range Metals/SVOCs

Table 3-1. Soil Sample Activities (Continued)

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
ECCL-SL-109	ECCLSL0109	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-110	ECCLSL0110	6/13/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-111	ECCLSL0111	6/13/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-112	ECCLSL0112	6/13/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-113	ECCLSL0113	6/14/2016	0-2.5	Firing Range Metals/SVOCs
ECCL-SL-114	ECCLSL0114 ECCLSL9011	6/14/2016	0-3	Firing Range Metals/SVOCs
ECCL-SL-213	ECCLSL0230	8/5/2019	0.0-1.0	Lead/Antimony/PAHs/XRF
ECCL-SL-214	ECCLSL0231	8/8/2019	1.0-1.5	Lead/PAHs/XRF
	ECCLSL0232	8/8/2019	1.5-2.0	Lead/PAHs/XRF
ECCL-SL-215	ECCLSL0233	8/8/2019	1.0-1.5	Lead/Antimony/PAHs/XRF
	ECCLSL0234	8/8/2019	1.5-2.0	Lead/Antimony/PAHs/XRF
ECCL-SL-216	ECCLSL0235	8/8/2019	0.5-1.0	Lead/Antimony/PAHs/XRF
	ECCLSL0236	8/8/2019	1.0-1.5	Lead/Antimony/PAHs/XRF
ECCL-SL-217	ECCLSL0237	8/6/2019	0.0-1.0	Lead/Antimony/PAHs/XRF
ECCL-SL-218	ECCLSL0238	8/6/2019	0.0-1.0	Lead/Antimony/PAHs/XRF
ECCL-SL-219	ECCLSL0239	8/1/2019	4.0-4.5	Lead/Antimony/PAHs/XRF
	ECCLSL0240	8/1/2019	4.5-5.0	Lead/Antimony/PAHs/XRF
ECCL-SL-220	ECCLSL0241	8/1/2019	5.5-6.0	Lead/Antimony/PAHs/XRF
	ECCLSL0242	8/1/2019	6.0-6.5	Lead/Antimony/PAHs/XRF
ECCL-SL-221	ECCLSL0243	8/6/2019	0.0-1.0	Lead/XRF
ECCL-SL-223	ECCLSL0253	8/8/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
ECCL-SL-224	ECCLSL0254	8/8/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
ECCL-SL-227	ECCLSL0249	8/8/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-235	ECCLSL0250	8/2/2019	2.0-2.5	Lead/PAHs/XRF
	ECCLSL0251	8/2/2019	2.5-3.0	Lead/PAHs/XRF
ECCL-SL-253	ECCLSL0244	8/5/2019	0.0-1.0	Firing Range Metals/PAHs/XRF
ECCL-SL-260	ECCLSL0294	8/6/2019	0.0-1.0	Lead/Antimony/PAHs/XRF
ECCL-SL-263	ECCLSL0307 ECCLSL9032	8/8/2019	0.5-1.0	Lead/PAHs/XRF
	ECCLSL0308	8/8/2019	1.0-1.5	Lead/PAHs/XRF
Trap and Skeet Ranges				
ECCL-SL-001	ECCLSL0001	6/10/2016	0-1.0	Firing Range Metals/SVOCs
ECCL-SL-002	ECCLSL0002 ECCLSL9001	6/10/2016	0-1.0	Firing Range Metals/SVOCs
ECCL-SL-003	ECCLSL0003 ECCLSL0003MS/MSD	6/10/2016	0-1.0	Firing Range Metals/SVOCs
ECCL-SL-004	ECCLSL0004	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-005	ECCLSL0005	6/10/2016	0-1.0	Firing Range Metals/SVOCs
ECCL-SL-006	ECCLSL0006	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-007	ECCLSL0007	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-008	ECCLSL0008	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-009	ECCLSL0009	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-010	ECCLSL0010	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-011	ECCLSL0011	6/10/2016	0-0.5	Firing Range Metals/SVOCs

Table 3-1. Soil Sample Activities (Continued)

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
ECCL-SL-012	ECCLSL0012	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-013	ECCLSL0013	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-014	ECCLSL0014 ECCLSL9002	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-015	ECCLSL0015	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-016	ECCLSL0016	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-017	ECCLSL0017	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-018	ECCLSL0018	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-019	ECCLSL0019	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-020	ECCLSL0020	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-021	ECCLSL0021	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-022	ECCLSL0022	6/10/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-023	ECCLSL0023	6/7/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-024	ECCLSL0024	6/7/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-025	ECCLSL0025 ECCLSL9003	6/7/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-026	ECCLSL0026	6/7/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-027	ECCLSL0027	6/7/2016	0-1	Firing Range Metals/SVOCs
ECCL-SL-028	ECCLSL0028	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-029	ECCLSL0029	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-030	ECCLSL0030	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-031	ECCLSL0031	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-032	ECCLSL0032	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-033	ECCLSL0033 ECCLSL9004	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-034	ECCLSL0034	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-035	ECCLSL0035	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-036	ECCLSL0036	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-037	ECCLSL0037	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-038	ECCLSL0038	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-039	ECCLSL0039	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-040	ECCLSL0040	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-041	ECCLSL0041	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-042	ECCLSL0042 ECCLSL9005	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-043	ECCLSL0043	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-044	ECCLSL0044	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-045	ECCLSL0045	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-046	ECCLSL0046	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-047	ECCLSL0047	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-048	ECCLSL0048	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-049	ECCLSL0049	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-050	ECCLSL0050	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-051	ECCLSL0051	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-052	ECCLSL0052 ECCLSL0052MS/MSD	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-053	ECCLSL0053	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-054	ECCLSL0054	6/9/2016	0-0.5	Firing Range Metals/SVOCs

Table 3-1. Soil Sample Activities (Continued)

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
ECCL-SL-055	ECCLSL0055	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-056	ECCLSL0056	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-057	ECCLSL0057	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-058	ECCLSL0058	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-059	ECCLSL0059	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-060	ECCLSL0060	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-061	ECCLSL0061	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-062	ECCLSL0062	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-063	ECCLSL0063	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-064	ECCLSL0064 ECCLSL9008	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-065	ECCLSL0065	6/13/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-066	ECCLSL0066	6/13/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-067	ECCLSL0067	6/13/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-068	ECCLSL0068	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-069	ECCLSL0069 ECCLSL9006	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-070	ECCLSL0070	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-071	ECCLSL0071	6/7/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-072	ECCLSL0072	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-073	ECCLSL0073	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-074	ECCLSL0074	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-075	ECCLSL0075	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-076	ECCLSL0076	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-077	ECCLSL0077 ECCLSL077MS/MSD	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-078	ECCLSL0078	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-079	ECCLSL0079 ECCLSL9007	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-080	ECCLSL0080	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-081	ECCLSL0081	6/9/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SL-173	ECCLSL0173	8/2/2019	0.0-1.0	PAHs
ECCL-SL-174	ECCLSL0174	8/2/2019	0.0-1.0	PAHs
ECCL-SL-175	ECCLSL0175	8/1/2019	1.0-2.0	PAHs/Carbazole
	ECCLSL0176 ECCLSL9019	8/1/2019	2.0-3.0	PAHs/Carbazole
ECCL-SL-176	ECCLSL0177	8/2/2019	1.0-2.0	PAHs
	ECCLSL0178	8/2/2019	2.0-3.0	PAHs
	ECCLSL0293	8/2/2019	3.0-4.0	PAHs
ECCL-SL-177	ECCLSL0179	7/31/2019	1.0-2.0	PAHs/Carbazole
	ECCLSL0180	7/31/2019	2.0-3.0	PAHs/Carbazole
	ECCLSL0292	7/31/2019	3.0-4.0	PAHs/Carbazole
ECCL-SL-178	ECCLSL0181	8/2/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-179	ECCLSL0182	8/2/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-180	ECCLSL0183	8/1/2019	0-0.5	Lead/XRF
	ECCLSL0184	8/1/2019	0.5-1.0	Lead/XRF
ECCL-SL-181	ECCLSL0185	8/1/2019	0.5-1.0	Lead/Antimony/Arsenic/XRF
	ECCLSL0186	8/1/2019	1.0-1.5	Lead/Antimony/Arsenic/XRF

Table 3-1. Soil Sample Activities (Continued)

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
ECCL-SL-182	ECCLSL0187 ECCLSL9020	8/1/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-183	ECCLSL0188	8/1/2019	0.5-1.0	Lead/XRF
	ECCLSL0189	8/1/2019	1.0-1.5	Lead/XRF
ECCL-SL-184	ECCLSL0190	8/1/2019	0.0-1.0	Lead/XRF
ECCL-SL-185	ECCLSL0191	8/1/2019	0.0-1.0	Lead/XRF
	ECCLSL9021	8/1/2019	0.0-1.0	Lead/XRF
ECCL-SL-186	ECCLSL0192	8/1/2019	0.5-1.0	Lead/XRF
	ECCLSL0193	8/1/2019	1.0-1.5	Lead/XRF
ECCL-SL-187	ECCLSL0194	8/1/2019	0.0-1.0	Lead/XRF
ECCL-SL-188	ECCLSL0195	8/1/2019	0.0-0.8	Lead/XRF
ECCL-SL-189	ECCLSL0196	8/1/2019	0.0-0.9	Lead/XRF
ECCL-SL-190	ECCLSL0197	8/1/2019	0.0-1.0	Lead/XRF
ECCL-SL-191	ECCLSL0198	8/1/2019	0.5-1.0	Lead/XRF
	ECCLSL0199	8/1/2019	1.0-1.5	Lead/XRF
ECCL-SL-192	ECCLSL0200	8/1/2019	0.0-1.0	Lead/XRF
ECCL-SL-193	ECCLSL0201	8/1/2019	0.0-1.0	Lead/XRF
ECCL-SL-194	ECCLSL0202	8/1/2019	0.0-1.0	Lead/XRF
ECCL-SL-195	ECCLSL0203	7/31/2019	1.0-1.5	Lead/Antimony/Arsenic/XRF
	ECCLSL0204	7/31/2019	1.5-2.0	Lead/Antimony/Arsenic/XRF
ECCL-SL-196	ECCLSL0213	7/31/2019	1.0-1.5	Lead/XRF
	ECCLSL0214	7/31/2019	1.5-2.0	Lead/XRF
ECCL-SL-197	ECCLSL0215	7/31/2019	0.0-1.0	Lead/XRF
ECCL-SL-198	ECCLSL0216	7/30/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-199	ECCLSL0217 ECCLSL9025	7/30/2019	0.5-1.0	Lead/PAHs/XRF
	ECCLSL0218	7/30/2019	1.0-1.5	Lead/PAHs/XRF
ECCL-SL-200	ECCLSL0205	7/30/2019	0.5-1.0	Lead/PAHs/XRF
	ECCLSL0206 ECCLSL9022	7/31/2019	1.0-1.5	Lead/PAHs/XRF
ECCL-SL-201	ECCLSL0207 ECCLSL9023	7/31/2019	0.0-0.5	Lead/PAHs/XRF
	ECCLSL0208	7/31/2019	0.5-1.0	Lead/PAHs/XRF
ECCL-SL-202	ECCLSL0209	7/30/2019	1.0-2.0	PAHs/Carbazole
	ECCLSL0210	7/30/2019	2.0-3.0	PAHs/Carbazole
	ECCLSL0291	7/30/2019	3.0-4.0	PAHs/Carbazole
ECCL-SL-203	ECCLSL0211	7/30/2019	0.5-1.0	Lead/PAHs/XRF
	ECCLSL0212	7/30/2019	1.0-1.5	Lead/PAHs/XRF
ECCL-SL-204	ECCLSL0219	7/30/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-205	ECCLSL0220	7/30/2019	1.0-2.0	PAHs/Carbazole
	ECCLSL0221	7/30/2019	2.0-3.0	PAHs/Carbazole
ECCL-SL-206	ECCLSL0222 ECCLSL9024	7/30/2019	0.0-1.0	PAHs
ECCL-SL-207	ECCLSL0223	7/30/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-208	ECCLSL0224	7/30/2019	0.0-0.5	Lead/PAHs/XRF
	ECCLSL0225	7/30/2019	0.5-1.0	Lead/PAHs/XRF
ECCL-SL-268	ECCLSL0297	8/8/2019	0.0-0.5	Lead/XRF
	ECCLSL0298	8/8/2019	0.5-1.0	Lead/XRF

Table 3-1. Soil Sample Activities (Continued)

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
ECCL-SL-269	ECCLSL0299 ECCLSL9031	8/8/2019	0.0-1.0	Lead/PAHs/XRF
ECCL-SL-270	ECCLSL0296	8/8/2019	0.0-0.5	Lead/PAHs/XRF

bgs = Below Ground Surface
ECCL = Erie County Conservation League
ft = Feet
ID = Identifier
MS = Matrix Spike
MSD = Matrix Spike Duplicate
PAH = Polycyclic Aromatic Hydrocarbon
SVOC = Semivolatile Organic Compound
TAL = Target Analyte List
XRF = X-ray Fluorescence
Firing Range Metals = Antimony, arsenic, copper, iron, lead, tin, and zinc.
TAL Metals = Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, lead, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.
VOC = Volatile Organic Compound

Table 3-2. Sediment Sampling Activities

Station ID	Sample ID	Sample Collection Date	Sample Interval (ft bgs)	Analyses
Drainage Ditch				
ECCL-SDSW-001	ECCLSD001	6/10/2016	0-1.75	Firing Range Metals/SVOCs
ECCL-SD-004	ECCLSD004	6/9/2016	0-1.5	Firing Range Metals/SVOCs
ECCL-SD-007	ECCLSD007	6/10/2016	0-1.5	Firing Range Metals/SVOCs
ECCL-SD-008	ECCLSD008	6/10/2016	0-2.0	Firing Range Metals/SVOCs
Pistol Range (West)				
ECCL-SD-009	ECCLSD009	6/10/2016	0-2.0	Firing Range Metals/SVOCs
Trap and Skeet Ranges				
ECCL-SDSW-002	ECCLSD002 ECCLSD9002	6/9/2016	0-1.5	Firing Range Metals/SVOCs
ECCL-SDSW-003	ECCLSD003	6/9/2016	0-1.5	Firing Range Metals/SVOCs
ECCL-SD-005	ECCLSD005	6/9/2016	0-1.5	Firing Range Metals/SVOCs
ECCL-SD-006	ECCLSD006	6/9/2016	0-2.0	Firing Range Metals/SVOCs
ECCL-SD-019	ECCLSD0019	7/31/2019	0.0-0.7	Lead
ECCL-SD-020	ECCLSD0021 ECCLSD9003	7/31/2019	0.0-1.0	Lead/PAHs
Pond East				
ECCL-SDSW-010	ECCLSD010 ECCLSD010MS/MSD	6/8/2016	0-<0.1	Firing Range Metals/SVOCs
ECCL-SDSW-011	ECCLSD011 ECCLSD9001	6/8/2016	0-<0.1	Firing Range Metals/SVOCs
ECCL-SDSW-012	ECCLSD012	6/8/2016	0-<0.1	Firing Range Metals/SVOCs
Pond West A				
ECCL-SDSW-015	ECCLSD015	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SDSW-016	ECCLSD016	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SDSW-017	ECCLSD017	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SDSW-018	ECCLSD018	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SD-022	ECCLSD0024	7/31/2019	0.7	Lead/Arsenic/XRF
ECCL-SD-024	ECCLSD0026	7/31/2019	0.7	Lead/Arsenic/XRF
ECCL-SD-026	ECCLSD0028	7/31/2019	0.3	Lead/Arsenic/XRF
ECCL-SD-028	ECCLSD0030 ECCLSD9004	7/31/2019	1.0	Lead/Arsenic/XRF
ECCL-SD-029	ECCLSD0031	7/31/2019	0.5	Lead/Arsenic/XRF
Pond West B				
ECCL-SDSW-013	ECCLSD013	6/8/2016	0-0.5	Firing Range Metals/SVOCs
ECCL-SDSW-014	ECCLSD014	6/8/2016	0-0.5	Firing Range Metals/SVOCs

bgs = Below Ground Surface
ECCL = Erie County Conservation League
ft = Feet
ID = Identifier
MS = Matrix Spike
MSD = Matrix Spike Duplicate
PAH = Polycyclic Aromatic Hydrocarbon
SVOC = Semivolatile Organic Compound
XRF = X-ray Fluorescence
Firing Range Metals = Antimony, arsenic, copper, iron, lead, tin, and zinc.

Table 3-3. Surface Water Sampling Activities

Station ID	Sample ID	Sample Collection Date	Analyses
ECCL-SDSW-010	ECCLSW010	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-011	ECCLSW011 ECCLSW011MS/MSD	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-012	ECCLSW012 ECCLSW9001	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-013	ECCLSW013	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-014	ECCLSW014	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-015	ECCLSW015	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-016	ECCLSW016	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-017	ECCLSW017	6/8/2016	Firing Range Metals/SVOCs
ECCL-SDSW-018	ECCLSW018	6/8/2016	Firing Range Metals and SVOCs

ECCL = Erie County Conservation League
ID = Identifier
MS = Matrix Spike
MSD = Matrix Spike Duplicate
SVOC = Semivolatile Organic Compound
Firing Range Metals = Antimony, arsenic, copper, iron, lead, tin, and zinc.

Table 3-4. Groundwater Sampling Activities

Station ID	Sample ID	Sample Collection Date	Analyses
MW-12	ECCLGW0012 ECCLGW9001	8/21/2019	Firing Range Metals/PAHs
MW-9	ECCLGW0009	8/21/2019	Firing Range Metals/PAHs (Unfiltered and Filtered)

ECCL = Erie County Conservation League
ID = Identifier
PAH = Polycyclic Aromatic Hydrocarbon
Firing Range Metals = Antimony, arsenic, copper, iron, lead, tin, and zinc.

Table 3-5. Asbestos Sampling Activities

Station ID	Sample ID	Sample Collection Date	Analyses
ECCL-SL-259	ECCLSL0290	7/30/2019	Asbestos
ECCL-DD-001	ECCLDD0001	7/30/2019	Asbestos
ECCL-DD-002	ECCLDD0002	7/30/2019	Asbestos

ECCL = Erie County Conservation League
ID = Identifier

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4. STREAMLINED RISK ASSESSMENT

According to Section 300.410(b) of the NCP, an RSE shall include evaluation of threat to public health and an evaluation of the magnitude of risk. The objective of this section is to perform a streamlined risk assessment for ECCL soil, sediment, surface water, and groundwater in accordance with USEPA's guidance on conducting NTCRAs (USEPA 1993) to establish the potential risk to human health and the environment.

4.1 STREAMLINED HUMAN HEALTH RISK EVALUATION

The streamlined human health evaluation consisted of the identification of COPCs by comparison of environmental sampling results to background concentrations and risk-based screening levels (SLs) followed by identification of chemicals of concern (COCs), which included a sum-of-ratios (SOR) to identify potential cumulative risks from multiple chemicals. The risk-based SLs used are the most stringent, based on a residential exposure scenario. Use of residential SLs allows for unrestricted reuse of the property.

4.1.1 Identification of COPCs

COPCs were identified by comparing the maximum detected concentration (MDC) of each detected chemical to risk-based SLs and background concentrations.

4.1.1.1 COPCs in Soil

For the soil media, USEPA RSLs for residential exposure to soil were used as conservative SLs (USEPA 2019). The MDC of each detected chemical was compared to the RSL at a target risk of 1E-06 and target hazard quotient (HQ) of 0.1. Special circumstances apply to some chemicals, as described below:

- The residential soil RSLs for aluminum, antimony, arsenic, cobalt, iron, manganese, and thallium are less than the naturally occurring background concentrations of these metals in soil at NASA PBS; therefore, the MDCs of these chemicals were compared to background concentrations to identify COPCs.
- No RSLs are available for acenaphthylene, benzo(*g,h,i*)perylene, and phenanthrene. The RSL for pyrene is used as a proxy value for these PAHs based on similar structures and properties (NDEP 2006; VDEQ 2014).
- No RSLs are available for carbazole and methylcyclohexane. Carbazole was detected in 12 of 121 soil samples at concentrations ranging from 0.035 to 10 milligrams per kilogram (mg/kg). The Ohio EPA Voluntary Action Program (VAP) has established a Generic Numeric Standard of 430 mg/kg for residential exposure to carbazole which is greater than the MDC; therefore, the lack of an RSL for evaluation of the low detected concentrations does not impact the conclusions of the screening risk assessment. Methylcyclohexane was detected in one of two soil samples. Adequate toxicity data are not available to develop a screening value for this chemical.
- Chemicals considered essential nutrients (e.g., calcium, chloride, iodine, iron, magnesium, potassium, phosphorus, and sodium) are an integral part of the human food supply and are often added to foods as supplements. USEPA recommends these chemicals not be evaluated provided they are present at low concentrations (i.e., only slightly above naturally occurring levels) and toxic at only very high doses (i.e., much higher than those that could be associated with contact at the AOC) [USEPA 1989]. Essential nutrients were not carried forward as COPCs.

Soil was aggregated into six EUs based on past use and geography:

- Drainage Ditch,
- Former Clubhouse and Garage,
- Pistol Range (East),
- Pistol Range (West),
- Rifle Range, and
- Trap and Skeet Ranges.

The locations of the EUs and soil samples included in each of these EUs are shown in **Figures 11 and 12**. Screening of chemicals detected in soil is shown in **Table 4-1**.

Drainage Ditch

The Drainage Ditch EU includes the portions of the ditch not included in the Trap and Skeet EU. No COPCs were identified for the Drainage Ditch, as described below:

- Six inorganic chemicals were detected in soil samples collected at the Drainage Ditch. None of these chemicals were detected above the Residential RSL and background.
- Twenty SVOCs were detected in soil samples collected from the Drainage Ditch. None of these chemicals were detected above Residential RSLs.

Former Clubhouse and Garage

Risk-based screening identified aluminum, thallium, and the PAHs benz(a)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene as surface soil COPCs for the Former Clubhouse and Garage, as described below:

- Sixteen inorganic chemicals were detected in soil samples collected at the Former Clubhouse and Garage. Aluminum and thallium were the only inorganics detected above the Residential RSLs and background.
- Nineteen SVOCs and three VOCs were detected in soil samples at the Former Clubhouse and Garage. Benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene were detected above their Residential RSLs.

Pistol Range (East)

Risk-based screening identified antimony, copper, lead, and benzo(*a*)pyrene as surface soil COPCs for the Pistol Range (East), as described below:

- Seven inorganic chemicals were detected in surface soil samples collected at the Pistol Range (East). Only antimony, copper, and lead were detected above the Residential RSLs and background.
- Twenty-six SVOCs were detected in surface soil samples. Only benzo(*a*)pyrene was detected above its Residential RSL.

Subsurface soil samples were collected at various depths, ranging from 4.5 to 6.5 ft bgs. Risk-based screening identified lead as the only subsurface soil COPC for the Pistol Range (East), as described below:

- Lead was the only inorganic chemical analyzed in subsurface soil and was detected above the Residential RSL and background.
- Ten PAHs were detected in subsurface soil samples; however, none of the PAHs were detected above their Residential RSLs.

Pistol Range (West)

Risk-based screening identified antimony, copper, lead, benzo(*a*)pyrene, and benzo(*b*)fluoranthene as surface soil COPCs, as described below:

- Seven inorganic chemicals were detected in surface soil samples collected at the Pistol Range (West). Antimony, copper, and lead were detected above the Residential RSLs and background.
- Twenty-seven SVOCs were detected in surface soil samples. Only benzo(*a*)pyrene and benzo(*b*)fluoranthene were detected above their Residential RSLs.

Subsurface soil samples were collected at the Pistol Range (West) at various depths, ranging from 3 to 4 ft bgs. No COPCs were identified in subsurface soil. Lead was detected below the Residential RSL. PAHs were not detected in the subsurface soil samples.

Rifle Range

Risk-based screening identified antimony, copper, lead, benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene as surface soil COPCs, as described below:

- Six inorganic chemicals were detected in surface soil samples collected at the Rifle Range. Antimony, copper, and lead were detected above the Residential RSLs and background.
- Twenty-three SVOCs were detected in surface soil samples. The PAHs benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene were detected above their Residential RSLs.

Subsurface soil samples were collected at the Rifle Range at various depths, ranging from 2 to 6.5 ft bgs. Risk based screening identified antimony and lead as subsurface soil COPCs, as described below:

- Antimony and lead were detected in subsurface soil samples at concentrations above the Residential RSLs and background.
- Thirteen PAHs were detected in subsurface soil samples; however, none of the PAHs were detected above their Residential RSLs.

Trap and Skeet Range

Risk-based screening identified antimony, arsenic, lead, benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, chrysene, dibenz(*a,h*)anthracene, indeno(1,2,3-*cd*)pyrene, and pyrene as surface soil COPCs, as described below:

- Seven inorganic chemicals were detected in surface soil samples collected at the Trap and Skeet Range. Antimony, arsenic, and lead were detected above the Residential RSLs and background.
- Twenty-eight SVOCs were detected in surface soil samples collected at the Trap and Skeet Range. Eight PAHs (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene,

chrysene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene, and pyrene) were detected above their Residential RSLs.

Subsurface soil samples were collected at the Trap and Skeet Range at various depths, ranging from 2 to 4 ft bgs. Twelve SVOCs were detected in subsurface soil samples. Benzo(*a*)pyrene and dibenz(*a,h*)anthracene exceeded the Residential RSLs and were identified as subsurface soil COPCs.

4.1.1.2 COPCs in Sediment

No human health screening values are available for sediment. USEPA RSLs for residential exposure to soil were used as conservative SLs for sediment (USEPA 2019). The MDC of each detected chemical was compared to the soil RSL at a target risk of 1E-06 and target HQ of 1. A target HQ of 1 was used because fewer than 10 chemicals having non-cancer endpoints were detected in sediment. NASA PBS-specific background values are not available for sediment. To evaluate whether detected metals are potentially associated with naturally occurring background, detected metals concentrations were compared to Ohio SRVs and background soil concentrations. Background soil concentrations are appropriate because (1) unlike the Ohio SRVs, they are NASA PBS specific, and (2) surrounding soil is the source of sediment in the ponds.

Sediment was aggregated into three EUs based on geography and site history:

- Pond East,
- Pond West A, and
- Pond West B.

Screening of chemicals detected in sediment is shown in **Table 4-2**.

Pond East

No COPCs were identified for sediment at Pond East, as described below:

- Six inorganic chemicals were detected in sediment samples collected at Pond East. All were detected below the sediment SRV, soil background SLs, and/or Residential soil RSLs.
- Fifteen SVOCs were detected in sediment samples collected at Pond East. All of the SVOCs were detected below the Residential soil RSLs.

Pond West A

Lead was the only COPC identified for sediment in Pond West A, as described below:

- Five inorganic chemicals were detected in sediment samples collected at Pond West A. Only lead was detected above the sediment SRV, soil background, and Residential RSL.
- Seven SVOCs were detected in sediment samples collected at Pond West A. All were detected below the Residential soil RSLs.

Pond West B

No COPCs were identified for sediment in Pond West B, as described below:

- Six inorganic chemicals were detected in sediment samples collected at Pond West B. All were detected below the SRV, soil background SLs, and/or Residential soil RSLs.
- Five SVOCs were detected in sediment samples collected at Pond West B. All of the SVOCs were detected below the Residential soil RSLs.

4.1.1.3 COPCs in Surface Water

Surface water at NASA PBS is not used as a source of drinking water. The Erie County Health Department does not permit surface water to be used as a private drinking water supply. Therefore, reported concentrations are first compared to Ohio EPA surface WQC for human health for non-drinking water. These criteria are conservative as they include ingestion of fish from contaminated surface water. Approximately 1 to 2.5 ft of standing water is present at the ponds and they do not support fishing. In the absence of WQC for non-drinking water, the Ohio EPA surface WQC for protection of the public water supply were used for comparisons to the MDCs with the exception of iron. The Ohio EPA WQC for iron is the Federal secondary MCL. Chemicals "are not health threatening at the Secondary MCL" (USEPA 2017b). Public water supplies test for these chemicals on a voluntary basis to prevent impacts to the water system (e.g., formation of scale). For iron, the secondary MCL is designed to prevent iron from causing a rusty color or taste. Therefore, iron concentrations are evaluated by comparison to the risk-based tap water RSL rather than the Ohio EPA WQC/Secondary MCL. Because Ohio EPA WQC are only available for a limited number of chemicals, USEPA tap water RSLs and MCLs also are provided.

Surface water was aggregated into three EUs based on geography:

- Pond East,
- Pond West A, and
- Pond West B.

Screening of chemicals detected in surface water is shown in **Table 4-3**.

Pond East

Six inorganic chemicals were detected in surface water samples collected at Pond East. None were detected above SLs.

Pond West A

Lead was the only COPC identified for surface water in Pond West (A), as described below:

- Seven inorganic chemicals were detected in surface water collected at Pond West A. Lead was detected above the tap water RSL.
- Two SVOCs were detected in surface water samples collected at Pond West A; both were detected below screening criteria.

Pond West B

Lead was the only COPC identified for surface water in Pond West B, as described below:

- Five inorganic chemicals were detected in surface water collected at Pond West B. Lead was detected above the tap water RSL.

- One SVOC was detected in surface water samples collected at Pond West B but was below the tap water RSL.

4.1.1.4 COPCs in Groundwater

Samples were collected from two temporary monitoring wells installed at the Rifle Range and downgradient from the Rifle and Pistol Ranges and analyzed for PAHs and metals (filtered and unfiltered). Because the groundwater samples were collected from temporary monitoring wells and exhibited high turbidity, filtered results were used in this screening-level risk assessment for inorganics. USEPA RSLs for residential exposure to tap water were used as conservative SLs for groundwater. The MDC of each detected chemical was compared to the RSL at a target risk of 1E-06 and target HQ of 1. A target HQ of 1 was used because fewer than 10 chemicals having non-cancer endpoints were detected in groundwater.

Screening of chemicals detected in groundwater is shown in **Table 4-4**.

No COPCs were identified for groundwater, as described below:

- Four inorganic chemicals were detected in filtered groundwater samples, and all were below tap water RSLs.
- Two PAHs were detected, both below their tap water RSLs.

4.1.2 Identification of COCs

COCs were identified by comparison of potential exposure concentrations to Residential RSLs adjusted for a target risk of 1E-05 and target HQ of 1 per the Ohio EPA Division of Environmental Response and Revitalization (DERR) program, which has adopted a human health cumulative Incremental Lifetime Cancer Risk goal of 1E-05 to be used as the level of acceptable excess cancer risk and for developing site remediation goals. In addition, SOR was calculated for all carcinogenic chemicals and, separately, for all non-carcinogenic chemicals having similar critical effects or target organs (e.g., aluminum and benzo[a]pyrene can both exhibit neurotoxicity in developing offspring). The SOR is used to account for potential additive effects from exposure to multiple chemicals that can cause the same effect (e.g., cancer) or affect the same target organ. This approach compares the exposure point concentration (EPC) of each chemical to the RSL to determine a ratio. The EPC represents a reasonable maximum exposure concentration as represented by either the 95% upper confidence limit on the mean (95UCL) or the MDC as appropriate for each exposure medium. The SOR method is based on the principle that a ratio less than or equal to 1 represents acceptable cumulative exposure. The risk-based RSLs for some chemicals are less than background concentrations. In these instances, the chemical concentrations are compared to background to identify COCs. Since the background screening level is not risk-based, these chemicals are not included in the SOR calculations. The RSL for lead is based on an acceptable blood lead concentration and is not additive with other chemicals. If the SOR is greater than 1, chemicals contributing significantly to the SOR are identified as COCs even if the EPC for that chemical is less than the chemical-specific RSL.

4.1.2.1 COCs in Soil

COCs were identified by comparing potential exposure concentrations in soil to the previously identified RSLs for residential exposure to soil (USEPA 2019) converted to a target risk of 1E-05 and target HQ of 1, including an SOR. The EPC was the 95UCL calculated using ProUCL. Inputs and outputs for ProUCL are provided in **Appendix G**. In addition to the EPC, the MDC of each COPC was evaluated to assess the potential for smaller areas of contamination that may require remediation.

Drainage Ditch

Screening of chemicals detected in soil at the Drainage Ditch EU is detailed in **Table 4-1**. No COPCs were identified in the Drainage Ditch EU. As a result, no COCs have been identified.

Former Clubhouse and Garage

The COC screening for soil is detailed in **Table 4-5**.

The EPCs of thallium and benzo(*a*)pyrene were above the Residential soil RSLs and are discussed further below.

The SORs for non-carcinogens are shown in **Table 4-6**. The SORs are less than 1; therefore, no COCs have been identified based on potential cumulative effects of non-carcinogenic chemicals.

The SORs for carcinogens are shown in **Table 4-7**. The SORs are 2 for both the MDCs and EPCs. The chemicals contributing significantly to the SORs are benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene. Benz(*a*)pyrene was identified as a COC based on a comparison of the EPC to the Residential RSL. The carcinogenic PAHs (cPAHs) benz(*a*)anthracene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene were identified as additional COCs at the Former Clubhouse and Garage based on potential cumulative effects. These chemicals are discussed in more detail below, and individual sample results are provided in **Appendix C:**

- Thallium – The RSL for thallium (0.78 mg/kg) is based on a provisional toxicity value and is less than the background screening level (1.3 mg/kg). Thallium was detected in only one of four samples. This single detection (3.8 mg/kg) was above the background screening level. Thallium appears to be naturally present in this area. The reported thallium concentration is less than 3 times the background screening level, and no source of thallium is present at the Former Clubhouse and Garage. Given the low magnitude of thallium that is likely naturally occurring, thallium was not identified as a COC.
- cPAHs – Benzo(*a*)pyrene was detected above the RSL at one (SL-169) of four locations. Benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene were identified as COCs due to their potential cumulative effects of their MDCs at SL-169. The detected concentrations of cPAHs, including benzo(*a*)pyrene, were orders of magnitude lower at the other three locations around the former buildings. Sample SL-169 was collected near a former road area with broken asphalt debris. The PAH concentrations at the Former Clubhouse and Garage are not indicative of an operations-related point source of PAHs and are indicative of road sources (e.g., asphalt and exhaust particles from vehicles). As the SOR for cPAHs is a low magnitude (2) at SL-169 where the road is a potential source and the concentrations of PAHs in the remaining three samples around the former buildings are even lower, PAHs were not identified as COCs for remediation.

In summary, thallium is naturally present in the area, and the slightly elevated concentrations of PAHs are indicative of road sources; therefore, no COCs are identified for the Former Clubhouse and Garage.

Pistol Range (East)

The COC screening for soil is detailed in **Table 4-5**.

The 95UCL for lead (16,000 mg/kg) is well above the Residential soil RSL (400 mg/kg). The Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) used to calculate the RSL recommends

use of the arithmetic average concentration as the EPC for lead in soil (rather than the 95UCL). The arithmetic average concentration of lead (4,880 mg/kg) at this small (less than 0.5-acre) EU is also well above the RSL, and lead is identified as a COC requiring remediation. The 95UCL and arithmetic average concentrations of lead in the subsurface soil also were above the Residential RSL.

The EPC for antimony exceeds the Residential soil RSL for this metal and is also identified as a COC in surface soil.

The SOR evaluation for non-carcinogens detected in surface soil is shown in **Table 4-6**. All of the COPCs affect different target organs and are not additive; thus, no additional COCs are identified based on the SOR evaluation. No COPCs with non-carcinogenic endpoints were identified in subsurface soil.

Benzo(*a*)pyrene was the only COPC with a carcinogenic endpoint; therefore, SORs for carcinogens were not calculated for surface soil. Benzo(*a*)pyrene was detected below the screening level and was not identified as a COC. No carcinogenic COPCs were identified in subsurface soil; therefore, SORs were not calculated for this soil interval.

Antimony and lead are discussed in more detail below, and individual sample results are provided in **Appendix C:**

- Antimony – Antimony was detected at concentrations (64 and 460 mg/kg) above background (9.3 mg/kg) and the RSL (31 mg/kg) at two locations (SL-155 and SL-152 within the berm). Antimony either was not detected or was detected below the background screening level and RSL in the remaining 26 samples. The elevated concentrations of antimony were co-located with elevated detections of lead (17,000 and 35,000 mg/kg). Remediation of the Pistol Range (East) for lead will address elevated concentrations of antimony.
- Lead – Lead was detected above its RSL in 19 of 37 surface soil samples at concentrations ranging from 470 to 88,000 mg/kg in the target, berm, lateral berm, and high fire areas of the EU. Lead was detected in one of four subsurface soil samples at a concentration (1,700 mg/kg) above its RSL in the berm area of the EU.

In summary, lead in both surface and subsurface soil is identified as a COC for remediation in the Pistol Range (East). Although elevated concentrations of antimony were detected at two sample locations, these locations are co-located with elevated concentrations of lead.

Pistol Range (West)

The COC screening for soil is detailed in **Table 4-5**.

The EPC of lead (5,500 mg/kg) exceeded the Residential RSL for surface soil, and lead is identified as a COC. As noted previously, the IEUBK model used to calculate the RSL recommends use of the arithmetic average concentration for lead in soil. The arithmetic average concentration of lead (2,300 mg/kg) at this small (less than 1-acre) EU is also above the RSL, and lead is identified as a COC requiring remediation. The EPCs of all other COPCs are less than the RSLs. The MDCs of antimony and copper exceed the RSLs for these metals; however, the EPC is the more applicable comparison for this small EU.

The SOR evaluation for non-carcinogens detected in surface soil is shown in **Table 4-6**. All of the COPCs affect different target organs and are not additive; thus, no additional COCs are identified based on the SOR evaluation. No COPCs with non-carcinogenic endpoints were identified in subsurface soil.

The SORs for carcinogens in surface soil are shown in **Table 4-7**. The SORs are less than 1; therefore, no COCs are identified based on potential cumulative effects of carcinogens. As COPCs were not identified in the subsurface soil, an SOR was not calculated for subsurface soil.

Antimony, copper, and lead are discussed in more detail below, and individual samples results are provided in **Appendix C:**

- Antimony – Antimony was detected above the RSL (31 mg/kg) at three locations (SL-119, SL-121, and SL-231) at concentrations ranging from 53 to 57 mg/kg. Antimony either was not detected or was detected below the RSL in the remaining 36 samples. The elevated concentrations of antimony were co-located with elevated detections of lead (ranging from 7,200 to 29,000 mg/kg). Remediation of the Pistol Range (West) for lead will address elevated concentrations of antimony.
- Copper – Copper was detected above the RSL (3,100 mg/kg) in one location (8,700 mg/kg at SL-115) within the discharge area of Pistol Range (West). Detected concentrations in the remaining 31 samples were below the RSL. As only a single isolated concentration of copper was above the RSL, and the EPC (676 mg/kg) is well below the RSL, copper was not identified as a COC for remediation. However, this and nearby samples also were identified as representing a potentially unacceptable risk to ecological receptors; therefore, removal of soil in this area is also recommended.
- Lead – Lead was detected in 26 of 45 surface soil samples at concentrations ranging from 460 to 29,000 mg/kg above its RSL in the floor, target, berm, lateral berms, and high fire areas of the EU. Lead was not detected in the subsurface soil samples above its RSL.

In summary, only lead in surface soil is identified as a COC for remediation in the Pistol Range (West) to address potential human health risks. Antimony was detected above the RSL in three locations co-located with elevated lead. Copper was above the RSL in a single sample and was not identified as a COC for remediation for protection of human health. However, this and nearby samples also were identified as representing a potentially unacceptable risk to ecological receptors; therefore, remediation of soil in this area is also recommended

Rifle Range

The COC screening for soil is detailed in **Table 4-5**.

The 95UCLs and MDCs of lead exceeded the Residential RSL for surface and subsurface soil, and lead is identified as a COC. In addition, the MDCs of antimony and benzo(*a*)pyrene in surface soil exceeded the Residential RSLs. Although the EPCs are less than the Residential RSLs, antimony and benzo(*a*)pyrene are identified as COCs based on the MDC screen. As the Rifle Range EU is larger (3.3 acres) than a small residential lot, the MDC comparison is appropriate.

The SOR evaluation for non-carcinogens detected in surface soil is shown in **Table 4-6**. All of the COPCs affect different target organs and are not additive; thus, no additional COCs are identified based on the SOR evaluation. As only one COPC with a non-carcinogenic endpoint (antimony) was present in the subsurface soil, an SOR was not calculated for subsurface soil.

The SORs for carcinogens in surface soil are shown in **Table 4-7**. For the 95UCLs, the SOR is less than 1, and no additional COCs are identified. For the MDCs, the SOR is greater than 1 (6) due primarily to benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene. Benzo(*a*)pyrene was identified as a COC based on exceeding the RSL. Benz(*a*)anthracene, benzo(*b*)fluoranthene, and

dibenz(*a,h*)anthracene are identified as additional COCs based on the SOR. As carcinogenic COPCs were not identified in the subsurface soil, an SOR was not calculated for subsurface soil.

Antimony lead, and the cPAHs benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene are discussed in more detail below, and individual samples results are provided in **Appendix C**:

- Antimony – Antimony was detected at six locations (SL-089, SL-090, SL-093, SL-095, SL-096, and SL-099) at concentrations (ranging from 39 to 110 mg/kg) above the RSL (31 mg/kg). Antimony either was not detected or was detected below the RSL in the remaining 38 samples. The elevated concentrations of antimony were co-located with elevated detections of lead (ranging from 6,600 to 28,000 mg/kg). Remediation of the Rifle Range for lead will address elevated concentrations of antimony. As a result, only lead was identified as a COC for remediation for the Rifle Range.
- Lead – Lead was detected in 19 of 50 surface soil samples at concentrations ranging from 430 to 28,000 mg/kg above its RSL in the target, berm, and lateral berm areas of the EU. Lead was detected (at concentrations of 530 and 1,900 mg/kg) in two of six subsurface soil samples north of the berm above its RSL.
- cPAHs – Benzo(*a*)pyrene (4.9 mg/kg) was detected at 1 of 45 locations in the berm above the RSL (1.1 mg/kg). Although benz(*a*)anthracene and benzo(*b*)fluoranthene did not exceed their RSL (11 mg/kg), and dibenz(*a,h*)anthracene did not exceed its RSL (1.1 mg/kg), the MDCs of these three cPAHs were co-located with the MDC of benzo(*a*)pyrene. Lead was detected at a concentration of 3,500 mg/kg at this location (SL-101). Remediation of the Rifle Range for lead will address elevated concentrations of cPAHs. As a result, only lead was identified as a COC for remediation at the Rifle Range.

In summary, although elevated concentrations of antimony and cPAHs were detected, the EPCs of these chemicals are less than RSLs and the locations with elevated concentrations are co-located with elevated concentrations of lead. Remediation of lead will address the elevated concentrations of antimony and cPAHs. Lead in surface and subsurface soil is identified as a COC for remediation at the Rifle Range.

Trap and Skeet Range

The COC screening for soil is detailed in **Table 4-5**.

The 95UCLs and MDCs of antimony, arsenic, lead, benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene exceeded the Residential RSLs for surface soil and were identified as COCs. In addition, the MDC of indeno(1,2,3-*cd*)pyrene exceeded the residential RSL for surface soil and was identified as a COC. As the Trap and Skeet Range EU is quite large (approximately 30 acres), the MDC comparison represents small potential hot spots of contamination that could be present within the larger EU.

The 95UCLs and MDCs of the only two COPCs in subsurface soil [benzo(*a*)pyrene and dibenz(*a,h*)anthracene] are less than the Residential RSLs; therefore, no COCs were identified in the subsurface soil based on the comparison of the 95UCL and MDCs to Residential RSLs.

The SOR evaluation for non-carcinogens detected in surface soil is shown in **Table 4-6**. All of the COPCs affect different target organs and are not additive; thus, no additional COCs are identified based on the SOR evaluation. Only one COPC was present in the subsurface soil with a non-carcinogenic endpoint (benzo[a]pyrene); therefore, an SOR was not calculated for subsurface soil.

The SORs for carcinogens in surface soil are shown in **Table 4-7**. For both the 95UCL and the MDCs, the SOR is greater than 1 due primarily to benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, and dibenz(*a,h*)anthracene. These PAHs were identified as COCs based on exceeding the RSLs; therefore, no additional COCs were identified based on the SORs. For the subsurface soil, the 95UCL and MDC SORs do not exceed 1; therefore, no COCs are identified based on potential cumulative effects of carcinogens for subsurface soil.

Antimony, arsenic, lead, and the cPAHs benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene are discussed in more detail below, and individual samples results are provided in **Appendix C:**

- Antimony – Antimony was detected above the RSL (31 mg/kg) at 13 locations (SL-009, SL-046, SL-047, SL-049, SL-051, SL-060, SL-069, SL-070, SL-074, SL-075, SL-076, SL-081, and SL-200) at concentrations ranging from 35 to 10,000 mg/kg. Antimony either was not detected or was detected below the RSL in the remaining 78 samples. The elevated concentrations of antimony were co-located with elevated detections of lead (ranging from 2,600 to 100,000 mg/kg) or elevated concentrations of benzo(*a*)pyrene (41 mg/kg). Remediation of the Trap and Skeet Range for lead and cPAHs will address elevated concentrations of antimony.
- Arsenic – Arsenic was detected above the background screening criteria (36.5 mg/kg) at 13 locations (SL-009, SL-030, SL-046, SL-049, SL-051, SL-060, SL-069, SL-070, SL-074, SL-075, SL-076, SL-081, and SL-200) at concentrations ranging from 37 to 2,200 mg/kg. Arsenic was detected below background in the remaining 78 samples. The elevated concentrations of arsenic were co-located with elevated detections of lead (ranging from 3,000 to 100,000 mg/kg) or benzo(*a*)pyrene (41 mg/kg).
- Lead – Lead was detected above its RSL in 68 of 131 surface soil samples at concentrations ranging from 420 to 100,000 mg/kg. Due to the frequency and magnitude of exceedances of the RSL, lead was selected as a COC for remediation in the Trap and Skeet Range.
- cPAHs – Benzo(*a*)pyrene, dibenz(*a,h*)anthracene, benz(*a*)anthracene, benzo(*b*)fluoranthene, and indeno(1,2,3-*cd*)pyrene were detected above RSLs at 12 to 29 of 112 locations. These cPAHs were identified as COCs for remediation at the Trap and Skeet Range.

In summary, although elevated concentrations of antimony and arsenic were detected, these locations are co-located with elevated concentrations of lead or cPAHs. Remediation of lead and cPAHs will address the elevated concentrations of antimony and arsenic. Lead and the cPAHs [benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenz(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene] are identified as COCs for remediation at the Trap and Skeet Range.

4.1.2.2 COCs in Sediment

COC screening of chemicals detected in sediment is shown in **Table 4-8**. To identify COCs, sediment sample results were compared to Residential soil RSLs published in May 2019 and adjusted for a target risk of 1E-05 and target HQ of 1 (USEPA 2019). These are conservative comparisons, as exposure to the pond sediment from wading are much less than the exposures incorporated into the exposure to soil for the Residential RSLs.

Pond East

No COPCs were identified in the Pond East EU. As a result, no COCs are identified.

Pond West A

Lead was identified as a COC in sediment based on a comparison of the MDC to the RSL. Pond West A is an approximately 0.75-acre wetland that receives stormwater drainage from the trap range fallout zone with elevated concentrations of lead in the soil. Although human exposures would be limited in the shallow pond, lead is recommended for remediation as part of the soil remediation at Pond West A.

Pond West B

No COPCs were identified in Pond West B. As a result, no COCs are identified.

4.1.2.3 COCs in Surface Water

COC screening of chemicals detected in surface water is shown in **Table 4-9**. The only COPC in surface water is lead. No risk-based screening values are available for lead in surface water. Lead concentrations were evaluated by comparison to the MCL. This is a conservative comparison, as the ponds do not serve as drinking water sources, and exposures to the ponds from incidental ingestion and wading are much less frequent than the exposures incorporated in the drinking water screening criteria.

Pond East

No COPCs were identified in Pond East. As a result, no COCs are identified.

Pond West A

Screening of chemicals detected in surface water at Pond West A is shown in **Table 4-9**. The MDC of lead (27 micrograms per liter [µg/L]) is less than 2 times the tap water RSL of 15 µg/L. The pond is a shallow (water depth of 2.5 ft at the time of sampling), small (approximately 0.75-acre) wetland. The pond does not serve as a drinking water source, and the exposures from incidental ingestion of pond water during wading is much lower than the exposure to a drinking water source. As a result, no COCs are identified for remediation for surface water at Pond West A.

Pond West B

Screening of chemicals detected in surface water at Pond West B is shown in **Table 4-9**. The MDC of lead (28 µg/L) is less than 2 times the tap water RSL of 15 µg/L. The pond is a shallow (water depth of 2.5 ft at the time of sampling), small (approximately 0.75-acre) wetland. The pond does not serve as a drinking water source, and the exposures from incidental ingestion of pond water during wading is much lower than the exposure to a drinking water source. As a result, no COCs are identified for remediation for surface water at Pond West B.

4.1.2.4 COCs in Groundwater

No COPCs were identified in groundwater. As a result, no COCs are identified.

4.2 STREAMLINED ECOLOGICAL RISK EVALUATION

The objective of this section is to perform a streamlined risk assessment for the ECCL Firing Range and to establish the potential risk to wildlife. The action levels to establish an onsite source are concentrations that exceed levels identified in Section 3.2 (e.g., background, ESVs) to which the SI and RSE sample results were compared. More specifically, MDCs for analytes in soil, sediment, and surface water were compared to ESVs to determine if any COPECs were present at the site. In most cases, ESVs for inorganic COPECs

were below soil background criteria and SRV concentrations; thus, MDCs also were compared to background/SRVs in those cases. Groundwater is not considered as a separate medium for ecological receptors as they are unlikely to come into contact with this medium except in instances where the groundwater daylights to surface water. Soil was divided into six EUs:

- Drainage Ditch,
- Former Clubhouse and Garage,
- Pistol Range (East),
- Pistol Range (West),
- Rifle Range, and
- Trap and Skeet Ranges.

The Drainage Ditch and the Former Clubhouse and Garage were sampled at the surface (0 to 3 ft bgs or shallower). For the other four soil EUs, all depths (0 to 6 ft bgs) were considered, with the deepest samples collected at the Rifle Range. Surface water and sediment were divided into three EUs each:

- Pond East,
- Pond West A, and
- Pond West B.

For each screen, it also was determined if an analyte was a PBT compound (Ohio EPA 2008; USEPA 2011) or lacked screening information. After determining the list of COPECs, other factors such as sample location, frequency of detection, possible migration of contaminants, and average concentration were considered to determine if potential harm to ecological receptors exists from soil, sediment, or surface water. If potential unacceptable harm to ecological receptors was still present after these considerations, the chemical was considered an ecological COC and was retained for further evaluation.

4.2.1 Soil

Drainage Ditch Soil

Two inorganic and three organic chemicals were identified as COPECs in surface soil at the Drainage Ditch EU (**Table 4-10**). The MDCs of lead and copper are about 35 and 6 times their soil ESVs, respectively; the average concentrations are about 4.5 and 2.1 times the background criteria, respectively. The soil ESVs for both lead (11 mg/kg) and copper (28 mg/kg) are ecological soil screening levels (Eco-SSLs) for avians and both are overly conservative because the values are below the background criteria. The next available Eco-SSL above the background criterion for lead is for mammals (56 mg/kg) and for copper is for plants (70 mg/kg). The average concentrations of lead and copper are about 3.9 and 1.7 times the more reasonable soil ESVs, respectively. Two organics (benzaldehyde and dibenzofuran) lacked screening criteria. Benzo(*g,h,i*)perylene is a PBT compound detected below the soil ESV. These five COPECs are not considered a concern to wildlife. No further action (NFA) is recommended to protect ecological receptors from exposure to COPECs in the Drainage Ditch EU surface soil.

Former Clubhouse and Garage Soil

Three inorganic and four organic chemicals were identified as COPECs in surface soil at the Former Clubhouse and Garage EU (**Table 4-11**). However, average concentrations of aluminum and nickel are below background criteria, and the average concentration of benzo(*a*)pyrene is below the soil ESV. The average concentrations of lead and thallium are about 1 and 1.3 times the background criteria, respectively. Two organics (carbazole and methylcyclohexane) lacked screening criteria but were detected in only one sample each, suggesting limited wildlife exposures to these COPECs. Benzo(*g,h,i*)perylene is a PBT

compound detected below the soil ESV. As a result, these seven COPECs are not considered a concern to wildlife. NFA is recommended to protect ecological receptors from exposure to COPECs in the Former Clubhouse and Garage EU surface soil.

Pistol Range (East) Soil

Lead and benzo(*g,h,i*)perylene were identified as COPECs in shallow subsurface soil (4.5 to 5 ft) at the Pistol Range East EU (**Table 4-12**). The lead MDC is about 35 times the background criterion. Given the magnitude of this exceedance, lead is identified as an ecological COC in shallow subsurface soil at the Pistol Range East EU. Benzo(*g,h,i*)perylene is a PBT compound detected below the soil ESV. As a result, this COPEC is not considered a concern to wildlife. NFA is recommended to protect ecological receptors from exposure to this organic COPEC in the Pistol Range East EU shallow subsurface soil.

Four inorganic and five organic chemicals were identified as COPECs in surface soil at the Pistol Range East EU (**Table 4-12**). The greatest exceedance in the Pistol Range East EU surface soil is lead, with an MDC that is about 1,800 times the background criterion. The antimony MDC is about 49 times the background criterion. Given the magnitude of these exceedances, antimony and lead are both identified as ecological COCs in surface soil at the Pistol Range East EU.

MDC exceedances of soil ESVs and/or background were smaller in magnitude than lead and antimony for copper, tin, and naphthalene. Average concentrations of tin and naphthalene are below soil ESVs. The average concentration of copper is only about 2 times the background criterion. Three organics (benzaldehyde, caprolactam, and dibenzofuran) lacked screening criteria but were detected relatively infrequently (14, 1, and 6 of 27 samples, respectively), suggesting limited wildlife exposures to these organics. Benzo(*g,h,i*)perylene is a PBT compound detected below the soil ESV. As a result, these seven COPECs are not considered a concern to wildlife. NFA is recommended to protect ecological receptors from exposure to these seven COPECs in the Pistol Range East EU surface soil.

Pistol Range (West) Soil

Lead was identified as a COPEC in shallow subsurface soil (3 to 3.5 ft) at the Pistol Range West EU (**Table 4-13**). The MDC is approximately 14 times the soil ESV; however, the MDC exceedance of the background criterion (which is greater than the ESV) is relatively minor (3.1 times) and the average concentration (58.5 mg/kg) is just above the background criterion (48.6 mg/kg). In addition, the soil ESV is overly conservative given it is below the background criterion. The soil ESV (11 mg/kg) is the avian Eco-SSL. The next available Eco-SSL above the background criterion is for mammals at 56 mg/kg. The proximity of the average concentration (58.5 mg/kg) to the mammalian soil ESV suggests limited potential for adverse effects to ecological receptors. Therefore, NFA is required to protect ecological receptors from exposure to the Pistol Range West EU shallow subsurface soil, and no ecological COCs were identified for this medium.

Four inorganic and seven organic chemicals were identified as COPECs in surface soil at the Pistol Range West EU (**Table 4-13**). The greatest exceedance in the Pistol Range West EU surface soil is lead, with an MDC that is about 600 times the background criterion. The copper MDC is about 155 times the background criterion. Given the magnitude of these exceedances, copper and lead are both identified as ecological COCs in surface soil at the Pistol Range West EU.

MDC exceedances of soil ESVs and/or background were smaller in magnitude than lead and copper for antimony, zinc, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, and naphthalene. Average concentrations of these five COPECs are at or below background criteria and/or soil ESVs. Three organics (benzaldehyde, carbazole, and dibenzofuran) lacked screening criteria but were detected relatively infrequently (10, 1, and

5 of 28 samples, respectively), suggesting limited wildlife exposures to these organics. Benzo(*g,h,i*)perylene is a PBT compound detected below the soil ESV. As a result, these nine COPECs are not considered a concern to wildlife. NFA is recommended to protect ecological receptors from exposure to these nine COPECs in the Pistol Range West EU surface soil.

Rifle Range Soil

Antimony, lead, benzo(*g,h,i*)perylene, and naphthalene were identified as COPECs in shallow subsurface soil (2 to 6 ft)at the Rifle Range EU (**Table 4-14**). The greatest exceedance in the Rifle Range EU shallow subsurface soil is lead, with an MDC that is about 39 times the background criterion. Given the magnitude of this exceedance, lead is identified as an ecological COC in shallow subsurface soil at the Rifle Range EU. The MDC for antimony is only 1.1 times the background criterion, and the average concentration is below the background criterion. The MDC for naphthalene is only 1.1 times the soil ESV, and the average concentration is below the soil ESV. Benzo(*g,h,i*)perylene is a PBT compound detected below the soil ESV. As a result, antimony, benzo(*g,h,i*)perylene, and naphthalene are not considered a concern to wildlife. NFA is recommended to protect ecological receptors from exposure to these three COPECs in the Rifle Range EU shallow subsurface soil.

Three inorganic and six organic chemicals were identified as COPECs in surface soil at the Rifle Range EU (**Table 4-14**). The greatest exceedance in the Rifle Range EU surface soil is lead, with an MDC that is about 576 times the background criterion. The antimony and copper MDCs are about 12 and 162 times the background criterion. Given the magnitude of these exceedances, antimony, copper, and lead are identified as ecological COCs in surface soil at the Rifle Range EU.

Three organics (benzo[*a*]pyrene, chrysene, and naphthalene) had MDC exceedances of soil ESVs that were smaller in magnitude than the identified ecological COCs. Average concentrations of these COPECs are at or below background criteria and/or soil ESVs. Two organics (benzaldehyde and dibenzofuran) lacked screening criteria. Benzo(*g,h,i*)perylene is a PBT compound detected below the soil ESV. As a result, these six organics are not considered a concern to wildlife. NFA is recommended to protect ecological receptors from exposure to these six COPECs in the Rifle Range EU surface soil.

Trap and Skeet Range Soil

Benzo(*g,h,i*)perylene was identified as a COPEC in shallow subsurface soil (2 to 4 ft) at the Trap and Skeet Range EU (**Table 4-15**). Benzo(*g,h,i*)perylene is a PBT compound detected well below the soil ESV. As a result, benzo(*g,h,i*)perylene is not considered a concern to wildlife. NFA is recommended to protect ecological receptors exposed to shallow subsurface soil at the Trap and Skeet Range EU.

Six inorganic and 15 organic chemicals were identified as COPECs in surface soil at the Trap and Skeet Range EU (**Table 4-15**). The greatest exceedance in the Trap and Skeet Range EU surface soil is lead, with an MDC that is more than 2,000 times the background criterion, followed by antimony, which is more than 1,000 times the background criterion. The arsenic MDC is about 60 times the background criterion. Given the magnitude of these exceedances, these three inorganic COPECs (antimony, arsenic, and lead) are identified as ecological COCs in surface soil at the Trap and Skeet Range EU.

Seven high molecular weight (HMW) PAHs (benz[*a*]anthracene, benzo[*a*]pyrene, benzo[*b*]fluoranthene, benzo[*g,h,i*]perylene, chrysene, dibenz[*a,h*]anthracene, and pyrene) and four low molecular weight (LMW) PAHs (2-methylnaphthalene, fluoranthene, naphthalene, and phenanthrene) exceeded their individual soil ESVs; collectively, HMW PAHs are 340 times the soil ESV and LMW PAHs are 4.5 times the soil ESV. Of the HMW PAHs, three of seven (benz[*a*]anthracene, benzo[*a*]pyrene, and chrysene) had average concentrations greater than their soil ESVs. In contrast, the average concentration was below the individual

soil ESVs for three of four LMW PAHs; although the average naphthalene concentration was 1.2 times its soil ESV, the average LMW PAH concentration is below its collective soil ESV. Average concentrations at or below the soil ESVs indicate limited wildlife exposure to these PAHs. Thus, NFA is recommended to protect ecological receptors from exposure to 8 of the 11 PAHs. Given the magnitude of soil ESV exceedance for benz(*a*)anthracene, benzo(*a*)pyrene, and chrysene, these three HMW PAH COPECs are identified as ecological COCs in surface soil at the Trap and Skeet Range EU.

Four COPECs (copper, tin, zinc, and bis[2-ethylhexyl]phthalate) had MDC exceedances of soil ESVs that were smaller in magnitude than the identified ecological COCs. Average concentrations of these COPECs are at or below background criteria and/or soil ESVs. Three organics (benzaldehyde, carbazole, and dibenzofuran) lacked screening criteria. As a result, these seven COPECs are not considered a concern to wildlife. NFA is recommended to protect ecological receptors from exposure to these seven COPECs in the Trap and Skeet Range EU surface soil.

4.2.2 Sediment

Pond East Sediment

Four inorganic and three organic chemicals were identified as COPECs in sediment at the Pond East EU (**Table 4-16**). The greatest exceedance is 2-methylnaphthalene, with an MDC that is 19 times its sediment ESV and an average concentration 13 times its sediment ESV. However, the sediment MDC (0.38 mg/kg) is an order of magnitude less than the soil ESV for 2-methylnaphthalene (3.24 mg/kg). Two inorganics (arsenic and copper) slightly exceeded their sediment ESVs, with MDCs that are 3 times their respective sediment ESVs and average concentrations that are twice the sediment ESVs. However, these sediment ESVs are conservative as they are both below their respective Ohio SRVs; the average concentrations are 1.9 and 1.5 times the SRVs, respectively. This indicates wildlife population exposure to elevated concentrations of arsenic and copper is very limited. Two COPECs (antimony and 1,1-biphenyl) lacked screening criteria. Two COPECs (lead and benzo[*g,h,i*]perylene) are PBT compounds detected below the sediment ESV. In addition, of the seven COPECs, only one was identified in Pond East EU surface water (lead) and none exceeded sediment ESVs, indicating a lack of contaminant migration to surface water. The pond is also partially surrounded by wetlands that contain state potentially threatened plants (EnviroScience 2019), disturbance of which is not recommended. Therefore, NFA is required to protect ecological receptors from exposure to the Pond East EU sediment, and no ecological COCs were identified for this EU.

Pond West A Sediment

One organic and five inorganic chemicals were identified as COPECs in sediment at the Pond West A EU (**Table 4-16**). The greatest exceedance is lead, with an MDC (3,500 mg/kg) that is 98 times its sediment ESV (35.8 mg/kg) and 74 times its SRV (47 mg/kg). The average concentration (988 mg/kg) is 28 times its sediment ESV and 21 times its SRV. Copper also exceeded its sediment ESV and SRV, with an MDC 17 times its sediment ESV and 13 times the SRV. Given the magnitude of these exceedances, lead and copper are identified as an ecological COC in sediment at the Pond West A EU.

Two inorganics (arsenic and zinc) also exceeded their sediment ESVs and SRVs, with MDCs that are 1 and 3 times their respective sediment ESVs and average concentrations that are 1.1 and 2 times the SRVs. Two COPECs (iron and caprolactam) lacked screening criteria. In combination with the conservative sediment ESVs, these exceedances suggest limited wildlife exposure to elevated detections and indicate harm to populations of ecological receptors is unlikely. Pond West (A and B) is an ORAM Category 2 wetland (EnviroScience 2019), indicating moderate quality; minimalizing disturbances is recommended. NFA is

recommended to protect ecological receptors from exposure to these four COPECs (arsenic, iron, zinc, and caprolactam) in the Pond West A sediment.

Pond West B Sediment

Five inorganics were identified as COPECs in sediment at the Pond West B EU (**Table 4-16**). One COPEC (antimony) lacked screening criteria. For the remaining four COPECs, the sediment ESVs are conservative as they are below their respective Ohio SRVs. The greatest exceedance is lead, with an MDC (330 mg/kg) that is 9 times its sediment ESV (35.8 mg/kg) and an average concentration (300 mg/kg) 8 times its sediment ESV and 6 times its SRV (47 mg/kg). As noted in Section 4.2.1, lead was identified as an Ecological COC in soil in the two soil EUs (Rifle Range and Trap and Skeet Range) adjacent to Pond B West. The average lead concentrations in the surface at these two EUs were 2,301 and 6,170 mg/kg, respectively, substantially higher than the lead average (300 mg/kg) in the Pond B West sediment. Removal of the much higher lead concentrations in the soils from these two adjacent EUs would reduce the migration of elevated lead into the pond. In fact, because average soil concentrations of lead post-remediation would be below the sediment average in Pond B West, any migration from the adjacent soils would result in lower average concentrations in the pond. Thus, even without active remediation in the pond, average lead concentrations would be expected to decrease and this passive approach lets the current ecosystem remain intact. Three inorganics (arsenic, copper, and zinc) slightly exceeded their sediment ESVs, with MDCs that are 1, 3, and 2 times their respective sediment ESVs and average concentrations that are 1 to 2 times the SRVs. In combination with the conservative sediment ESVs, these limited exceedances indicate harm to populations of ecological receptors is unlikely. In addition, of the five COPECs, only one was identified in the Pond West B EU surface water (lead) and none exceeded surface water ESVs, indicating a lack of contaminant migration to surface water. Pond West (A and B) is an ORAM Category 2 wetland (EnviroScience 2019), indicating moderate quality; minimalizing disturbances is recommended. Therefore, NFA is required to protect ecological receptors from exposure to Pond West B sediment, and no ecological COCs were identified for this EU.

4.2.3 Surface Water

Pond East Surface Water

Lead was identified as a COPEC in surface water at the Pond East EU (**Table 4-17**). However, it was identified solely as a PBT chemical, since the MDC (2.6 µg/L) is well below the surface water ESV (120 µg/L). Because the surface water ESV is almost 50 times the MDC, lead is not considered a COC in surface water at the Pond East EU; therefore, NFA is required to protect ecological receptors from exposure to the Pond East EU surface water, and no ecological COCs were identified in surface water for this EU.

Pond West A Surface Water

Copper, lead, and caprolactam were identified as COPECs in surface water at the Pond West A EU (**Table 4-17**). Although copper slightly exceeded its surface water ESV, lead was identified as a PBT chemical with an MDC below its surface water ESV, and caprolactam was identified as a COPEC due to lack of a surface water ESV. Because lead (27 µg/L) is well below its surface water ESV (120 µg/L) and caprolactam lacks a surface water ESV and was only detected twice, neither are considered COCs. Although the MDC for copper (24 µg/L) slightly exceeds its surface water ESV (14 µg/L), it was only detected in two of four locations, and the average concentration (16.1 µg/L) is essentially equal to the surface water ESV. Therefore, NFA is required to protect ecological receptors from exposure to the Pond West A EU surface water, and no ecological COCs were identified in surface water for this EU.

Pond West B Surface Water

Lead and caprolactam were identified as COPECs in surface water at the Pond West B EU (**Table 4-17**). Lead was identified as a PBT chemical with an MDC (28 µg/L) below its surface water ESV (120 µg/L), and caprolactam was identified as a COPEC due to lack of a surface water ESV. Because lead is well below its surface water ESV and caprolactam lacks an ESV and was only detected once, neither are considered COCs. Therefore, NFA is required to protect ecological receptors from exposure to the Pond West B EU surface water, and no ecological COCs were identified in surface water for this EU.

4.3 RISK ASSESSMENT CONCLUSIONS

4.3.1 Conclusions of Streamlined Human Health Evaluation

The streamlined human health evaluation consisted of comparison of environmental sampling results to background concentrations and risk-based SLs.

4.3.1.1 Soil

Soil at the ECCL Firing Range was aggregated into five EUs based on past use:

Drainage Ditch – Metals and SVOCs were detected in soil at the drainage ditch. All of the detected concentrations were below background and/or Residential RSLs. No COCs are identified for remediation in surface soil at the Drainage Ditch.

Former Clubhouse and Garage – No COCs were identified as requiring remediation for the surface soil.

Pistol Range (East) – Lead was identified as a COC requiring remediation in the surface and subsurface soil at this EU. Although antimony exceeded the RSL and background at two soil locations, these locations are co-located with elevated concentrations of lead, and remediation of lead will address elevated concentrations of antimony.

Pistol Range (West) – Lead was identified as a COC requiring remediation in the surface soil at this EU. No COCs were identified as requiring remediation it the subsurface soil. Although antimony exceeded the RSLs and background at three soil locations, these locations were co-located with elevated concentrations of lead, and remediation of lead would address elevated concentrations of antimony.

Rifle Range – Lead was identified as a COC requiring remediation in the surface and subsurface soil at this EU. Elevated concentrations of antimony and cPAHs were detected; however, the EPCs of these chemicals are less than RSLs and the locations with elevated concentrations are co-located with elevated concentrations of lead. Remediation of lead will address the elevated concentrations of antimony and cPAHs.

Trap and Skeet Range – Lead and the cPAHs benz(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, dibenzo(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene were identified as COCs requiring remediation in the surface soil (0 to 2 ft bgs) of the Trap and Skeet Range. No COCs were identified for remediation in the subsurface soil (>2 ft bgs). Although elevated concentrations of antimony and arsenic were detected, these locations are co-located with elevated concentrations of lead or cPAHs. Remediation of lead and cPAHs will address the elevated concentrations of antimony and arsenic.

4.3.1.2 Sediment

Sediment at the ECCL Firing Range was aggregated into three EUs based on past use, geography, and drainage from the firing ranges:

Pond East – Pond East is a man-made pond south of the trap field shooting points. All of the detected chemical concentrations were below SRVs, soil background, and/or Residential RSLs. No COCs are identified for remediation in sediment at Pond East.

Pond West A – Pond West A is a small wetland west of the Trap and Skeet Range. Although the exposure to the sediment in the pond is limited, lead was identified as a COC for remediation in the wetland based on comparison to Residential soil RSLs as part of the soil remediation at the Trap and Skeet Range.

Pond West B – Pond West B is a small wetland west of the Trap and Skeet Range that has a hydraulic connection with Pond West A. All of the detected chemical concentrations were below SRVs, soil background, and/or Residential RSLs. No COCs are identified for remediation in sediment at Pond West B.

4.3.1.3 Surface Water

Surface water samples were co-located with a subset of the sediment samples discussed above. With the exception of lead in the Pond West A and Pond West B EUs, all of the detected concentrations were below Ohio WQC, tap water RSLs, or MCLs. The MDCs of lead were less than 2 times the tap water RSL at the Pond West A and Pond West B EUs. These ponds do not serve as a drinking water source, and the exposures from incidental ingestion of pond water during wading is much lower than the exposure to drinking water. As a result, no COCs are identified for remediation for surface water for any EU.

4.3.1.4 Groundwater

No COPCs are identified for remediation in groundwater.

4.3.2 Conclusions of Streamlined Ecological Evaluation

The streamlined ecological evaluation consisted of comparison of environmental sampling results to background concentrations and ESVs and additional evaluation of COPECs to identify COCs. Ecological COCs identified for each medium aggregated by EU are summarized in **Table 4-18** and are presented below.

4.3.2.1 Soil

Soil at the ECCL Firing Range was aggregated into six EUs based on past use:

- Drainage Ditch – No ecological COCs are identified for remediation in surface soil at the Drainage Ditch.
- Former Clubhouse and Garage – No ecological COCs were identified as requiring remediation for the surface soil.
- Pistol Range (East) – Lead was identified as an ecological COC requiring remediation in the surface and subsurface soil at this EU. Antimony also was identified as an ecological COC requiring remediation in the surface soil at this EU.

- Pistol Range (West) – Lead and copper were identified as ecological COCs requiring remediation in the surface at this EU. No ecological COCs were identified in the shallow subsurface soil.
- Rifle Range – Lead was identified as an ecological COC requiring remediation in the surface and subsurface soil at this EU. Antimony and copper also were identified as ecological COCs requiring remediation in the surface soil at this EU.
- Trap and Skeet Range – Antimony, arsenic, lead, benz(*a*)anthracene, benzo(*a*)pyrene, and chrysene were identified as ecological COCs requiring remediation in the surface soil of the Trap and Skeet Range. No COCs were identified for remediation in the subsurface soil.

4.3.2.2 Sediment

Sediment at the ECCL Firing Range was aggregated into three EUs based on past use, geography, and drainage from the firing ranges:

- Pond East – Pond East is a man-made pond south of the trap field shooting points. While four inorganic and three organic chemicals were identified as COPECs in sediment at the Pond East EU, this pond had the smallest exceedances in sediment of the three EUs. The exceedances are of such a low magnitude that any removal activity would provide limited benefit to the aquatic environment but potentially endanger the surrounding wetlands that contain state potentially threatened plants (EnviroScience 2019). A few examples of the small exceedances include arsenic and copper where the average concentrations are only 1.9 and 1.5 times the SRVs, respectively. The greatest exceedance is 2-methylnaphthalene, with an MDC that is 19 times its sediment ESV and an average concentration 13 times its ESV. However, the sediment MDC (0.38 mg/kg) is an order of magnitude less than the soil ESV for 2-methylnaphthalene (3.24 mg/kg) and below the average soil concentration of 0.425 mg/kg in the adjacent Trap and Skeet Range EU. No ecological COCs are identified for remediation in sediment at Pond East.
- Pond West A – Pond West A is a small wetland west of the Trap and Skeet Range. Lead and copper are identified as ecological COCs for remediation in the wetland based on magnitude of exceedances despite the ORAM Category 2 rating (see Pond West B bullet below).
- Pond West B – Pond West B is a small wetland west of the Trap and Skeet Range that has a hydraulic connection with Pond West A. Five inorganics were identified as COPECs in sediment at the Pond West B EU but the exceedances were generally considered limited (i.e., average concentrations are 1 to 2 times the SRVs). While the greatest exceedance in sediment was for lead, this inorganic may be remediated in soil at the Rifle Range and the Skeet Range, which are near Pond West B. Reducing lead concentrations at these two EUs would be beneficial in reducing future lead concentrations in Pond West B and allows the current ecosystem to remain intact. Pond West (A and B) is an ORAM Category 2 wetland (EnviroScience 2019), indicating moderate quality; minimalizing disturbances is recommended. No ecological COCs are identified for remediation in sediment at Pond West B.

4.3.2.3 Surface Water

Surface water samples were co-located with a subset of the sediment samples discussed above. With the exception of copper in the Pond West A EU, all of the detected concentrations were below surface water ESVs. In addition, the average concentration (16.1 µg/L) of copper is essentially equal to the ESV. Lead was identified as a COPEC in all three surface water EUs because it is a PBT chemical. However, lead was always detected well below its ESV. Caprolactam was identified as a COPEC in two surface water EUs due to lack of an ESV but was infrequently detected. As a result, no ecological COCs are identified for remediation for surface water for any EU.

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations			BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
			Min	Max	Avg					
Drainage Ditch Surface Soil										
Antimony	7440-36-0	3/ 4	1	4.3	2.71	9.3	0	3.1	No	Below BKG
Arsenic	7440-38-2	4/ 4	9.3	28	17.1	36.5	0	0.68	No	Below BKG
Copper	7440-50-8	4/ 4	67	170	117	56.2	4	310	No	Below SL
Iron	7439-89-6	4/ 4	9500	30000	20400	234000	0	5500	No	Below BKG
Lead	7439-92-1	4/ 4	100	380	220	48.6	4	400	No	Below SL
Zinc	7440-66-6	4/ 4	36	320	132	322	0	2300	No	Below BKG
1,1'-Biphenyl	92-52-4	1/ 4	0.0089	0.0089	0.0362	--	--	4.7	No	Below SL
2-Methylnaphthalene	91-57-6	2/ 4	0.0063	0.094	0.0282	--	--	24	No	Below SL
Acenaphthylene[c]	208-96-8	1/ 4	0.01	0.01	0.00725	--	--	180	No	Below SL
Anthracene	120-12-7	1/ 4	0.0098	0.0098	0.0072	--	--	1800	No	Below SL
Benz(*a*)anthracene	56-55-3	4/ 4	0.0094	0.061	0.0263	--	--	1.1	No	Below SL
Benzaldehyde	100-52-7	2/ 4	0.029	0.079	0.0745	--	--	170	No	Below SL
Benzo(*a*)pyrene	50-32-8	4/ 4	0.012	0.051	0.0275	--	--	0.11	No	Below SL
Benzo(*b*)fluoranthene	205-99-2	3/ 4	0.022	0.091	0.0384	--	--	1.1	No	Below SL
Benzo(*g,h,i*)perylene[c]	191-24-2	2/ 4	0.018	0.02	0.0129	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	2/ 4	0.011	0.027	0.0129	--	--	11	No	Below SL
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 4	0.087	0.087	0.0718	--	--	39	No	Below SL
Chrysene	218-01-9	4/ 4	0.016	0.084	0.0468	--	--	110	No	Below SL
Dibenzofuran	132-64-9	3/ 4	0.015	0.057	0.0396	--	--	7.3	No	Below SL
Di-*n*-butyl phthalate	84-74-2	3/ 4	0.033	0.05	0.0485	--	--	630	No	Below SL
Fluoranthene	206-44-0	3/ 4	0.019	0.12	0.0423	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	2/ 4	0.011	0.018	0.0106	--	--	1.1	No	Below SL
Naphthalene	91-20-3	1/ 4	0.02	0.02	0.0095	--	--	3.8	No	Below SL
Phenanthrene[c]	85-01-8	4/ 4	0.0092	0.1	0.0458	--	--	180	No	Below SL
Phenol	108-95-2	2/ 4	0.041	0.069	0.0516	--	--	1900	No	Below SL
Pyrene	129-00-0	4/ 4	0.015	0.17	0.06	--	--	180	No	Below SL

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations Min	Max	Avg	BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
Former Clubhouse and Garage (Surface Soil)										
Aluminum	**7429-90-5**	**4/ 4**	**5000**	**19500**	**10000**	**15500**	**1**	**7700**	**Yes**	**Exceeds SL**
Arsenic	7440-38-2	4/ 4	6.7	16	11.7	36.5	0	0.68	No	Below BKG
Barium	7440-39-3	4/ 4	37	80	61	826	0	1500	No	Below BKG
Beryllium	7440-41-7	2/ 4	0.65	5.15	1.57	1	1	16	No	Below SL
Calcium	7440-70-2	4/ 4	11500	91000	32600	52300	1	--	No	Essential nutrient
Chromium	7440-47-3	4/ 4	8.6	14	10.6	29	0	--	No	Below BKG
Cobalt	7440-48-4	4/ 4	4.4	61.5	22.2	116	0	2.3	No	Below BKG
Iron	7439-89-6	4/ 4	11000	39000	22800	234000	0	5500	No	Below BKG
Lead	7439-92-1	4/ 4	22	90	48.8	48.6	1	400	No	Below SL
Magnesium	7439-95-4	4/ 4	1800	9200	4430	10400	0	--	No	Essential nutrient
Manganese	7439-96-5	4/ 4	240	1800	671	3510	0	180	No	Below BKG
Nickel	7440-02-0	4/ 4	14	135	47.8	55.1	1	150	No	Below SL
Potassium	7440-09-7	3/ 4	860	1100	1020	3390	0	--	No	Essential nutrient
Thallium	**7440-28-0**	**1/ 4**	**3.4**	**3.4**	**1.68**	**1.3**	**1**	**0.078**	**Yes**	**Exceeds SL**
Vanadium	7440-62-2	4/ 4	12	31	20.5	40.9	0	39	No	Below BKG
Zinc	7440-66-6	4/ 4	43	275	106	322	0	2300	No	Below BKG
2-Methylnaphthalene	91-57-6	1/ 4	0.037	0.037	0.0217	--	--	24	No	Below SL
Acenaphthene	83-32-9	1/ 4	0.0905	0.0905	0.0291	--	--	360	No	Below SL
Acenaphthylene[c]	208-96-8	1/ 4	0.175	0.175	0.0503	--	--	180	No	Below SL
Anthracene	120-12-7	2/ 4	0.016	0.465	0.125	--	--	1800	No	Below SL
Benz(*a*)anthracene	**56-55-3**	**3/ 4**	**0.063**	**2**	**0.537**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Benzo(*a*)pyrene	**50-32-8**	**3/ 4**	**0.061**	**1.8**	**0.489**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Benzo(*b*)fluoranthene	**205-99-2**	**4/ 4**	**0.018**	**2.7**	**0.724**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Benzo(*g,h,i*)perylene[c]	191-24-2	3/ 4	0.037	0.995	0.277	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	2/ 4	0.04	1.07	0.282	--	--	11	No	Below SL
Carbazole	86-74-8	1/ 4	0.22	0.22	0.0763	--	--	--	--	No SL
Chrysene	218-01-9	3/ 4	0.1	2.1	0.59	--	--	110	No	Below SL
Dibenz(*a,h*)anthracene	**53-70-3**	**2/ 4**	**0.018**	**0.325**	**0.0903**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations Min	Max	Avg	BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
Fluoranthene	206-44-0	3/ 4	0.02	4.9	1.28	--	--	240	No	
Fluorene	86-73-7	1/ 4	0.16	0.16	0.0465	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	2/ 4	0.055	1.005	0.27	--	--	1.1	No	Below SL
Naphthalene	91-20-3	1/ 4	0.069	0.069	0.0297	--	--	3.8	No	Below SL
Phenanthrene[c]	85-01-8	2/ 4	0.1	2.55	0.667	--	--	180	No	Below SL
Phenol	108-95-2	1/ 4	0.21	0.21	0.0941	--	--	1900	No	Below SL
Pyrene	129-00-0	3/ 4	0.028	3.4	0.894	--	--	180	No	Below SL
Acetone	67-64-1	2/ 2	0.2	0.205	0.203	--	--	6100	No	Below SL
Methylcyclohexane	108-87-2	1/ 2	0.012	0.012	0.009	--	--	--	--	No SL
Toluene	108-88-3	1/ 2	0.011	0.011	0.00701	--	--	490	No	Below SL
Pistol Range (East)										
Surface Soil										
Antimony	**7440-36-0**	**26/ 28**	**0.55**	**460**	**21**	**9.3**	**2**	**3.1**	**Yes**	**Exceeds SL**
Arsenic	7440-38-2	28/ 28	4.4	30	17.8	36.5	0	0.68	No	Below BKG
Copper	**7440-50-8**	**28/ 28**	**33**	**580**	**118**	**56.2**	**19**	**310**	**Yes**	**Exceeds SL**
Iron	7439-89-6	28/ 28	10000	29000	20400	234000	0	5500	No	Below BKG
Lead	**7439-92-1**	**37/ 37**	**13**	**88000**	**4880**	**48.6**	**34**	**400**	**Yes**	**Exceeds SL**
Tin	7440-31-5	9/ 28	3.4	320	16.3	--	--	4700	No	Below SL
Zinc	7440-66-6	28/ 28	12	250	62.7	322	0	2300	No	Below BKG
1,1'-Biphenyl	92-52-4	3/ 27	0.0042	0.0079	0.0361	--	--	4.7	No	Below SL
2,4-Dinitrotoluene	121-14-2	1/ 27	0.034	0.034	0.15	--	--	1.7	No	Below SL
2-Methylnaphthalene	91-57-6	23/ 27	0.0055	0.45	0.108	--	--	24	No	Below SL
Acenaphthylene[c]	208-96-8	5/ 33	0.012	0.041	0.00938	--	--	180	No	Below SL
Acetophenone	98-86-2	4/ 27	0.011	0.013	0.0691	--	--	780	No	Below SL
Anthracene	120-12-7	6/ 33	0.0056	0.02	0.00743	--	--	1800	No	Below SL
Benz(*a*)anthracene	56-55-3	25/ 33	0.0059	0.16	0.0315	--	--	1.1	No	Below SL
Benzaldehyde	100-52-7	14/ 27	0.015	0.47	0.0894	--	--	170	No	Below SL
Benzo(*a*)pyrene	**50-32-8**	**25/ 33**	**0.0064**	**0.18**	**0.0383**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Benzo(*b*)fluoranthene	205-99-2	26/ 33	0.0099	0.25	0.0519	--	--	1.1	No	Below SL

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations			BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
			Min	Max	Avg					
Benzo(*g,h,i*)perylene[c]	191-24-2	21/ 33	0.0083	0.11	0.0243	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	22/ 33	0.0044	0.091	0.0194	--	--	11	No	Below SL
Bis(2-ethylhexyl)phthalate	117-81-7	13/ 27	0.023	0.65	0.0715	--	--	39	No	Below SL
Caprolactam	105-60-2	1/ 27	0.059	0.059	0.249	--	--	3100	No	Below SL
Chrysene	218-01-9	28/ 33	0.0077	0.3	0.0567	--	--	110	No	Below SL
Dibenz(*a,h*)anthracene	53-70-3	2/ 33	0.0063	0.023	0.00638	--	--	0.11	No	Below SL
Dibenzofuran	132-64-9	6/ 27	0.012	0.024	0.0361	--	--	7.3	No	Below SL
Diethyl phthalate	84-66-2	2/ 27	0.032	0.044	0.0535	--	--	5100	No	Below SL
Di-*n*-butyl phthalate	84-74-2	7/ 27	0.018	0.44	0.0734	--	--	630	No	Below SL
Fluoranthene	206-44-0	27/ 33	0.0083	0.17	0.0378	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	16/ 33	0.0067	0.06	0.0158	--	--	1.1	No	Below SL
Isophorone	78-59-1	1/ 27	0.03	0.03	0.0387	--	--	570	No	Below SL
Naphthalene	91-20-3	18/ 33	0.0081	0.16	0.0322	--	--	3.8	No	Below SL
N-Nitrosodiphenylamine	86-30-6	6/ 27	0.054	0.67	0.107	--	--	110	No	Below SL
Phenanthrene[c]	85-01-8	28/ 33	0.0069	0.17	0.048	--	--	180	No	Below SL
Pyrene	129-00-0	29/ 33	0.0085	0.16	0.0446	--	--	180	No	Below SL
Subsurface Soil										
Lead	**7439-92-1**	**4/ 4**	**15**	**1700**	**594**	**48.6**	**3**	**400**	**Yes**	**Exceeds SL**
Benz(*a*)anthracene	56-55-3	1/ 4	0.056	0.056	0.0205	--	--	1.1	No	Below SL
Benzo(*a*)pyrene	50-32-8	1/ 4	0.061	0.061	0.0218	--	--	0.11	No	Below SL
Benzo(*b*)fluoranthene	205-99-2	1/ 4	0.095	0.095	0.0303	--	--	1.1	No	Below SL
Benzo(*g,h,i*)perylene[c]	191-24-2	1/ 4	0.04	0.04	0.0165	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	1/ 4	0.027	0.027	0.0133	--	--	11	No	Below SL
Chrysene	218-01-9	1/ 4	0.11	0.11	0.034	--	--	110	No	Below SL
Fluoranthene	206-44-0	1/ 4	0.086	0.086	0.028	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	1/ 4	0.027	0.027	0.0133	--	--	1.1	No	Below SL
Phenanthrene[c]	85-01-8	1/ 4	0.038	0.038	0.016	--	--	180	No	Below SL
Pyrene	129-00-0	1/ 4	0.078	0.078	0.026	--	--	180	No	Below SL

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations Min	Max	Avg	BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
Pistol Range (West)										
Surface Soil										
Antimony	**7440-36-0**	**29/ 39**	**0.58**	**57**	**9.31**	**9.3**	**7**	**3.1**	**Yes**	**Exceeds SL**
Arsenic	7440-38-2	32/ 32	6	29	14.7	36.5	0	0.68	No	Below BKG
Copper	**7440-50-8**	**32/ 32**	**25**	**8700**	**504**	**56.2**	**24**	**310**	**Yes**	**Exceeds SL**
Iron	7439-89-6	32/ 32	6400	29500	18800	234000	0	5500	No	Below BKG
Lead	**7439-92-1**	**45/ 45**	**26**	**29000**	**2300**	**48.6**	**36**	**400**	**Yes**	**Exceeds SL**
Tin	7440-31-5	5/ 32	4.3	35	6.7	--	--	4700	No	Below SL
Zinc	7440-66-6	32/ 32	13.5	1300	132	322	3	2300	No	Below SL
1,1'-Biphenyl	92-52-4	3/ 28	0.0072	0.014	0.0349	--	--	4.7	No	Below SL
2-Methylnaphthalene	91-57-6	22/ 28	0.0099	0.53	0.147	--	--	24	No	Below SL
Acenaphthene	83-32-9	3/ 45	0.018	0.045	0.00833	--	--	360	No	Below SL
Acenaphthylene[c]	208-96-8	5/ 45	0.013	0.08	0.0102	--	--	180	No	Below SL
Acetophenone	98-86-2	1/ 28	0.013	0.013	0.0718	--	--	780	No	Below SL
Anthracene	120-12-7	9/ 45	0.0068	0.17	0.0153	--	--	1800	No	Below SL
Benz(*a*)anthracene	56-55-3	31/ 45	0.0055	0.68	0.0728	--	--	1.1	No	Below SL
Benzaldehyde	100-52-7	10/ 28	0.015	0.66	0.109	--	--	170	No	Below SL
Benzo(*a*)pyrene	**50-32-8**	**34/ 45**	**0.0074**	**0.6**	**0.0832**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Benzo(*b*)fluoranthene	**205-99-2**	**39/ 45**	**0.0097**	**1.4**	**0.131**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Benzo(*g,h,i*)perylene[c]	191-24-2	28/ 45	0.011	0.3	0.0415	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	28/ 45	0.0051	0.6	0.0486	--	--	11	No	Below SL
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 28	2.2	2.2	0.139	--	--	39	No	Below SL
Butyl benzyl phthalate	85-68-7	2/ 28	0.024	0.81	0.0781	--	--	290	No	Below SL
Carbazole	86-74-8	1/ 28	0.084	0.084	0.0376	--	--	--	--	No SL
Chrysene	218-01-9	38/ 45	0.012	3.9	0.191	--	--	110	No	Below SL
Dibenz(*a,h*)anthracene	53-70-3	6/ 45	0.017	0.097	0.0108	--	--	0.11	No	Below SL
Dibenzofuran	132-64-9	5/ 28	0.0061	0.053	0.0353	--	--	7.3	No	Below SL
Diethyl phthalate	84-66-2	2/ 28	0.042	0.046	0.0515	--	--	5100	No	Below SL
Di-*n*-butyl phthalate	84-74-2	17/ 28	0.017	0.25	0.0552	--	--	630	No	Below SL

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations Min	Max	Avg	BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
Fluoranthene	206-44-0	38/ 45	0.0091	2.1	0.131	--	--	240	No	Below SL
Fluorene	86-73-7	1/ 45	0.073	0.073	0.00789	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	24/ 45	0.002	0.21	0.0307	--	--	1.1	No	Below SL
Naphthalene	91-20-3	26/ 45	0.0049	0.18	0.0382	--	--	3.8	No	Below SL
N-Nitrosodiphenylamine	86-30-6	8/ 28	0.042	0.28	0.065	--	--	110	No	Below SL
Phenanthrene[c]	85-01-8	37/ 45	0.0078	0.88	0.0822	--	--	180	No	Below SL
Pyrene	129-00-0	40/ 45	0.0099	1.6	0.124	--	--	180	No	Below SL
Subsurface Soil										
Lead	7439-92-1	4/ 4	5.1	150	58.8	48.6	2	400	No	Below SL
Rifle Range										
Surface Soil										
Antimony	**7440-36-0**	**32/ 44**	**0.53**	**110**	**13.4**	**9.3**	**12**	**3.1**	**Yes**	**Exceeds SL**
Arsenic	7440-38-2	36/ 36	6.1	34	19.4	36.5	0	0.68	No	Below BKG
Copper	**7440-50-8**	**36/ 36**	**15**	**840**	**188**	**56.2**	**24**	**310**	**Yes**	**Exceeds SL**
Iron	7439-89-6	36/ 36	14000	34000	23800	234000	0	5500	No	Below BKG
Lead	**7439-92-1**	**50/ 50**	**23**	**28000**	**2300**	**48.6**	**37**	**400**	**Yes**	**Exceeds SL**
Zinc	7440-66-6	36/ 36	14	170	44.1	322	0	2300	No	Below BKG
1,1'-Biphenyl	92-52-4	19/ 33	0.0038	0.034	0.0569	--	--	4.7	No	Below SL
2-Methylnaphthalene	91-57-6	32/ 33	0.027	1.3	0.475	--	--	24	No	Below SL
Acenaphthene	83-32-9	6/ 49	0.0093	0.045	0.0114	--	--	360	No	Below SL
Acenaphthylene[c]	208-96-8	12/ 49	0.009	0.043	0.013	--	--	180	No	Below SL
Anthracene	120-12-7	15/ 49	0.0052	0.17	0.0173	--	--	1800	No	Below SL
Benz(*a*)anthracene	**56-55-3**	**27/ 49**	**0.006**	**4.5**	**0.138**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Benzaldehyde	100-52-7	17/ 33	0.015	0.99	0.192	--	--	170	No	Below SL
Benzo(*a*)pyrene	**50-32-8**	**27/ 49**	**0.0076**	**4.9**	**0.15**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Benzo(*b*)fluoranthene	**205-99-2**	**32/ 49**	**0.012**	**2.8**	**0.14**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Benzo(*g,h,i*)perylene[c]	191-24-2	21/ 49	0.0073	1.7	0.0595	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	21/ 49	0.004	0.3	0.0349	--	--	11	No	Below SL

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations			BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
			Min	Max	Avg					
Bis(2-ethylhexyl)phthalate	117-81-7	3/ 33	0.026	0.037	0.109	--	--	39	No	Below SL
Chrysene	218-01-9	37/ 49	0.011	11	0.311	--	--	110	No	Below SL
Dibenz(*a,h*)anthracene	**53-70-3**	**4/ 49**	**0.034**	**0.71**	**0.0261**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Dibenzofuran	132-64-9	20/ 33	0.013	0.065	0.0639	--	--	7.3	No	Below SL
Di-*n*-butyl phthalate	84-74-2	1/ 33	0.22	0.22	0.105	--	--	630	No	Below SL
Fluoranthene	206-44-0	33/ 49	0.01	0.68	0.0842	--	--	240	No	Below SL
Fluorene	86-73-7	6/ 49	0.011	0.043	0.0119	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	16/ 49	0.0048	0.58	0.0335	--	--	1.1	No	Below SL
Naphthalene	91-20-3	38/ 49	0.0082	0.38	0.0974	--	--	3.8	No	Below SL
N-Nitrosodiphenylamine	86-30-6	3/ 33	0.062	0.1025	0.0815	--	--	110	No	Below SL
Phenanthrene[c]	85-01-8	41/ 49	0.0071	0.54	0.175	--	--	180	No	Below SL
Pyrene	129-00-0	39/ 49	0.0077	1.8	0.117	--	--	180	No	Below SL
Subsurface Soil										
Antimony	**7440-36-0**	**2/ 4**	**5.3**	**10**	**4.33**	**9.3**	**1**	**3.1**	**Yes**	**Exceeds SL**
Lead	**7439-92-1**	**6/ 6**	**29**	**1900**	**476**	**48.6**	**5**	**400**	**Yes**	**Exceeds SL**
Anthracene	120-12-7	1/ 6	0.019	0.019	0.0148	--	--	1800	No	Below SL
Benz(*a*)anthracene	56-55-3	3/ 6	0.019	0.082	0.0383	--	--	1.1	No	Below SL
Benzo(*a*)pyrene	50-32-8	2/ 6	0.085	0.094	0.04	--	--	0.11	No	Below SL
Benzo(*b*)fluoranthene	205-99-2	2/ 6	0.11	0.14	0.0518	--	--	1.1	No	Below SL
Benzo(*g,h,i*)perylene[c]	191-24-2	2/ 6	0.063	0.064	0.0313	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	2/ 6	0.057	0.06	0.0297	--	--	11	No	Below SL
Chrysene	218-01-9	4/ 6	0.024	0.14	0.0594	--	--	110	No	Below SL
Dibenz(*a,h*)anthracene	53-70-3	1/ 6	0.022	0.022	0.0153	--	--	0.11	No	Below SL
Fluoranthene	206-44-0	2/ 6	0.21	0.22	0.0818	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	2/ 6	0.059	0.061	0.0302	--	--	1.1	No	Below SL
Naphthalene	91-20-3	4/ 6	0.017	0.16	0.0511	--	--	3.8	No	Below SL
Phenanthrene[c]	85-01-8	6/ 6	0.055	0.24	0.137	--	--	180	No	Below SL
Pyrene	129-00-0	3/ 6	0.021	0.18	0.0672	--	--	180	No	Below SL

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations Min	Max	Avg	BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
Trap and Skeet Ranges										
Surface Soil										
Antimony	**7440-36-0**	**82/ 91**	**0.54**	**10000**	**361**	**9.3**	**28**	**3.1**	**Yes**	**Exceeds SL**
Arsenic	**7440-38-2**	**91/ 91**	**3.7**	**2200**	**107**	**36.5**	**13**	**0.68**	**Yes**	**Exceeds SL**
Copper	7440-50-8	85/ 85	4.2	100	19.9	56.2	4	310	No	Below SL
Iron	7439-89-6	85/ 85	5200	70000	15700	234000	0	5500	No	Below BKG
Lead	**7439-92-1**	**131/ 131**	**6.5**	**100000**	**6170**	**48.6**	**123**	**400**	**Yes**	**Exceeds SL**
Tin	7440-31-5	2/ 85	190	300	11	--	--	4700	No	Below SL
Zinc	7440-66-6	85/ 85	14	690	61.6	322	2	2300	No	Below SL
1,1'-Biphenyl	92-52-4	2/ 85	0.016	0.044	0.644	--	--	4.7	No	Below SL
2-Methylnaphthalene	91-57-6	33/ 85	0.0039	8.7	0.425	--	--	24	No	Below SL
2-Methylphenol	95-48-7	1/ 85	0.014	0.014	2.54	--	--	320	No	Below SL
Acenaphthene	83-32-9	25/ 112	0.0098	7.7	0.485	--	--	360	No	Below SL
Acenaphthylene[c]	208-96-8	7/ 112	0.0056	0.1	0.0795	--	--	180	No	Below SL
Acetophenone	98-86-2	1/ 85	0.014	0.014	1.28	--	--	780	No	Below SL
Anthracene	120-12-7	34/ 112	0.0019	9.6	0.511	--	--	1800	No	Below SL
Benz(*a*)anthracene	**56-55-3**	**100/ 112**	**0.0043**	**200**	**11.6**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Benzaldehyde	100-52-7	26/ 85	0.014	2.8	1.27	--	--	170	No	Below SL
Benzo(*a*)pyrene	**50-32-8**	**102/ 112**	**0.0051**	**220**	**14.1**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Benzo(*b*)fluoranthene	**205-99-2**	**104/ 112**	**0.0075**	**200**	**12.1**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Benzo(*g,h,i*)perylene[c]	191-24-2	81/ 112	0.0041	140	7.1	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	**207-08-9**	**87/ 112**	**0.004**	**65**	**3.63**	**--**	**--**	**11**	**Yes**	**Exceeds SL**
Bis(2-ethylhexyl)phthalate	117-81-7	18/ 85	0.025	1.5	0.912	--	--	39	No	Below SL
Carbazole	86-74-8	10/ 89	0.035	10	0.78	--	--	--	--	No SL
Chrysene	**218-01-9**	**101/ 112**	**0.0068**	**370**	**19.8**	**--**	**--**	**110**	**Yes**	**Exceeds SL**
Dibenz(*a,h*)anthracene	**53-70-3**	**40/ 112**	**0.0094**	**42**	**2.38**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Dibenzofuran	132-64-9	18/ 85	0.0036	1.6	0.564	--	--	7.3	No	Below SL
Di-*n*-butyl phthalate	84-74-2	20/ 85	0.017	0.1175	0.893	--	--	630	No	Below SL

Table 4-1. Summary Statistics and Human Health Risk Assessment Data Screen for Soil (Continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Detected Concentrations			BKG[a]	Samples Exceeding BKG	Screening Level[b] (HQ=0.1, TR=1E-6)	HH COPC? (Yes/No)	Justification
			Min	Max	Avg					
Fluoranthene	206-44-0	101/ 112	0.01	130	6.75	--	--	240	No	Below SL
Fluorene	86-73-7	23/ 112	0.0052	3.2	0.184	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	**193-39-5**	**71/ 112**	**0.0043**	**88**	**4.26**	**--**	**--**	**1.1**	**Yes**	**Exceeds SL**
Naphthalene	91-20-3	22/ 112	0.0044	2	0.122	--	--	3.8	No	Below SL
N-Nitrosodiphenylamine	86-30-6	3/ 85	0.1345	0.45	0.651	--	--	110	No	Below SL
Pentachlorophenol	87-86-5	4/ 84	0.048	0.12	1.93	--	--	1	No	Below SL
Phenanthrene[c]	85-01-8	89/ 112	0.0052	54	2.73	--	--	180	No	Below SL
Phenol	108-95-2	5/ 85	0.015	0.027	0.643	--	--	1900	No	Below SL
Pyrene	**129-00-0**	**107/ 112**	**0.007**	**200**	**10.1**	**--**	**--**	**180**	**Yes**	**Exceeds SL**
Subsurface Soil										
Anthracene	120-12-7	1/ 8	0.022	0.022	0.0107	--	--	1800	No	Below SL
Benz(*a*)anthracene	56-55-3	7/ 8	0.091	0.76	0.272	--	--	1.1	No	Below SL
Benzo(*a*)pyrene	**50-32-8**	**7/ 8**	**0.1295**	**0.91**	**0.316**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Benzo(*b*)fluoranthene	205-99-2	7/ 8	0.059	0.36	0.171	--	--	1.1	No	Below SL
Benzo(*g,h,i*)perylene[c]	191-24-2	7/ 8	0.08	0.47	0.178	--	--	180	No	Below SL
Benzo(*k*)fluoranthene	207-08-9	6/ 8	0.018	0.11	0.04	--	--	11	No	Below SL
Chrysene	218-01-9	7/ 8	0.15	1.3	0.484	--	--	110	No	Below SL
Dibenz(*a,h*)anthracene	**53-70-3**	**7/ 8**	**0.026**	**0.15**	**0.0618**	**--**	**--**	**0.11**	**Yes**	**Exceeds SL**
Fluoranthene	206-44-0	7/ 8	0.019	0.15	0.0587	--	--	240	No	Below SL
Indeno(1,2,3-*cd*)pyrene	193-39-5	7/ 8	0.035	0.14	0.0692	--	--	1.1	No	Below SL
Phenanthrene[c]	85-01-8	4/ 8	0.033	0.11	0.0373	--	--	180	No	Below SL
Pyrene	129-00-0	7/ 8	0.065	0.61	0.196	--	--	180	No	Below SL

All units are milligrams per kilogram (mg/kg).

[a] Background screening levels from IT, 1998, Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio.
[b] Residential regional screening levels (RSLs) from table published May 2019 (USEPA 2019), unless otherwise noted, corresponding to a TR of 1E-06 and a target HQ of 0.1.
[c] No reference dose or cancer potency factors are available for this polycyclic aromatic hydrocarbon (PAH); therefore, the RSL value for pyrene was used (NDEP 2006).

Avg = Average Detected Concentration
BKG = Background
CAS = Chemical Abstracts Service
COPC = Chemical of Potential Concern
HH = Human Health
HQ = Hazard Quotient
Max = Maximum Detected Concentration
Min = Minimum Detected Concentration
SL = Screening Level
TR = Target Cancer Risk
-- = No Value Available
Bold = Chemical is a COPC

Table 4-2. Summary Statistics and Human Health Risk Assessment Data Screen for Sediment

Analyte	CAS Number	Freq of Detect	Detected Concentrations Min	Max	Avg	Ohio SRV	Samples Exceeding SRV	Soil BKG[a]	Samples Exceeding Soil BKG	Residential Soil RSL[b] (HQ=1, TR=1E-6)	Potential HH Concern? (Yes/No)	Justification
Pond East												
Antimony	7440-36-0	3/ 3	0.93	1.3	1.08	0.84	3	9.3	0	31 n	No	Below RSL and Soil BKG
Arsenic	7440-38-2	3/ 3	9.6	31	21.2	11	2	36.5	0	0.68 c	No	Below Soil BKG
Copper	7440-50-8	3/ 3	39	88	64.3	42	2	56.2	1	3100 n	No	Below RSL
Iron	7439-89-6	3/ 3	15500	41000	30200	44000	0	234000	0	55000 n	No	Below SRV and Soil BKG
Lead	7439-92-1	3/ 3	20	29	25.3	47	0	48.6	0	400 L	No	Below SRV and Soil BKG
Zinc	7440-66-6	3/ 3	22	58	39.7	190	0	322	0	23000 n	No	Below SRV and Soil BKG
1,1'-Biphenyl	92-52-4	2/ 3	0.013	0.018	0.0259	--	--	--	--	47 n	No	Below RSL
2-Methylnaphthalene	91-57-6	3/ 3	0.092	0.38	0.264	--	--	--	--	240 n	No	Below RSL
Anthracene	120-12-7	1/ 3	0.012	0.012	0.00775	--	--	--	--	18000 n	No	Below RSL
Benz(*a*)anthracene	56-55-3	2/ 3	0.028	0.061	0.0313	--	--	--	--	1.1 c	No	Below RSL
Benzo(*a*)pyrene	50-32-8	2/ 3	0.043	0.084	0.044	--	--	--	--	0.11 c	No	Below RSL
Benzo(*b*)fluoranthene	205-99-2	2/ 3	0.037	0.09	0.044	--	--	--	--	1.1 c	No	Below RSL
Benzo(*g,h,i*)perylene	191-24-2	2/ 3	0.0325	0.055	0.0308	--	--	--	--	1800 n	No	Below RSL
Benzo(*k*)fluoranthene	207-08-9	2/ 3	0.0125	0.034	0.0172	--	--	--	--	11 c	No	Below RSL
Chrysene	218-01-9	3/ 3	0.031	0.098	0.0617	--	--	--	--	110 c	No	Below RSL
Dibenzofuran	132-64-9	1/ 3	0.019	0.019	0.0351	--	--	--	--	73 n	No	Below RSL
Fluoranthene	206-44-0	3/ 3	0.011	0.12	0.0518	--	--	--	--	2400 n	No	Below RSL
Indeno(1,2,3-*cd*)pyrene	193-39-5	2/ 3	0.0165	0.04	0.0205	--	--	--	--	1.1 c	No	Below RSL
Naphthalene	91-20-3	3/ 3	0.037	0.12	0.0813	--	--	--	--	3.8 c	No	Below RSL
Phenanthrene[c]	85-01-8	3/ 3	0.039	0.16	0.116	--	--	--	--	1800 n	No	Below RSL
Pyrene	129-00-0	3/ 3	0.0375	0.12	0.0732	--	--	--	--	1800 n	No	Below RSL
Pond West A												
Arsenic	7440-38-2	9/ 9	3.1	24	11.6	11	4	36.5	0	0.68 c	No	Below Soil BKG
Copper	7440-50-8	4/ 4	200	540	390	42	4	56.2	4	3100 n	No	Below RSL
Iron	7439-89-6	4/ 4	24000	53000	34800	44000	1	234000	0	55000 n	No	Below RSL and Soil BKG
Lead	**7439-92-1**	**9/ 9**	**62**	**3500**	**988**	**47**	**9**	**48.6**	**9**	**400 L**	**Yes**	**Exceeds RSL, SRV, and Soil BKG**
Zinc	7440-66-6	4/ 4	250	480	375	190	4	322	3	23000 n	No	Below RSL
2-Methylnaphthalene	91-57-6	1/ 4	0.019	0.019	0.0268	--	--	--	--	240 n	No	Below RSL
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 4	0.12	0.12	0.249	--	--	--	--	39 c	No	Below RSL
Caprolactam	105-60-2	1/ 4	0.31	0.31	1.13	--	--	--	--	31000 n	No	Below RSL

Table 4-2. Summary Statistics and Human Health Risk Assessment Data Screen for Sediment (Continued)

Analyte	CAS Number	Freq of Detect	Detected Concentrations			Ohio SRV	Samples Exceeding SRV	Soil BKG[a]	Samples Exceeding Soil BKG	Residential Soil RSL[b] (HQ=1, TR=1E-6)	Potential HH Concern? (Yes/No)	Justification
Di-*n*-butyl phthalate	84-74-2	1/ 4	0.1	0.1	0.244	--	--	--	--	6300 n	No	Below RSL
Fluoranthene	206-44-0	2/ 4	0.027	0.03	0.0313	--	--	--	--	2400 n	No	Below RSL
Phenanthrene[c]	85-01-8	1/ 4	0.016	0.016	0.026	--	--	--	--	1800 n	No	Below RSL
Pyrene	129-00-0	2/ 4	0.024	0.027	0.0298	--	--	--	--	1800 n	No	Below RSL
Pond West B												
Antimony	7440-36-0	2/ 2	1.7	2.2	1.95	0.84	2	9.3	0	31 n	No	Below RSL and Soil BKG
Arsenic	7440-38-2	2/ 2	9	13	11	11	1	36.5	0	0.68 c	No	Below Soil BKG
Copper	7440-50-8	2/ 2	78	100	89	42	2	56.2	2	3100 n	No	Below RSL
Iron	7439-89-6	2/ 2	8800	13000	10900	44000	0	234000	0	55000 n	No	Below SRV and Soil BKG
Lead	7439-92-1	2/ 2	270	330	300	47	2	48.6	2	400 L	No	Below RSL
Zinc	7440-66-6	2/ 2	220	260	240	190	2	322	0	23000 n	No	Below RSL and Soil BKG
Benzo(*a*)pyrene	50-32-8	1/ 2	0.012	0.012	0.011	--	--	--	--	0.11 c	No	Below RSL
Benzo(*b*)fluoranthene	205-99-2	1/ 2	0.015	0.015	0.0125	--	--	--	--	1.1 c	No	Below RSL
Chrysene	218-01-9	1/ 2	0.012	0.012	0.011	--	--	--	--	110 c	No	Below RSL
Fluoranthene	206-44-0	2/ 2	0.012	0.024	0.018	--	--	--	--	2400 n	No	Below RSL
Pyrene	129-00-0	1/ 2	0.016	0.016	0.013	--	--	--	--	1800 n	No	Below RSL

All units are milligrams per kilogram (mg/kg).

[a] Background screening levels from IT, 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio*.
[b] Residential regional screening levels (RSLs) from table published May 2019 (USEPA 2019), unless otherwise noted, corresponding to a TR of 1E-06 and a target HQ of 1.
[c] No reference dose or cancer potency factors are available for this polycyclic aromatic hydrocarbon (PAH); therefore, the RSL value for pyrene was used (NDEP 2006).

-- = No Value Available
Avg = Average Detected Concentration
BKG = Background
CAS = Chemical Abstracts Service
COPC = Chemical of Potential Concern
HH = Human Health
HQ = Hazard Quotient
Max = Maximum Detected Concentration
Min = Minimum Detected Concentration
SL = Screening Level
SRV = Sediment Reference Value from Ohio EPA *Guidance for Conducting Ecological Risk Assessments* (revised July 2018)
TR = Target Cancer Risk
Bold = Chemical is a COPC

Table 4-3. Summary Statistics and Human Health Risk Assessment Data Screen for Surface Water

Analyte	CAS Number	Freq of Detect	Detected Concentrations			Screening Criteria				Selected Screening Criteria Source[e]	HH COPC? (Yes/No)	Justification
			Min	Max	Avg[a]	Ohio HH ND WQC[b]	Ohio HH DW WQC[c]	Tapwater RSL[d]	MCL			
Pond East												
Antimony	7440-36-0	1/ 3	0.24	0.24	0.747	4300	6.0	7.8	6	Ohio ND WQC	No	Below risk screening criteria
Arsenic	7440-38-2	3/ 3	0.88	1	0.923	--	10	0.052	10	Ohio DW WQC	No	Below risk screening criteria
Copper	7440-50-8	3/ 3	4	4.2	4.13	1300	--	800	1300	Ohio ND WQC	No	Below risk screening criteria
Iron	7439-89-6	3/ 3	310	320	313	--	300[e]	14000	--	Ohio DW WQC	No	Below risk screening criteria
Lead	7439-92-1	3/ 3	2.4	2.6	2.48	--	--	15	15	RSL	No	Below risk screening criteria
Zinc	7440-66-6	3/ 3	65	67	65.8	69000	9100	6000	--	Ohio ND WQC	No	Below risk screening criteria
Pond West A												
Antimony	7440-36-0	4/ 4	0.26	0.52	0.363	4300	6.0	7.8	6	Ohio ND WQC	No	Below risk screening criteria
Arsenic	7440-38-2	4/ 4	0.62	0.9	0.72	--	10	0.052	10	Ohio DW WQC	No	Below risk screening criteria
Copper	7440-50-8	2/ 4	22	24	16.1	1300	--	800	1300	Ohio ND WQC	No	Below risk screening criteria
Iron	7439-89-6	4/ 4	250	340	283	--	300[e]	14000	--	Ohio DW WQC	No	Below risk screening criteria
Lead	**7439-92-1**	**4/ 4**	**19**	**27**	**22.8**	**--**	**--**	**15**	**15**	**RSL**	**Yes**	**Exceeds screening level**
Tin	7440-31-5	1/ 4	2.3	2.3	4.33	--	--	12000	--	RSL	No	Below risk screening criteria
Zinc	7440-66-6	4/ 4	44	55	50.3	69000	9100	6000	--	Ohio ND WQC	No	Below risk screening criteria
Caprolactam	105-60-2	2/ 4	0.32	0.37	1.42	--	--	9900	--	RSL	No	Below risk screening criteria
Isophorone	78-59-1	1/ 4	0.35	0.35	0.461	26000	360	78	--	Ohio ND WQC	No	Below risk screening criteria
Pond West B												
Arsenic	7440-38-2	2/ 2	0.81	0.87	0.84	--	10	0.052	10	Ohio DW WQC	No	Below risk screening criteria
Copper	7440-50-8	2/ 2	3.9	4.4	4.15	1300	--	800	1300	Ohio ND WQC	No	Below risk screening criteria
Iron	7439-89-6	2/ 2	840	870	855	--	300[e]	14000	--	Ohio DW WQC	No	Below risk screening criteria
Lead	**7439-92-1**	**2/ 2**	**27**	**28**	**27.5**	**--**	**--**	**15**	**15**	**RSL**	**Yes**	**Exceeds screening level**
Zinc	7440-66-6	2/ 2	63	64	63.5	69000	9100	6000	--	Ohio ND WQC	No	Below risk screening criteria
Caprolactam	105-60-2	1/ 2	0.33	0.33	1.57	--	--	9900	--	RSL	No	Below risk screening criteria

All units are micrograms per liter (µg/L).

[a] Average concentration for all samples using 1/2 the detection limit for non-detects.

[b] Ohio Water Quality Criteria for protection of Human Health (fish consumption) for Lake Erie drainage basin from https://epa.ohio.gov/portals/35/rules/01-34.pdf. In the absence of Lake Erie values, Ohio river values were selected.

[c] Ohio Water Quality Criteria for protection of human health (public water supply) for Lake Erie drainage basin from https://epa.ohio.gov/portals/35/rules/01-33.pdf. In the absence of Lake Erie values, Ohio river values were selected.

[d] USEPA tap water RSLs at a target risk level of 1E-06 (c) or target HQ (n) of 1 from http://www2.epa.gov/risk/risk-based-screening-table-generic-tables, dated May 2019.

[e] Ohio Water Quality Criteria for protection of human health (public water supply) for iron is the secondary MCL. This secondary MCL is not toxicity based, is not enforceable, and is not applicable for use for screening iron concentrations as described in the text.

-- = No Value Available
Avg = Average Detected Concentration
CAS = Chemical Abstracts Service
COPC = Chemical of Potential Concern
DW = Drinking Water
HH = Human Health
HQ = Hazard Quotient
Max = Maximum Detected Concentration
MCL = Federal Maximum Contaminant Level for drinking water
Min = Minimum Detected Concentration
ND = Non-detect
RSL = Regional Screening Level
USEPA = U.S. Environmental Protection Agency
WQC = Water Quality Criteria
Bold = Chemical is a COPC

Table 4-4. Summary Statistics and Human Health Risk Assessment Data Screen for Groundwater

Analyte	CAS Number	Freq of Detect	Detected Concentrations			BKG[b]	Samples Exceeding BKG	Screening Criteria			HH COPC? (Yes/No)	Justification
			Min	Max	Avg[a]			Tapwater RSL[c]	MCL [d]	Ohio Drinking Water Criteria [e]		
Non-Filtered												
Naphthalene	91-20-3	1/ 2	0.13	0.13	0.078	--	--	0.17	--	--	No	Below RSL
Phenanthrene	85-01-8	1/ 2	0.093	0.093	0.0595	--	--	120	--	--	No	Below RSL
Filtered (Dissolved)												
Copper	7440-50-8	1/ 1	6	6	6	19.8	0	800	1300	1300	No	Below BKG, RSL, MCL, and Ohio DWS
Iron	7439-89-6	1/ 1	10000	10000	10000	1550	1	14000	--	300[f]	No	Below RSL
Lead	7439-92-1	1/ 1	14	14	14	--	--	15	15	--	No	Below RSL and MCL
Zinc	7440-66-6	1/ 1	170	170	170	507	0	6000	--	9100	No	Below BKG, RSL, and Ohio DWS

All units are micrograms per liter (µg/L).

[a] Average concentration for all samples using 1/2 the detection limit for non-detects.
[b] Background screening levels from IT, 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio*.
[c] USEPA tap water RSLs at a target risk level of 1E-06 (c) or target HQ (n) of 1 from http://www2.epa.gov/risk/risk-based-screening-table-generic-tables, dated May 2019.
[d] USEPA MCLs from http://www2.epa.gov/risk/risk-based-screening-table-generic-tables, dated May 2019.
[e] Ohio drinking water standards the lower of the standards from https://www.epa.ohio.gov/portals/35/rules/01-34.pdf (for fish consumption) and from https://www.epa.ohio.gov/portals/35/rules/01-33.pdf (for drinking water), dated February 2017.
[f] Ohio Water Quality Criteria for protection of human health (public water supply) for iron is the secondary MCL. This secondary MCL is not toxicity based, is not enforceable, and is not applicable for use for screening iron concentrations as described in the text.

-- = No Value Available.
Avg = Average Detected Concentration
BKG = Background
CAS = Chemical Abstracts Service
COPC = Chemical of potential concern
DWS = Drinking Water Standard
HH = Human Health
HQ = Hazard Quotient
Max = Maximum Detected Concentration
MCL = Federal Maximum Contaminant Level for drinking water
Min = Minimum Detected Concentration
RSL = Regional Screening Level
USEPA = U.S. Environmental Protection Agency

Table 4-5. Human Health Risk Assessment COC Screen for Soil

COPC	CAS Number	Freq of Detect	EPC (95UCL)	MDC	RSL[a] HQ =1	RSL[a] Risk=10^{-5}	BKG[b]	EPC Exceed SL? (Yes/No)	MDC Exceed SL? (Yes/No)
Drainage Ditch Surface Soil									
No COPCs	--	--	--	--	--		--	--	--
Former Clubhouse and Garage (Surface Soil)									
Aluminum	7429-90-5	4/ 4	19500	19500	77000	--	15500	No	No
Thallium	**7440-28-0**	**1/ 4**	**3.4**	**3.4**	**0.78**	**--**	**1.3[c]**	**Yes**	**Yes**
Benz(*a*)anthracene	56-55-3	3/ 4	1.8	2.0	--	11	--	No	No
Benzo(*a*)pyrene	**50-32-8**	**3/ 4**	**1.6**	**1.8**	**18**	**1.1**	**--**	**Yes**	**Yes**
Benzo(*b*)fluoranthene	205-99-2	4/ 4	2.7	2.7	--	11	--	No	No
Dibenz(*a,h*)anthracene	53-70-3	2/ 4	0.325	0.325	--	1.1	--	No	No
Pistol Range (East)									
Surface Soil									
Antimony	**7440-36-0**	**26/ 28**	**93**	**460**	**31**	--	**9.3**	**Yes**	**Yes**
Copper	7440-50-8	28/ 28	580	580	3100	--	56.2	No	No
Lead	**7439-92-1**	**37/ 37**	**16000**	**88000**	**400**	--	**48.6**	**Yes**	**Yes**
Benzo(*a*)pyrene	50-32-8	25/ 33	0.057	0.18	18	1.1	--	No	No
Subsurface Soil									
Lead	**7439-92-1**	**4/ 4**	**1480**	**1700**	**400**	**--**	**48.6**	**Yes**	**Yes**
Pistol Range (West)									
Surface Soil									
Antimony	7440-36-0	29/ 39	16.5	57	31	--	9.3	No	**Yes**
Copper	7440-50-8	32/ 32	676	8700	3100	--	56.2	No	**Yes**
Lead	**7439-92-1**	**45/ 45**	**5500**	**29000**	**400**	**--**	**48.6**	**Yes**	**Yes**
Benzo(*a*)pyrene	50-32-8	34/ 45	0.13	0.6	18	1.1	--	No	No
Benzo(*b*)fluoranthene	205-99-2	39/ 45	0.19	1.4	--	11	--	No	No
Subsurface Soil									
No COPCs	--	--	--	--	--		--	--	--
Rifle Range									
Surface Soil									
Antimony	7440-36-0	32/ 44	29.9	110	31	--	9.3	No	**Yes**
Copper	7440-50-8	36/ 36	840	840	3100	--	56.2	No	No
Lead	**7439-92-1**	**50/ 50**	**5510**	**28000**	**400**	**--**	**48.6**	**Yes**	**Yes**
Benz(*a*)anthracene	56-55-3	27/ 49	0.10	4.5	--	11	--	No	No
Benzo(*a*)pyrene	50-32-8	27/ 49	0.11	4.9	18	1.1	--	No	**Yes**
Benzo(*b*)fluoranthene	205-99-2	32/ 49	0.40	2.8	--	11	--	No	No
Dibenz(*a,h*)anthracene	53-70-3	4/ 49	0.015	0.71	--	1.1	--	No	No

Table 4-5. Human Health Risk Assessment COC Screen for Soil (Continued)

COPC	CAS Number	Freq of Detect	EPC (95UCL)	MDC	RSL[a] HQ =1	RSL[a] Risk=10^{-5}	BKG[b]	EPC Exceed SL? (Yes/No)	MDC Exceed SL? (Yes/No)
Subsurface Soil									
Antimony	7440-36-0	2/ 4	10	10	31	--	9.3	No	No
Lead	**7439-92-1**	**6/ 6**	**1070**	**1900**	**400**	**--**	**48.6**	**Yes**	**Yes**
Trap and Skeet Ranges									
Surface Soil									
Antimony	**7440-36-0**	**82/ 91**	**986**	**10000**	**31**	**--**	**9.3**	**Yes**	**Yes**
Arsenic	**7440-38-2**	**91/ 91**	**261**	**2200**	**35**	**6.8**	**36.5[c]**	**Yes**	**Yes**
Lead	**7439-92-1**	**131/ 131**	**13500**	**100000**	**400[d]**	**--**	**48.6**	**Yes**	**Yes**
Benz(*a*)anthracene	**56-55-3**	**100/ 112**	**26.3**	**200**	**--**	**11**	**--**	**Yes**	**Yes**
Benzo(*a*)pyrene	**50-32-8**	**102/ 112**	**31.8**	**220**	**18**	**1.1**	**--**	**Yes**	**Yes**
Benzo(*b*)fluoranthene	**205-99-2**	**104/ 112**	**27.8**	**200**	**--**	**11**	**--**	**Yes**	**Yes**
Benzo(*k*)fluoranthene	207-08-9	87/ 112	8.45	65	--	110	--	No	No
Chrysene	218-01-9	101/ 112	44.5	370	--	1100	--	No	No
Dibenz(*a,h*)anthracene	**53-70-3**	**40/ 112**	**5.14**	**42**	**--**	**1.1**	**--**	**Yes**	**Yes**
Indeno(1,2,3-*cd*)pyrene	193-39-5	71/ 112	9.95	88	--	11	--	No	**Yes**
Pyrene	129-00-0	107/ 112	200	200	1800	--	--	No	No
Subsurface Soil									
Benzo(*a*)pyrene	50-32-8	7/ 8	0.91	0.91	18	1.1	--	No	No
Dibenz(*a,h*)anthracene	53-70-3	7/ 8	0.15	0.15	--	1.1	--	No	No

All units are milligrams per kilogram (mg/kg).

[a] Residential regional screening levels (RSLs) from table published May 2019 (USEPA 2019), unless otherwise noted, corresponding to a TR of 1E-05 and a target HQ of 1.
[b] Background screening levels from IT, 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio*.
[c] RSLs for arsenic and thallium are less than the background criteria; therefore, the background concentrations are used as the SLs.
[d] RSL for lead is based on an acceptable blood lead level rather than a specific target organ or critical effect.

-- = No value available
BKG = Background
CAS = Chemical Abstracts Service
COC = Chemical of Concern
COPC = Chemical of Potential Concern
EPC = Exposure Point Concentration
HQ = Hazard Quotient
MDC = Maximum Detected Concentration
RSL = Regional Screening Level
SL = Screening Level
TR = Target Cancer Risk
95UCL = 95 Percent Upper Confidence Limit
Bold = Chemical is a COC

Table 4-6. Sum-of-Ratios for Non-Carcinogens: COC Screening for Soil

COPC	CAS Number	MDC	EPC (95UCL)	Residential RSL HQ=1	Critical Effect or Target Organ	Ratio EPC/RSL	Percent Contribution to SOR	Ratio MDC/RSL	Percent Contribution to SOR
Former Clubhouse and Garage – Surface Soil									
Aluminum	7429-90-5	19500	19500	77000	Neurotoxicity in offspring	0.25	--	0.25	--
Thallium	7440-28-0	3.4	3.4	0.78	Hair Follicles	NA[b]	--	NA[b]	--
Benz(*a*)anthracene	56-55-3	2	1.8	--	--	--	--	--	--
Benzo(*a*)pyrene	50-32-8	1.8	1.6	18	Developmental neurotoxicity	0.09	--	0.10	--
Benzo(*b*)fluoranthene	205-99-2	2.7	2.7	--	--	--	--	--	--
Dibenz(*a,h*)anthracene	53-70-3	0.325	0.325	--	--	--	--	--	--
SOR						*0.3*		*0.4*	
Pistol Range (East) – Surface Soil									
Antimony	7440-36-0	460	93	31	Hematologic	3.0	--	15	--
Copper	7440-50-8	580	580	3100	Gastrointestinal	0.2	--	0.2	--
Lead	7439-92-1	88000	16000	400	NA	NA[b]	--	NA[b]	--
Benzo(*a*)pyrene	50-32-8	0.18	0.0573	18	Developmental neurotoxicity	0.003	--	0.01	--
SOR						--		--	
Pistol Range (East) – Subsurface Soil									
Lead	7439-92-1	1700	1480	400	NA	NA[b]	--	NA[b]	--
Pistol Range (West) – Surface Soil									
Antimony	7440-36-0	57	16.5	31	Hematologic	0.5	--	2	--
Copper	7440-50-8	8700	676	3100	Gastrointestinal	0.2	--	3	--
Lead	7439-92-1	29000	5500	400	NA	NA[b]	--	NA[b]	--
Benzo(*a*)pyrene	50-32-8	0.6	0.13	18	Developmental neurotoxicity	0.0	--	0.03	--
Benzo(*b*)fluoranthene	205-99-2	1.4	0.185	--	--	--	--	--	--
SOR						--		--	
Rifle Range – Surface Soil									
Antimony	7440-36-0	110	29.9	31	Hematologic	1.0	--	4	--
Copper	7440-50-8	840	840	3100	Gastrointestinal	0.3	--	0.3	--
Lead	7439-92-1	28000	5510	400	NA	NA[b]	--	NA[b]	--
Benz(*a*)anthracene	56-55-3	4.5	0.0992	--	--	--	--	--	--
Benzo(*a*)pyrene	50-32-8	4.9	0.107	18	Developmental neurotoxicity	0.006	--	0.3	--
Benzo(*b*)fluoranthene	205-99-2	2.8	0.404	--	--	--	--	--	--
Dibenz(*a,h*)anthracene	53-70-3	0.71	0.015	--	--	--	--	--	--
SOR						--		--	

Table 4-6. Sum-of-Ratios for Non-Carcinogens: COC Screening for Soil (Continued)

COPC	CAS Number	MDC	EPC (95UCL)	Residential RSL HQ=1	Critical Effect or Target Organ	Ratio EPC/RSL	Percent Contribution to SOR	Ratio MDC/RSL	Percent Contribution to SOR
Rifle Range – Subsurface Soil									
Antimony	7440-36-0	10	10	31	Hematologic	0.3	--	0.3	--
Lead	7439-92-1	1900	1070	400	NA	NA[b]	--	NA[b]	--
Trap and Skeet Ranges – Surface Soil									
Antimony	7440-36-0	10000	986	31	Hematologic	31.8	**--**	323	**--**
Arsenic	7440-38-2	2200	261	35	Skin	NA[b]	**--**	NA[b]	**--**
Lead	7439-92-1	100000	13500	400	NA	NA[c]	**--**	NA[c]	**--**
Benz(*a*)anthracene	56-55-3	200	26.3	--	--	--	**--**	--	**--**
Benzo(*a*)pyrene	50-32-8	220	31.8	18	Developmental neurotoxicity	1.8	**--**	12	**--**
Benzo(*b*)fluoranthene	205-99-2	200	27.8	--	--	--	**--**	--	**--**
Benzo(*k*)fluoranthene	207-08-9	65	8.45	--	--	--	**--**	--	**--**
Chrysene	218-01-9	370	44.5	--	--	--	**--**	--	**--**
Dibenz(*a,h*)anthracene	53-70-3	42	5.14	--	--	--	**--**	--	**--**
Indeno(1,2,3-*cd*)pyrene	193-39-5	88	9.95	--	--	--	**--**	--	**--**
Pyrene	129-00-0	200	200	1800	Kidney	0.1	**--**	0.1	**--**
SOR						--		--	
Trap and Skeet Ranges – Subsurface Soil									
Benzo(*a*)pyrene	50-32-8	0.91	0.91	18	Developmental neurotoxicity	0.1	--	0.05	--
Dibenz(*a,h*)anthracene	53-70-3	0.15	0.15	--	--	--	--	--	--

All units are milligrams per kilogram (mg/kg).

[a] Non-cancer RSL for thallium (0.78 mg/kg) is less than the background criteria (1.3 mg/kg); therefore, the background concentration is used as the screening level. Likewise, non-cancer RSL for arsenic (35 mg/kg) is less than the background criteria (36.5 mg/kg). Background concentrations were not used for the SOR.
[b] RSL for lead is based on an acceptable blood lead level rather than a specific target organ or critical effect.

-- = No value available or percent contribution not calculated if SOR is not greater than 1.
CAS = Chemical Abstract Service
COPC = Chemical of Potential Concern
EPC = Exposure Point Concentration
MDC = Maximum Detected Concentration
NA = Not applicable, result for this sample is not included in the SOR because the reported concentration is less than the background screening value.
RSL = Regional Screening Level
SOR = Sum-of-Ratios
95UCL = 95 Percent Upper Confidence Limit
Bold = SOR greater than 1

Table 4-7. Sum-of-Ratios for Carcinogens: COC Screening for Soil

COPC	CAS Number	MDC	EPC	Residential RSL Risk=10-5	Ratio EPC/RSL	Percent Contribution to SOR	Ratio MDC/RSL	Percent Contribution to SOR
Former Clubhouse and Garage – Surface Soil								
Aluminum	7429-90-5	19500	19500	--	--	--	--	--
Thallium	7440-28-0	3.4	3.4	--	--	--	--	--
Benz(*a*)anthracene	56-55-3	2	1.8	11	0.2	7%	0.2	8%
Benzo(*a*)pyrene	50-32-8	1.8	1.6	1.1	1.4	67%	1.6	69%
Benzo(*b*)fluoranthene	205-99-2	2.7	2.7	11	0.2	11%	0.2	10%
Dibenz(*a,h*)anthracene	53-70-3	0.325	0.325	1.1	0.3	14%	0.3	13%
SOR					**2**		**2**	
Pistol Range (East) – Surface Soil								
Antimony	7440-36-0	460	93	--	--	--	--	--
Copper	7440-50-8	580	580	--	--	--	--	--
Lead	7439-92-1	88000	16000	--	NA[a]	--	NA[a]	--
Benzo(*a*)pyrene	50-32-8	0.18	0.0573	1.1	0.1	--	0.2	--
Pistol Range (East) – Subsurface Soil								
Lead	7439-92-1	1700	1480	--	NA[a]	--	NA[a]	--
Pistol Range (West) – Surface Soil								
Antimony	7440-36-0	57	16.5	--	--	--	--	--
Copper	7440-50-8	8700	676	--	--	--	--	--
Lead	7439-92-1	29000	5500	--	NA[a]	--	NA[a]	--
Benzo(*a*)pyrene	50-32-8	0.6	0.13	1.1	0.1	--	0.5	--
Benzo(*b*)fluoranthene	205-99-2	1.4	0.185	11	0.02	--	0.1	--
SOR					0.1		0.7	
Rifle Range – Surface Soil								
Antimony	7440-36-0	110	29.9	--	--	--	--	--
Copper	7440-50-8	840	840	--	--	--	--	--
Lead	7439-92-1	28000	5510	--	NA[a]	--	NA[a]	--
Benz(*a*)anthracene	56-55-3	4.5	0.0992	11	0.01	--	0.4	7%
Benzo(*a*)pyrene	50-32-8	4.9	0.107	1.1	0.10	--	4.5	77%
Benzo(*b*)fluoranthene	205-99-2	2.8	0.404	11	0.04	--	0.3	4%
Dibenz(*a,h*)anthracene	53-70-3	0.71	0.015	1.1	0.01	--	0.6	11%
SOR					0.2		**6**	

Table 4-7. Sum-of-Ratios for Carcinogens: COC Screening for Soil (Continued)

COPC	CAS Number	MDC	EPC	Residential RSL Risk=10-5	Ratio EPC/RSL	Percent Contribution to SOR	Ratio MDC/RSL	Percent Contribution to SOR
Rifle Range – Subsurface Soil								
Antimony	7440-36-0	10	10	--	--	--	--	--
Lead	7439-92-1	1900	1070	--	NA[a]	--	NA[a]	--
Trap and Skeet Ranges – Surface Soil								
Antimony	7440-36-0	10000	986	--	--	--	--	--
Arsenic	7440-38-2	2200	261	0.68	NA[b]	--	NA[b]	--
Lead	7439-92-1	100000	13500	--	NA[a]	--	NA[a]	--
Benz(*a*)anthracene	56-55-3	200	26.3	11	**2**	6%	18.2	6%
Benzo(*a*)pyrene	50-32-8	220	31.8	1.1	**29**	73%	200.0	71%
Benzo(*b*)fluoranthene	205-99-2	200	27.8	11	**3**	6%	18.2	6%
Benzo(*k*)fluoranthene	207-08-9	65	8.45	110	0.1	<1%	0.6	<1%
Chrysene	218-01-9	370	44.5	1100	0.04	<1%	0.3	<1%
Dibenz(*a,h*)anthracene	53-70-3	42	5.14	1.1	**5**	12%	38.2	13%
Indeno(1,2,3-*cd*)pyrene	193-39-5	88	9.95	11	0.9	2%	8.0	3%
Pyrene	129-00-0	200	200	--	--	--	--	--
SOR					**40**		**283**	
Trap and Skeet Ranges – Subsurface Soil								
Benzo(*a*)pyrene	50-32-8	0.91	0.91	1.1	0.8	--	0.8	--
Dibenz(*a,h*)anthracene	53-70-3	0.15	0.15	1.1	0.1	--	0.1	--
SOR					1		1	

All units are milligrams per kilogram (mg/kg).
[a] RSL for lead is based on an acceptable blood lead level rather than a specific target organ or critical effect.
[b] Cancer RSL for arsenic (6.8 mg/kg) is less than the background criteria (36.5 mg/kg). Background concentrations were not used for the SOR.

-- = No value available or percent contribution not calculated if SOR is not greater than 1.
CAS = Chemical Abstract Service
COC = Chemical of Concern
COPC = Chemical of Potential Concern
EPC = Exposure Point Concentration = 95% upper confidence limit (95UCL) or the maximum detected concentration, whichever is lower.
MDC = Maximum Detected Concentration
NA = Not applicable, result for this sample is not included in the SOR because the reported concentration is less than the background screening value.
RSL = Regional Screening Level
SOR = Sum-of-Ratios
Bold = SOR greater than 1

Table 4-8. Human Health Risk Assessment COC Screening for Sediment

COPC	CAS Number	Freq of Detect	Detected Concentrations			Ohio SRV	Samples Exceeding SRV	Soil BKG[a]	Samples Exceeding Soil BKG	Residential Soil RSL[b] (HQ=1, TR=1E-5)		MDC Exceed SL? (Yes/No)
			Min	Max	Avg							
Pond East												
No COPCs	--	--	--	--	--	--	--	--	--	--	--	--
Pond West A												
Lead	**7439-92-1**	**9/ 9**	**62**	**3500**	**988**	**47**	**9**	**48.6**	**9**	**400**	**L**	**Yes**
Pond West B												
No COPCs	--	--	--	--	--	--	--	--	--	--	--	--

All units are milligrams per kilogram (mg/kg).

[a] Background screening levels from IT, 1998, *Site Investigation of Acid Areas, Plum Brook Ordnance Works, Sandusky, Ohio*.
[b] Residential regional screening levels (RSLs) from table published May 2019 (USEPA 2019), unless otherwise noted, corresponding to a TR of 1E-05 and a target HQ of 1.

-- = No value available
Avg = Average Detected Concentration
BKG = Background
CAS = Chemical Abstracts Service
COC = Chemical of Concern
COPC = Chemical of Potential Concern
HQ = Hazard Quotient
Max = Maximum Detected Concentration
MDC = Maximum Detected Concentration
Min = Minimum Detected Concentration
RSL = Regional Screening Level
SL = Screening Level
SRV = Sediment Reference Value
TR = Target Cancer Risk
Bold = Chemical is a COPC

Table 4-9. Human Health Risk Assessment COC Screening for Surface Water

COPC	CAS Number	Freq of Detect	Detected Concentrations			Screening Criteria				Selected Screening Criteria Source[e]	MDC Exceed SL? (Yes/No)
			Min	Max	Avg[a]	Ohio HH ND WQC[b]	Ohio HH DW WQC[c]	Tapwater RSL[d]	MCL		
Pond West A											
Lead	**7439-92-1**	**4/ 4**	**19**	**27**	**22.8**	**--**	**--**	**15**	**15**	**RSL**	**Yes**
Pond West B											
Lead	**7439-92-1**	**2/ 2**	**27**	**28**	**27.5**	**--**	**--**	**15**	**15**	**RSL**	**Yes**

All units are micrograms per liter (µg/L).

[a] Average concentration for all samples using 1/2 the detection limit for non-detects.
[b] Ohio Water Quality Criteria for protection of Human Health (fish consumption) for Lake Erie drainage basin from https://epa.ohio.gov/portals/35/rules/01-34.pdf.
[c] Ohio Water Quality Criteria for protection of human health (public water supply) for Lake Erie drainage basin from https://epa.ohio.gov/portals/35/rules/01-33.pdf.
[d] USEPA tap water RSLs at a target risk level of 1E-05 (c) or target HQ (n) of 1 from http://www2.epa.gov/risk/risk-based-screening-table-generic-tables, dated May 2019.

-- = No Value Available.
Avg = Average Detected Concentration
CAS = Chemical Abstracts Service
COC = Chemical of Concern
COPC = Chemical of Potential Concern
DW = Drinking Water
HH = Human health
HQ = Hazard Quotient
Max = Maximum Detected Concentration
MCL = Federal Maximum Contaminant Level for drinking water
MDC = Maximum Detected Concentration
Min = Minimum Detected Concentration
ND = Non-detect
RSL = Regional Screening Level
SL = Screening level
USEPA = U.S. Environmental Protection Agency
WQC = Water Quality Criteria
Bold = Chemical is a COC

Table 4-10. Ecological Screening for Chemicals Detected in Soil at the Drainage Ditch EU

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Surface Soil												
Antimony	3/ 4	1	4.3	2.71	No	0.27	1	No	1.6E+01	Below background	ECCL-SD-008	0.0 - 1.5
Arsenic	4/ 4	9.3	28	17.1	No	18	1	No	1.6E+00	Below background	ECCL-SD-008	0.0 - 1.5
Copper	**4/ 4**	**67**	**170**	**117**	**No**	**28**	**1**	**Yes**	**6.1E+00**	**Exceeds ESV**	**ECCL-SD-008**	**0.0 - 1.5**
Iron	4/ 4	9500	30000	20400	No	--	--	No	No ESV	Below background	ECCL-SD-008	0.0 - 1.5
Lead	**4/ 4**	**100**	**380**	**220**	**Yes**	**11**	**1**	**Yes**	**3.5E+01**	**Exceeds ESV, PBT chemical**	**ECCL-SD-008**	**0.0 - 1.5**
Zinc	4/ 4	36	320	132	No	46	1	No	7.0E+00	Below background	ECCL-SD-004	0.0 - 1.5
1,1'-Biphenyl	1/ 4	0.0089	0.0089	0.0362	No	60	2	No	1.5E-04	Below ESV	ECCL-SD-008	0.0 - 1.5
2-Methylnaphthalene	2/ 4	0.0063	0.094	0.0282	No	3.24	3	No	2.9E-02	Below ESV	ECCL-SD-008	0.0 - 1.5
Acenaphthylene	1/ 4	0.01	0.01	0.00725	No	682	3	No	1.5E-05	Below ESV	ECCL-SD-007	0.0 - 1.5
Anthracene	1/ 4	0.0098	0.0098	0.0072	No	1480	3	No	6.6E-06	Below ESV	ECCL-SD-007	0.0 - 1.5
Benz(*a*)anthracene	4/ 4	0.0094	0.061	0.0263	No	5.21	3	No	1.2E-02	Below ESV	ECCL-SD-007	0.0 - 1.5
Benzaldehyde	**2/ 4**	**0.029**	**0.079**	**0.0745**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SD-007**	**0.0 - 1.5**
Benzo(*a*)pyrene	4/ 4	0.012	0.051	0.0275	No	1.52	3	No	3.4E-02	Below ESV	ECCL-SD-007	0.0 - 1.5
Benzo(*b*)fluoranthene	3/ 4	0.022	0.091	0.0384	No	59.8	3	No	1.5E-03	Below ESV	ECCL-SD-007	0.0 - 1.5
Benzo(*g,h,i*)perylene	**2/ 4**	**0.018**	**0.02**	**0.0129**	**Yes**	**119**	**3**	**Yes**	**1.7E-04**	**PBT chemical**	**ECCL-SD-007**	**0.0 - 1.5**
Benzo(*k*)fluoranthene	2/ 4	0.011	0.027	0.0129	No	148	3	No	1.8E-04	Below ESV	ECCL-SD-007	0.0 - 1.5
Bis(2-ethylhexyl)phthalate	1/ 4	0.087	0.087	0.0718	No	0.925	3	No	9.4E-02	Below ESV	ECCL-SD-004	0.0 - 1.5
Chrysene	4/ 4	0.016	0.084	0.0468	No	4.73	3	No	1.8E-02	Below ESV	ECCL-SD-007	0.0 - 1.5
Di-*n*-butyl phthalate	3/ 4	0.033	0.05	0.0485	No	200	2	No	2.5E-04	Below ESV	ECCL-SD-008	0.0 - 1.5
Dibenzofuran	**3/ 4**	**0.015**	**0.057**	**0.0396**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SD-008**	**0.0 - 1.5**
Fluoranthene	3/ 4	0.019	0.12	0.0423	No	122	3	No	9.8E-04	Below ESV	ECCL-SD-007	0.0 - 1.5
Indeno(1,2,3-*cd*)pyrene	2/ 4	0.011	0.018	0.0106	No	109	3	No	1.7E-04	Below ESV	ECCL-SD-007	0.0 - 1.5
Naphthalene	1/ 4	0.02	0.02	0.0095	No	0.0994	3	No	2.0E-01	Below ESV	ECCL-SD-008	0.0 - 1.5
Phenanthrene	4/ 4	0.0092	0.1	0.0458	No	45.7	3	No	2.2E-03	Below ESV	ECCL-SD-008	0.0 - 1.5
Phenol	2/ 4	0.041	0.069	0.0516	No	30	2	No	2.3E-03	Below ESV	ECCL-SD-004	0.0 - 1.5
Pyrene	4/ 4	0.015	0.17	0.06	No	78.5	3	No	2.2E-03	Below ESV	ECCL-SD-007	0.0 - 1.5

All units are milligrams per kilogram (mg/kg).

COPEC = Chemical of Potential Ecological Concern
Eco = Ecological
ESV = Ecological Screening Value
EU = Exposure Unit

HQ = Hazard Quotient
Max = Maximum Detected Concentration
PBT = Persistent, Bioaccumulative, and Toxic
SSL = Soil Screening Level

ESV Sources:
1 = EcoSSLs (USEPA)
2 = Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997)
3 = Region 5 Ecological Screening Levels (USEPA 2003)

Table 4-11. Ecological Screening for Chemicals Detected in Soil at the Former Clubhouse and Garage EU

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Surface Soil												
Aluminum	**4/ 4**	**5000**	**19500**	**10000**	**No**	**50**	**2**	**Yes**	**3.9E+02**	**Exceeds ESV**	**ECCL-SL-169**	**0.0 - 1.0**
Arsenic	4/ 4	6.7	16	11.7	No	18	1	No	8.9E-01	Below background	ECCL-SL-169	0.0 - 1.0
Barium	4/ 4	37	80	61	No	330	1	No	2.4E-01	Below background	ECCL-SL-172	0.0 - 1.0
Beryllium	2/ 4	0.65	5.15	1.57	No	21	1	No	2.5E-01	Below ESV	ECCL-SL-169	0.0 - 1.0
Calcium	4/ 4	11500	91000	32600	No	--	--	No	No ESV	Essential Nutrient	ECCL-SL-170	0.0 - 1.0
Chromium	4/ 4	8.6	14	10.6	No	26	1	No	5.4E-01	Below background	ECCL-SL-169	0.0 - 1.0
Cobalt	4/ 4	4.4	61.5	22.2	No	13	1	No	4.7E+00	Below background	ECCL-SL-169	0.0 - 1.0
Iron	4/ 4	11000	39000	22800	No	--	--	No	No ESV	Below background	ECCL-SL-169	0.0 - 1.0
Lead	**4/ 4**	**22**	**90**	**48.8**	**Yes**	**11**	**1**	**Yes**	**8.2E+00**	**Exceeds ESV, PBT chemical**	**ECCL-SL-172**	**0.0 - 1.0**
Magnesium	4/ 4	1800	9200	4430	No	--	--	No	No ESV	Essential Nutrient	ECCL-SL-170	0.0 - 1.0
Manganese	4/ 4	240	1800	671	No	220	1	No	8.2E+00	Below background	ECCL-SL-172	0.0 - 1.0
Nickel	**4/ 4**	**14**	**135**	**47.8**	**No**	**38**	**1**	**Yes**	**3.6E+00**	**Exceeds ESV**	**ECCL-SL-169**	**0.0 - 1.0**
Potassium	3/ 4	860	1100	1020	No	--		No	No ESV	Essential Nutrient	ECCL-SL-171	0.0 - 1.0
Thallium	**1/ 4**	**3.4**	**3.4**	**1.68**	**No**	**1**	**2**	**Yes**	**3.4E+00**	**Exceeds ESV**	**ECCL-SL-172**	**0.0 - 1.0**
Vanadium	4/ 4	12	31	20.5	No	7.8	1	No	4.0E+00	Below background	ECCL-SL-169	0.0 - 1.0
Zinc	4/ 4	43	275	106	No	46	1	No	6.0E+00	Below background	ECCL-SL-169	0.0 - 1.0
2-Methylnaphthalene	1/ 4	0.037	0.037	0.0217	No	3.24	3	No	1.1E-02	Below ESV	ECCL-SL-170	0.0 - 1.0
Acenaphthene	1/ 4	0.0905	0.0905	0.0291	No	20	2	No	4.5E-03	Below ESV	ECCL-SL-169	0.0 - 1.0
Acenaphthylene	1/ 4	0.175	0.175	0.0503	No	682	3	No	2.6E-04	Below ESV	ECCL-SL-169	0.0 - 1.0
Anthracene	2/ 4	0.016	0.465	0.125	No	1480	3	No	3.1E-04	Below ESV	ECCL-SL-169	0.0 - 1.0
Benz(*a*)anthracene	3/ 4	0.063	2	0.537	No	5.21	3	No	3.8E-01	Below ESV	ECCL-SL-169	0.0 - 1.0
Benzo(*a*)pyrene	**3/ 4**	**0.061**	**1.8**	**0.489**	**No**	**1.52**	**3**	**Yes**	**1.2E+00**	**Exceeds ESV**	**ECCL-SL-169**	**0.0 - 1.0**
Benzo(*b*)fluoranthene	4/ 4	0.018	2.7	0.724	No	59.8	3	No	4.5E-02	Below ESV	ECCL-SL-169	0.0 - 1.0
Benzo(*g,h,i*)perylene	**3/ 4**	**0.037**	**0.995**	**0.277**	**Yes**	**119**	**3**	**Yes**	**8.4E-03**	**PBT chemical**	**ECCL-SL-169**	**0.0 - 1.0**
Benzo(*k*)fluoranthene	2/ 4	0.04	1.07	0.282	No	148	3	No	7.2E-03	Below ESV	ECCL-SL-169	0.0 - 1.0
Carbazole	**1/ 4**	**0.22**	**0.22**	**0.0763**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-169**	**0.0 - 1.0**
Chrysene	3/ 4	0.1	2.1	0.59	No	4.73	3	No	4.4E-01	Below ESV	ECCL-SL-169	0.0 - 1.0
Dibenz(*a,h*)anthracene	2/ 4	0.018	0.325	0.0903	No	18.4	3	No	1.8E-02	Below ESV	ECCL-SL-169	0.0 - 1.0
Fluoranthene	3/ 4	0.02	4.9	1.28	No	122	3	No	4.0E-02	Below ESV	ECCL-SL-169	0.0 - 1.0
Fluorene	1/ 4	0.16	0.16	0.0465	No	30	2	No	5.3E-03	Below ESV	ECCL-SL-169	0.0 - 1.0
Indeno(1,2,3-*cd*)pyrene	2/ 4	0.055	1.005	0.27	No	109	3	No	9.2E-03	Below ESV	ECCL-SL-169	0.0 - 1.0

Table 4-11. Ecological Screening for Chemicals Detected in Soil at the Former Clubhouse and Garage EU (Continued)

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Naphthalene	1/ 4	0.069	0.069	0.0297	No	0.0994	3	No	6.9E-01	Below ESV	ECCL-SL-170	0.0 - 1.0
Phenanthrene	2/ 4	0.1	2.55	0.667	No	45.7	3	No	5.6E-02	Below ESV	ECCL-SL-169	0.0 - 1.0
Phenol	1/ 4	0.21	0.21	0.0941	No	30	2	No	7.0E-03	Below ESV	ECCL-SL-170	0.0 - 1.0
Pyrene	3/ 4	0.028	3.4	0.894	No	78.5	3	No	4.3E-02	Below ESV	ECCL-SL-169	0.0 - 1.0
Acetone	2/ 2	0.2	0.205	0.203	No	2.5	3	No	8.2E-02	Below ESV	ECCL-SL-169	0.0 - 1.0
Methylcyclohexane	**1/ 2**	**0.012**	**0.012**	**0.009**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-170**	**0.0 - 1.0**
Toluene	1/ 2	0.011	0.011	0.00701	No	200	2	No	5.5E-05	Below ESV	ECCL-SL-170	0.0 - 1.0

All units in milligrams per kilogram (mg/kg).

COPEC = Chemical of Potential Ecological Concern
Eco = Ecological
ESV = Ecological Screening Value
EU = Exposure Unit
HQ = Hazard Quotient
Max = Maximum Detected Concentration
PBT = Persistent, Bioaccumulative, and Toxic
SSL = Soil Screening Level
Bold = Chemical selected as a COPEC

ESV Sources:
1 = EcoSSLs (USEPA)
2 = Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997)
3 = Region 5 Ecological Screening Levels (USEPA 2003)

Table 4-12. Ecological Screening for Chemicals Detected in Soil at the Pistol Range (East) EU

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Surface Soil												
Antimony	**26/ 28**	**0.55**	**460**	**21**	**No**	**0.27**	**1**	**Yes**	**1.7E+03**	**Exceeds ESV**	**ECCL-SL-152**	**0.0 - 2.0**
Arsenic	28/ 28	4.4	30	17.8	No	18	1	No	1.7E+00	Below background	ECCL-SL-152	0.0 - 2.0
Copper	**28/ 28**	**33**	**580**	**118**	**No**	**28**	**1**	**Yes**	**2.1E+01**	**Exceeds ESV**	**ECCL-SL-156**	**0.0 - 3.0**
Iron	28/ 28	10000	29000	20400	No	--	--	No	No ESV	Below background	ECCL-SL-160	0.0 - 3.0
Lead	**37/ 37**	**13**	**88000**	**4880**	**Yes**	**11**	**1**	**Yes**	**8.0E+03**	**Exceeds ESV, PBT chemical**	**ECCL-SL-248**	**0.0 - 1.0**
Tin	**9/ 28**	**3.4**	**320**	**16.3**	**No**	**50**	**2**	**Yes**	**6.4E+00**	**Exceeds ESV**	**ECCL-SL-152**	**0.0 - 2.0**
Zinc	28/ 28	12	250	62.7	No	46	1	No	5.4E+00	Below background	ECCL-SL-142	0.0 - 1.0
1,1'-Biphenyl	3/ 27	0.0042	0.0079	0.0361	No	60	2	No	1.3E-04	Below ESV	ECCL-SL-163	0.0 - 3.0
2,4-Dinitrotoluene	1/ 27	0.034	0.034	0.15	No	1.28	3	No	2.7E-02	Below ESV	ECCL-SL-145	0.0 - 1.0
2-Methylnaphthalene	23/ 27	0.0055	0.45	0.108	No	3.24	3	No	1.4E-01	Below ESV	ECCL-SL-153	0.0 - 2.0
Acenaphthylene	5/ 33	0.012	0.041	0.00938	No	682	3	No	6.0E-05	Below ESV	ECCL-SL-166	0.0 - 3.0
Acetophenone	4/ 27	0.011	0.013	0.0691	No	300	3	No	4.3E-05	Below ESV	ECCL-SL-159	0.0 - 1.0
Anthracene	6/ 33	0.0056	0.02	0.00743	No	1480	3	No	1.4E-05	Below ESV	ECCL-SL-166	0.0 - 3.0
Benz(*a*)anthracene	25/ 33	0.0059	0.16	0.0315	No	5.21	3	No	3.1E-02	Below ESV	ECCL-SL-152	0.0 - 2.0
Benzaldehyde	**14/ 27**	**0.015**	**0.47**	**0.0894**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-162**	**0.0 - 2.0**
Benzo(*a*)pyrene	25/ 33	0.0064	0.18	0.0383	No	1.52	3	No	1.2E-01	Below ESV	ECCL-SL-152	0.0 - 2.0
Benzo(*b*)fluoranthene	26/ 33	0.0099	0.25	0.0519	No	59.8	3	No	4.2E-03	Below ESV	ECCL-SL-166	0.0 - 3.0

Table 4-12. Ecological Screening for Chemicals Detected in Soil at the Pistol Range (East) EU (Continued)

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Benzo(*g,h,i*)perylene	**21/ 33**	**0.0083**	**0.11**	**0.0243**	**Yes**	**119**	**3**	**Yes**	**9.2E-04**	**PBT chemical**	**ECCL-SL-162**	**0.0 - 2.0**
Benzo(*k*)fluoranthene	22/ 33	0.0044	0.091	0.0194	No	148	3	No	6.1E-04	Below ESV	ECCL-SL-165	0.0 - 1.0
Bis(2-ethylhexyl)phthalate	13/ 27	0.023	0.65	0.0715	No	0.925	3	No	7.0E-01	Below ESV	ECCL-SL-142	0.0 - 1.0
Caprolactam	**1/ 27**	**0.059**	**0.059**	**0.249**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-149**	**0.0 - 1.0**
Chrysene	28/ 33	0.0077	0.3	0.0567	No	4.73	3	No	6.3E-02	Below ESV	ECCL-SL-152	0.0 - 2.0
Di-*n*-butyl phthalate	7/ 27	0.018	0.44	0.0734	No	200	2	No	2.2E-03	Below ESV	ECCL-SL-143	0.0 - 1.0
Dibenz(*a,h*)anthracene	2/ 33	0.0063	0.023	0.00638	No	18.4	3	No	1.3E-03	Below ESV	ECCL-SL-248	0.0 - 1.0
Dibenzofuran	**6/ 27**	**0.012**	**0.024**	**0.0361**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-167**	**0.0 - 2.0**
Diethyl phthalate	2/ 27	0.032	0.044	0.0535	No	100	2	No	4.4E-04	Below ESV	ECCL-SL-145	0.0 - 1.0
Fluoranthene	27/ 33	0.0083	0.17	0.0378	No	122	3	No	1.4E-03	Below ESV	ECCL-SL-165	0.0 - 1.0
Indeno(1,2,3-*cd*)pyrene	16/ 33	0.0067	0.06	0.0158	No	109	3	No	5.5E-04	Below ESV	ECCL-SL-166	0.0 - 3.0
Isophorone	1/ 27	0.03	0.03	0.0387	No	139	3	No	2.2E-04	Below ESV	ECCL-SL-148	0.0 - 1.0
N-Nitrosodiphenylamine	6/ 27	0.054	0.67	0.107	No	20	2	No	3.4E-02	Below ESV	ECCL-SL-143	0.0 - 1.0
Naphthalene	**18/ 33**	**0.0081**	**0.16**	**0.0322**	**No**	**0.0994**	**3**	**Yes**	**1.6E+00**	**Exceeds ESV**	**ECCL-SL-167**	**0.0 - 2.0**
Phenanthrene	28/ 33	0.0069	0.17	0.048	No	45.7	3	No	3.7E-03	Below ESV	ECCL-SL-153	0.0 - 2.0
Pyrene	29/ 33	0.0085	0.16	0.0446	No	78.5	3	No	2.0E-03	Below ESV	ECCL-SL-152	0.0 - 2.0

Table 4-12. Ecological Screening for Chemicals Detected in Soil at the Pistol Range (East) EU (Continued)

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Subsurface Soil												
Lead	**4/ 4**	**15**	**1700**	**594**	**Yes**	**11**	**1**	**Yes**	**1.5E+02**	**Exceeds ESV, PBT chemical**	**ECCL-SL-246**	**4.5 - 5.0**
Benz(*a*)anthracene	1/ 4	0.056	0.056	0.0205	No	5.21	3	No	1.1E-02	Below ESV	ECCL-SL-246	4.5 - 5.0
Benzo(*a*)pyrene	1/ 4	0.061	0.061	0.0218	No	1.52	3	No	4.0E-02	Below ESV	ECCL-SL-246	4.5 - 5.0
Benzo(*b*)fluoranthene	1/ 4	0.095	0.095	0.0303	No	59.8	3	No	1.6E-03	Below ESV	ECCL-SL-246	4.5 - 5.0
Benzo(*g,h,i*)perylene	**1/ 4**	**0.04**	**0.04**	**0.0165**	**Yes**	**119**	**3**	**Yes**	**3.4E-04**	**PBT chemical**	**ECCL-SL-246**	**4.5 - 5.0**
Benzo(*k*)fluoranthene	1/ 4	0.027	0.027	0.0133	No	148	3	No	1.8E-04	Below ESV	ECCL-SL-246	4.5 - 5.0
Chrysene	1/ 4	0.11	0.11	0.034	No	4.73	3	No	2.3E-02	Below ESV	ECCL-SL-246	4.5 - 5.0
Fluoranthene	1/ 4	0.086	0.086	0.028	No	122	3	No	7.0E-04	Below ESV	ECCL-SL-246	4.5 - 5.0
Indeno(1,2,3-*cd*)pyrene	1/ 4	0.027	0.027	0.0133	No	109	3	No	2.5E-04	Below ESV	ECCL-SL-246	4.5 - 5.0
Phenanthrene	1/ 4	0.038	0.038	0.016	No	45.7	3	No	8.3E-04	Below ESV	ECCL-SL-246	4.5 - 5.0
Pyrene	1/ 4	0.078	0.078	0.026	No	78.5	3	No	9.9E-04	Below ESV	ECCL-SL-246	4.5 - 5.0

All units in milligrams per kilogram (mg/kg).

COPEC = Chemical of Potential Ecological Concern
Eco = Ecological
ESV = Ecological Screening Value
EU = Exposure Unit
HQ = Hazard Quotient
Max = Maximum Detected Concentration
PBT = Persistent, Bioaccumulative, and Toxic
SSL = Soil Screening Level

ESV Sources:
1 = EcoSSLs (USEPA)
2 = Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997)
3 = Region 5 Ecological Screening Levels (USEPA 2003)

Table 4-13. Ecological Screening for Chemicals Detected in Soil at the Pistol Range (West) EU

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Surface Soil												
Antimony	**29/ 39**	**0.58**	**57**	**9.31**	**No**	**0.27**	**1**	**Yes**	**2.1E+02**	**Exceeds ESV**	**ECCL-SL-231**	**0.0 - 1.0**
Arsenic	32/ 32	6	29	14.7	No	18	1	No	1.6E+00	Below background	ECCL-SL-138	0.0 - 3.0
Copper	**32/ 32**	**25**	**8700**	**504**	**No**	**28**	**1**	**Yes**	**3.1E+02**	**Exceeds ESV**	**ECCL-SL-115**	**0.0 - 1.0**
Iron	32/ 32	6400	29500	18800	No	--	--	No	No ESV	Below background	ECCL-SL-243	0.0 - 1.0
Lead	**45/ 45**	**26**	**29000**	**2300**	**Yes**	**11**	**1**	**Yes**	**2.6E+03**	**Exceeds ESV, PBT chemical**	**ECCL-SL-231**	**0.0 - 1.0**
Tin	5/ 32	4.3	35	6.7	No	50	2	No	7.0E-01	Below ESV	ECCL-SL-121	0.0 - 3.0
Zinc	**32/ 32**	**13.5**	**1300**	**132**	**No**	**46**	**1**	**Yes**	**2.8E+01**	**Exceeds ESV**	**ECCL-SL-115**	**0.0 - 1.0**
1,1'-Biphenyl	3/ 28	0.0072	0.014	0.0349	No	60	2	No	2.3E-04	Below ESV	ECCL-SL-132	0.0 - 1.0
2-Methylnaphthalene	22/ 28	0.0099	0.53	0.147	No	3.24		No	1.6E-01	Below ESV	ECCL-SL-129	0.0 - 3.0
Acenaphthene	3/ 45	0.018	0.045	0.00833	No	20	2	No	2.3E-03	Below ESV	ECCL-SL-127	0.0 - 2.0
Acenaphthylene	5/ 45	0.013	0.08	0.0102	No	682	3	No	1.2E-04	Below ESV	ECCL-SL-138	0.0 - 3.0
Acetophenone	1/ 28	0.013	0.013	0.0718	No	300	3	No	4.3E-05	Below ESV	ECCL-SL-130	0.0 - 1.0
Anthracene	9/ 45	0.0068	0.17	0.0153	No	1480	3	No	1.1E-04	Below ESV	ECCL-SL-121	0.0 - 3.0
Benz(*a*)anthracene	31/ 45	0.0055	0.68	0.0728	No	5.21	3	No	1.3E-01	Below ESV	ECCL-SL-121	0.0 - 3.0
Benzaldehyde	**10/ 28**	**0.015**	**0.66**	**0.109**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-131**	**0.0 - 1.0**
Benzo(*a*)pyrene	34/ 45	0.0074	0.6	0.0832	No	1.52	3	No	3.9E-01	Below ESV	ECCL-SL-230	0.0 - 1.0
Benzo(*b*)fluoranthene	39/ 45	0.0097	1.4	0.131	No	59.8	3	No	2.3E-02	Below ESV	ECCL-SL-121	0.0 - 3.0
Benzo(*g,h,i*)perylene	**28/ 45**	**0.011**	**0.3**	**0.0415**	**Yes**	**119**	3	**Yes**	**2.5E-03**	**PBT chemical**	**ECCL-SL-230**	**0.0 - 1.0**
Benzo(*k*)fluoranthene	28/ 45	0.0051	0.6	0.0486	No	148	3	No	4.1E-03	Below ESV	ECCL-SL-121	0.0 - 3.0
Bis(2-ethylhexyl)phthalate	**1/ 28**	**2.2**	**2.2**	**0.139**	**No**	**0.925**	3	**Yes**	**2.4E+00**	**Exceeds ESV**	**ECCL-SL-117**	**0.0 - 1.0**
Butyl benzyl phthalate	**2/ 28**	**0.024**	**0.81**	**0.0781**	**No**	**0.239**	3	**Yes**	**3.4E+00**	**Exceeds ESV**	**ECCL-SL-118**	**0.0 - 1.0**
Carbazole	**1/ 28**	**0.084**	**0.084**	**0.0376**	**No**	**--**	3	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-138**	**0.0 - 3.0**
Chrysene	38/ 45	0.012	3.9	0.191	No	4.73	3	No	8.2E-01	Below ESV	ECCL-SL-121	0.0 - 3.0
Di-*n*-butyl phthalate	17/ 28	0.017	0.25	0.0552	No	200	2	No	1.3E-03	Below ESV	ECCL-SL-118	0.0 - 1.0
Dibenz(*a,h*)anthracene	6/ 45	0.017	0.097	0.0108	No	18.4	3	No	5.3E-03	Below ESV	ECCL-SL-230	0.0 - 1.0

Table 4-13. Ecological Screening for Chemicals Detected in Soil at the Pistol Range (West) EU (Continued)

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Dibenzofuran	**5/ 28**	**0.0061**	**0.053**	**0.0353**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-127**	**0.0 - 2.0**
Diethyl phthalate	2/ 28	0.042	0.046	0.0515	No	100	2	No	4.6E-04	Below ESV	ECCL-SL-119	0.0 - 1.0
Fluoranthene	38/ 45	0.0091	2.1	0.131	No	122	3	No	1.7E-02	Below ESV	ECCL-SL-121	0.0 - 3.0
Fluorene	1/ 45	0.073	0.073	0.00789	No	30	2	No	2.4E-03	Below ESV	ECCL-SL-138	0.0 - 3.0
Indeno(1,2,3-*cd*)pyrene	24/ 45	0.002	0.21	0.0307	No	109	3	No	1.9E-03	Below ESV	ECCL-SL-138	0.0 - 3.0
N-Nitrosodiphenylamine	8/ 28	0.042	0.28	0.065	No	20	2	No	1.4E-02	Below ESV	ECCL-SL-119	0.0 - 1.0
Naphthalene	**26/ 45**	**0.0049**	**0.18**	**0.0382**	**No**	**0.0994**	**3**	**Yes**	**1.8E+00**	**Exceeds ESV**	**ECCL-SL-132**	**0.0 - 1.0**
Phenanthrene	37/ 45	0.0078	0.88	0.0822	No	45.7	3	No	1.9E-02	Below ESV	ECCL-SL-138	0.0 - 3.0
Pyrene	40/ 45	0.0099	1.6	0.124	No	78.5	3	No	2.0E-02	Below ESV	ECCL-SL-121	0.0 - 3.0
Subsurface Soil												
Lead	**4/ 4**	**5.1**	**150**	**58.8**	**Yes**	**11**	**1**	**Yes**	**1.4E+01**	**Exceeds ESV, PBT chemical**	**ECCL-SL-236**	**3.0 - 3.5**

All units in milligrams per kilogram (mg/kg).

Eco = Ecological
EU = Exposure Unit
COPEC = Chemical of Potential Ecological Concern
ESV = Ecological Screening Value
HQ = Hazard Quotient
Max = Maximum Detected Concentration
PBT = Persistent, Bioaccumulative, and Toxic
SSL = Soil Screening Level
Bold = Chemical selected as a COPEC

ESV Sources:
1 = EcoSSLs (USEPA)
2 = Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997)
3 = Region 5 Ecological Screening Levels (USEPA 2003)

Table 4-14. Ecological Screening for Chemicals Detected in Soil at the Rifle Range EU

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Surface Soil												
Antimony	**32/ 44**	**0.53**	**110**	**13.4**	**No**	**0.27**	**1**	**Yes**	**4.1E+02**	**Exceeds ESV**	**ECCL-SL-096**	**0.0 - 3.0**
Arsenic	36/ 36	6.1	34	19.4	No	18	1	No	1.9E+00	Below background	ECCL-SL-084	0.0 - 1.0
Copper	**36/ 36**	**15**	**840**	**188**	**No**	**28**	**1**	**Yes**	**3.0E+01**	**Exceeds ESV**	**ECCL-SL-096**	**0.0 - 3.0**
Iron	36/ 36	14000	34000	23800	No	--	--	No	No ESV	Below background	ECCL-SL-084	0.0 - 1.0
Lead	**50/ 50**	**23**	**28000**	**2300**	**Yes**	**11**	**1**	**Yes**	**2.5E+03**	**Exceeds ESV, PBT chemical**	**ECCL-SL-093**	**0.0 - 3.0**
Zinc	36/ 36	14	170	44.1	No	46	1	No	3.7E+00	Below background	ECCL-SL-093	0.0 - 3.0
1,1'-Biphenyl	19/ 33	0.0038	0.034	0.0569	No	60	2	No	5.7E-04	Below ESV	ECCL-SL-105	0.0 - 0.5
2-Methylnaphthalene	32/ 33	0.027	1.3	0.475	No	3.24	3	No	4.0E-01	Below ESV	ECCL-SL-085	0.0 - 1.0
Acenaphthene	6/ 49	0.0093	0.045	0.0114	No	20	2	No	2.3E-03	Below ESV	ECCL-SL-093	0.0 - 3.0
Acenaphthylene	12/ 49	0.009	0.043	0.013	No	682	3	No	6.3E-05	Below ESV	ECCL-SL-108	0.0 - 3.0
Anthracene	15/ 49	0.0052	0.17	0.0173	No	1480	3	No	1.1E-04	Below ESV	ECCL-SL-093	0.0 - 3.0
Benz(*a*)anthracene	27/ 49	0.006	4.5	0.138	No	5.21	3	No	8.6E-01	Below ESV	ECCL-SL-101	0.0 - 2.5
Benzaldehyde	**17/ 33**	**0.015**	**0.99**	**0.192**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-110**	**0.0 - 2.5**
Benzo(*a*)pyrene	**27/ 49**	**0.0076**	**4.9**	**0.15**	**No**	**1.52**	**3**	**Yes**	**3.2E+00**	**Exceeds ESV**	**ECCL-SL-101**	**0.0 - 2.5**
Benzo(*b*)fluoranthene	32/ 49	0.012	2.8	0.14	No	59.8	3	No	4.7E-02	Below ESV	ECCL-SL-101	0.0 - 2.5
Benzo(*g,h,i*)perylene	**21/ 49**	**0.0073**	**1.7**	**0.0595**	**Yes**	**119**	**3**	**Yes**	**1.4E-02**	**PBT chemical**	**ECCL-SL-101**	**0.0 - 2.5**
Benzo(*k*)fluoranthene	21/ 49	0.004	0.3	0.0349	No	148	3	No	2.0E-03	Below ESV	ECCL-SL-101	0.0 - 2.5
Bis(2-ethylhexyl)phthalate	3/ 33	0.026	0.037	0.109	No	0.925	3	No	4.0E-02	Below ESV	ECCL-SL-102	0.0 - 3.0
Chrysene	**37/ 49**	**0.011**	**11**	**0.311**	**No**	**4.73**	**3**	**Yes**	**2.3E+00**	**Exceeds ESV**	**ECCL-SL-101**	**0.0 - 2.5**
Di-*n*-butyl phthalate	1/ 33	0.22	0.22	0.105	No	200	2	No	1.1E-03	Below ESV	ECCL-SL-101	0.0 - 2.5
Dibenz(*a,h*)anthracene	4/ 49	0.034	0.71	0.0261	No	18.4	3	No	3.9E-02	Below ESV	ECCL-SL-101	0.0 - 2.5
Dibenzofuran	**20/ 33**	**0.013**	**0.065**	**0.0639**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-106**	**0.0 - 2.5**

Table 4-14. Ecological Screening for Chemicals Detected in Soil at the Rifle Range EU (Continued)

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Fluoranthene	33/ 49	0.01	0.68	0.0842	No	122	3	No	5.6E-03	Below ESV	ECCL-SL-108	0.0 - 3.0
Fluorene	6/ 49	0.011	0.043	0.0119	No	30	2	No	1.4E-03	Below ESV	ECCL-SL-093	0.0 - 3.0
Indeno(1,2,3-*cd*)pyrene	16/ 49	0.0048	0.58	0.0335	No	109	3	No	5.3E-03	Below ESV	ECCL-SL-101	0.0 - 2.5
N-Nitrosodiphenylamine	3/ 33	0.062	0.1025	0.0815	No	20	2	No	5.1E-03	Below ESV	ECCL-SL-102	0.0 - 3.0
Naphthalene	**38/ 49**	**0.0082**	**0.38**	**0.0974**	**No**	**0.0994**	**3**	**Yes**	**3.8E+00**	**Exceeds ESV**	**ECCL-SL-085**	**0.0 - 1.0**
Phenanthrene	41/ 49	0.0071	0.54	0.175	No	45.7	3	No	1.2E-02	Below ESV	ECCL-SL-108	0.0 - 3.0
Pyrene	39/ 49	0.0077	1.8	0.117	No	78.5	3	No	2.3E-02	Below ESV	ECCL-SL-101	0.0 - 2.5
Subsurface Soil												
Antimony	**2/ 4**	**5.3**	**10**	**4.33**	**No**	**0.27**	**1**	**Yes**	**3.7E+01**	**Exceeds ESV**	**ECCL-SL-220**	**5.5 - 6.0**
Lead	**6/ 6**	**29**	**1900**	**476**	**Yes**	**11**	**1**	**Yes**	**1.7E+02**	**Exceeds ESV, PBT chemical**	**ECCL-SL-220**	**5.5 - 6.0**
Anthracene	1/ 6	0.019	0.019	0.0148	No	1480	3	No	1.3E-05	Below ESV	ECCL-SL-235	2.0 - 2.5
Benz(*a*)anthracene	3/ 6	0.019	0.082	0.0383	No	5.21	3	No	1.6E-02	Below ESV	ECCL-SL-235	2.0 - 2.5
Benzo(*a*)pyrene	2/ 6	0.085	0.094	0.04	No	1.52	3	No	6.2E-02	Below ESV	ECCL-SL-235	2.0 - 2.5
Benzo(*b*)fluoranthene	2/ 6	0.11	0.14	0.0518	No	59.8	3	No	2.3E-03	Below ESV	ECCL-SL-235	2.0 - 2.5
Benzo(*g,h,i*)perylene	**2/ 6**	**0.063**	**0.064**	**0.0313**	**Yes**	**119**	**3**	**Yes**	**5.4E-04**	**PBT chemical**	**ECCL-SL-235**	**2.0 - 2.5**
Benzo(*k*)fluoranthene	2/ 6	0.057	0.06	0.0297	No	148	3	No	4.1E-04	Below ESV	ECCL-SL-235	2.5 - 3.0
Chrysene	4/ 6	0.024	0.14	0.0594	No	4.73	3	No	3.0E-02	Below ESV	ECCL-SL-235	2.0 - 2.5
Dibenz(*a,h*)anthracene	1/ 6	0.022	0.022	0.0153	No	18.4	3	No	1.2E-03	Below ESV	ECCL-SL-235	2.0 - 2.5
Fluoranthene	2/ 6	0.21	0.22	0.0818	No	122	3	No	1.8E-03	Below ESV	ECCL-SL-235	2.0 - 2.5
Indeno(1,2,3-*cd*)pyrene	2/ 6	0.059	0.061	0.0302	No	109	3	No	5.6E-04	Below ESV	ECCL-SL-235	2.0 - 2.5
Naphthalene	**4/ 6**	**0.017**	**0.16**	**0.0511**	**No**	**0.0994**	**3**	**Yes**	**1.6E+00**	**Exceeds ESV**	**ECCL-SL-220**	**5.5 - 6.0**
Phenanthrene	6/ 6	0.055	0.24	0.137	No	45.7	3	No	5.3E-03	Below ESV	ECCL-SL-220	5.5 - 6.0
Pyrene	3/ 6	0.021	0.18	0.0672	No	78.5	3	No	2.3E-03	Below ESV	ECCL-SL-235	2.0 - 2.5

All units are in milligrams per kilogram (mg/kg).

COPEC = Chemical of Potential Ecological Concern
Eco = Ecological
ESV = Ecological Screening Value
EU = Exposure Unit
HQ = Hazard Quotient

Max = Maximum Detected Concentration
PBT = Persistent, Bioaccumulative, and Toxic
SSL = Soil Screening Level

Bold = Chemical selected as a COPEC
ESV Sources:
1 = EcoSSLs (USEPA)
2 = Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997)
3 = Region 5 Ecological Screening Levels (USEPA 2003)

Table 4-15. Ecological Screening for Chemicals Detected in Soil at the Trap and Skeet Range EU

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Surface Soil												
Antimony	**82/ 91**	**0.54**	**10000**	**361**	**No**	**0.27**	**1**	**Yes**	**3.7E+04**	**Exceeds ESV**	**ECCL-SL-046**	**0.0 - 0.5**
Arsenic	**91/ 91**	**3.7**	**2200**	**107**	**No**	**18**	**1**	**Yes**	**1.2E+02**	**Exceeds ESV**	**ECCL-SL-046**	**0.0 - 0.5**
Copper	**85/ 85**	**4.2**	**100**	**19.9**	**No**	**28**	**1**	**Yes**	**3.6E+00**	**Exceeds ESV**	**ECCL-SD-005**	**0.0 - 1.5**
Iron	85/ 85	5200	70000	15700	No	--	--	No	No ESV	Below background	ECCL-SDSW-003	0.0 - 1.5
Lead	**131/ 131**	**6.5**	**100000**	**6170**	**Yes**	**11**	**1**	**Yes**	**9.1E+03**	**Exceeds ESV, PBT chemical**	**ECCL-SL-074**	**0.0 - 0.5**
Tin	**2/ 85**	**190**	**300**	**11**	**No**	**50**	**2**	**Yes**	**6.0E+00**	**Exceeds ESV**	**ECCL-SL-081**	**0.0 - 0.5**
Zinc	**85/ 85**	**14**	**690**	**61.6**	**No**	**46**	**1**	**Yes**	**1.5E+01**	**Exceeds ESV**	**ECCL-SDSW-003**	**0.0 - 1.5**
1,1'-Biphenyl	2/ 85	0.016	0.044	0.644	No	60	2	No	7.3E-04	Below ESV	ECCL-SL-069	0.0 - 0.5
2-Methylnaphthalene	**33/ 85**	**0.0039**	**8.7**	**0.425**	**No**	**3.24**	**3**	**Yes**	**2.7E+00**	**Exceeds ESV**	**ECCL-SL-028**	**0.0 - 0.5**
2-Methylphenol	1/ 85	0.014	0.014	2.54	No	40.4	3	No	3.5E-04	Below ESV	ECCL-SL-069	0.0 - 0.5
Acenaphthene	25/ 112	0.0098	7.7	0.485	No	20	2	No	3.9E-01	Below ESV	ECCL-SL-039	0.0 - 0.5
Acenaphthylene	7/ 112	0.0056	0.1	0.0795	No	682	3	No	1.5E-04	Below ESV	ECCL-SL-006	0.0 - 0.5
Acetophenone	1/ 85	0.014	0.014	1.28	No	300	3	No	4.7E-05	Below ESV	ECCL-SL-009	0.0 - 0.5
Anthracene	34/ 112	0.0019	9.6	0.511	No	1480	3	No	6.5E-03	Below ESV	ECCL-SL-039	0.0 - 0.5
Benz(*a*)anthracene	**100/ 112**	**0.0043**	**200**	**11.6**	**No**	**5.21**	**3**	**Yes**	**3.8E+01**	**Exceeds ESV**	**ECCL-SL-039**	**0.0 - 0.5**
Benzaldehyde	**26/ 85**	**0.014**	**2.8**	**1.27**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-004**	**0.0 - 0.5**
Benzo(*a*)pyrene	**102/ 112**	**0.0051**	**220**	**14.1**	**No**	**1.52**	**3**	**Yes**	**1.4E+02**	**Exceeds ESV**	**ECCL-SL-028**	**0.0 - 0.5**
Benzo(*b*)fluoranthene	**104/ 112**	**0.0075**	**200**	**12.1**	**No**	**59.8**	**3**	**Yes**	**3.3E+00**	**Exceeds ESV**	**ECCL-SL-029**	**0.0 - 0.5**
Benzo(*g,h,i*)perylene	**81/ 112**	**0.0041**	**140**	**7.1**	**Yes**	**119**	**3**	**Yes**	**1.2E+00**	**Exceeds ESV, PBT chemical**	**ECCL-SL-029**	**0.0 - 0.5**
Benzo(*k*)fluoranthene	87/ 112	0.004	65	3.63	No	148	3	No	4.4E-01	Below ESV	ECCL-SL-029	0.0 - 0.5
Bis(2-ethylhexyl)phthalate	**18/ 85**	**0.025**	**1.5**	**0.912**	**No**	**0.925**	**3**	**Yes**	**1.6E+00**	**Exceeds ESV**	**ECCL-SL-072**	**0.0 - 0.5**
Carbazole	**10/ 89**	**0.035**	**10**	**0.78**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-039**	**0.0 - 0.5**
Chrysene	**101/ 112**	**0.0068**	**370**	**19.8**	**No**	**4.73**	**3**	**Yes**	**7.8E+01**	**Exceeds ESV**	**ECCL-SL-039**	**0.0 - 0.5**
Dibenz(*a,h*)anthracene	**40/ 112**	**0.0094**	**42**	**2.38**	**No**	**18.4**	**3**	**Yes**	**2.3E+00**	**Exceeds ESV**	**ECCL-SL-039**	**0.0 - 0.5**
Dibenzofuran	**18/ 85**	**0.0036**	**1.6**	**0.564**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SL-033**	**0.0 - 0.5**
Di-*n*-butyl phthalate	20/ 85	0.017	0.1175	0.893	No	200	2	No	5.9E-04	Below ESV	ECCL-SL-002	0.0 - 1.0
Fluoranthene	**101/ 112**	**0.01**	**130**	**6.75**	**No**	**122**	**3**	**Yes**	**1.1E+00**	**Exceeds ESV**	**ECCL-SL-039**	**0.0 - 0.5**

Table 4-15. Ecological Screening for Chemicals Detected in Soil at the Trap and Skeet Range EU (Continued)

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	ESV Source	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect	Maximum Detect Depth
Fluorene	23/ 112	0.0052	3.2	0.184	No	30	2	No	1.1E-01	Below ESV	ECCL-SL-028	0.0 - 0.5
Indeno(1,2,3-*cd*)pyrene	71/ 112	0.0043	88	4.26	No	109	3	No	8.1E-01	Below ESV	ECCL-SL-029	0.0 - 0.5
Naphthalene	**22/ 112**	**0.0044**	**2**	**0.122**	**No**	**0.0994**	**3**	**Yes**	**2.0E+01**	**Exceeds ESV**	**ECCL-SL-028**	**0.0 - 0.5**
N-Nitrosodiphenylamine	3/ 85	0.1345	0.45	0.651	No	20	2	No	2.3E-02	Below ESV	ECCL-SL-023	0.0 - 1.0
Pentachlorophenol	4/ 84	0.048	0.12	1.93	No	2.1	3	No	5.7E-02	Below ESV	ECCL-SL-062	0.0 - 0.5
Phenanthrene	**89/ 112**	**0.0052**	**54**	**2.73**	**No**	**45.7**	**3**	**Yes**	**1.2E+00**	**Exceeds ESV**	**ECCL-SL-028**	**0.0 - 0.5**
Phenol	5/ 85	0.015	0.027	0.643	No	30	2	No	9.0E-04	Below ESV	ECCL-SL-069	0.0 - 0.5
Pyrene	**107/ 112**	**0.007**	**200**	**10.1**	**No**	**78.5**	**3**	**Yes**	**2.5E+00**	**Exceeds ESV**	**ECCL-SL-028**	**0.0 - 0.5**
Subsurface Soil												
Anthracene	1/ 8	0.022	0.022	0.0107	No	1480	3	No	1.5E-05	Below ESV	ECCL-SL-177	3.0 - 4.0
Benz(*a*)anthracene	7/ 8	0.091	0.76	0.272	No	5.21	3	No	1.5E-01	Below ESV	ECCL-SL-177	3.0 - 4.0
Benzo(*a*)pyrene	7/ 8	0.1295	0.91	0.316	No	1.52	3	No	6.0E-01	Below ESV	ECCL-SL-177	3.0 - 4.0
Benzo(*b*)fluoranthene	7/ 8	0.059	0.36	0.171	No	59.8	3	No	6.0E-03	Below ESV	ECCL-SL-177	2.0 - 3.0
Benzo(*g,h,i*)perylene	**7/ 8**	**0.08**	**0.47**	**0.178**	**Yes**	**119**	**3**	**Yes**	**3.9E-03**	**PBT chemical**	**ECCL-SL-177**	**3.0 - 4.0**
Benzo(*k*)fluoranthene	6/ 8	0.018	0.11	0.04	No	148	3	No	7.4E-04	Below ESV	ECCL-SL-176	2.0 - 3.0
Chrysene	7/ 8	0.15	1.3	0.484	No	4.73	3	No	2.7E-01	Below ESV	ECCL-SL-177	3.0 - 4.0
Dibenz(*a,h*)anthracene	7/ 8	0.026	0.15	0.0618	No	18.4	3	No	8.2E-03	Below ESV	ECCL-SL-177	3.0 - 4.0
Fluoranthene	7/ 8	0.019	0.15	0.0587	No	122	3	No	1.2E-03	Below ESV	ECCL-SL-176	2.0 - 3.0
Indeno(1,2,3-*cd*)pyrene	7/ 8	0.035	0.14	0.0692	No	109	3	No	1.3E-03	Below ESV	ECCL-SL-177	2.0 - 3.0
Phenanthrene	4/ 8	0.033	0.11	0.0373	No	45.7	3	No	2.4E-03	Below ESV	ECCL-SL-177	3.0 - 4.0
Pyrene	7/ 8	0.065	0.61	0.196	No	78.5	3	No	7.8E-03	Below ESV	ECCL-SL-177	3.0 - 4.0

All units in milligrams per kilogram (mg/kg).

COPEC = Chemical of Potential Ecological Concern
Eco = Ecological
EU = Exposure Unit
ESV = Ecological Screening Value
HQ = Hazard Quotient
Max = Maximum Detected Concentration
PBT = Persistent, Bioaccumulative, and Toxic
SSL = Soil Screening Level
Bold = Chemical selected as a COPEC

ESV Sources:
1 = EcoSSLs (USEPA)
2 = Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997)
3 = Region 5 Ecological Screening Levels (USEPA 2003)

Table 4-16. Ecological Screening for Chemicals Detected in Sediment

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	SRV	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect
Sediment – Pond East											
Antimony	**3/ 3**	**0.93**	**1.3**	**1.08**	**No**	**--**	**0.84**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SDSW-012**
Arsenic	**3/ 3**	**9.6**	**31**	**21.2**	**No**	**9.79**	**11**	**Yes**	**3.17E+00**	**Exceeds ESV**	**ECCL-SDSW-010**
Copper	**3/ 3**	**39**	**88**	**64.3**	**No**	**31.6**	**42**	**Yes**	**2.78E+00**	**Exceeds ESV**	**ECCL-SDSW-012**
Iron	3/ 3	15500	41000	30200	No	--	44000	No	No ESV	Below SRV	ECCL-SDSW-010
Lead	**3/ 3**	**20**	**29**	**25.3**	**Yes**	**35.8**	**47**	**Yes**	**8.10E-01**	**PBT chemical**	**ECCL-SDSW-012**
Zinc	3/ 3	22	58	39.7	No	121	190	No	4.79E-01	Below SRV	ECCL-SDSW-012
1,1'-Biphenyl	**2/ 3**	**0.013**	**0.018**	**0.0259**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SDSW-010**
2-Methylnaphthalene	**3/ 3**	**0.092**	**0.38**	**0.264**	**No**	**0.0202**	**--**	**Yes**	**1.88E+01**	**Exceeds ESV**	**ECCL-SDSW-010**
Anthracene	1/ 3	0.012	0.012	0.00775	No	0.0572	--	No	2.10E-01	Below ESV	ECCL-SDSW-012
Benz(*a*)anthracene	2/ 3	0.028	0.061	0.0313	No	0.108	--	No	5.65E-01	Below ESV	ECCL-SDSW-012
Benzo(*a*)pyrene	2/ 3	0.043	0.084	0.044	No	0.15	--	No	5.60E-01	Below ESV	ECCL-SDSW-012
Benzo(*b*)fluoranthene	2/ 3	0.037	0.09	0.044	No	10.4	--	No	8.65E-03	Below ESV	ECCL-SDSW-012
Benzo(*g,h,i*)perylene	**2/ 3**	**0.0325**	**0.055**	**0.0308**	**Yes**	**0.17**	**--**	**Yes**	**3.24E-01**	**PBT chemical**	**ECCL-SDSW-012**
Benzo(*k*)fluoranthene	2/ 3	0.0125	0.034	0.0172	No	0.24	--	No	1.42E-01	Below ESV	ECCL-SDSW-012
Chrysene	3/ 3	0.031	0.098	0.0617	No	0.166	--	No	5.90E-01	Below ESV	ECCL-SDSW-012
Dibenzofuran	1/ 3	0.019	0.019	0.0351	No	0.449	--	No	4.23E-02	Below ESV	ECCL-SDSW-012
Fluoranthene	3/ 3	0.011	0.12	0.0518	No	0.423	--	No	2.84E-01	Below ESV	ECCL-SDSW-012
Indeno(1,2,3-*cd*)pyrene	2/ 3	0.0165	0.04	0.0205	No	0.2	--	No	2.00E-01	Below ESV	ECCL-SDSW-012
Naphthalene	3/ 3	0.037	0.12	0.0813	No	0.176	--	No	6.82E-01	Below ESV	ECCL-SDSW-012
Phenanthrene	3/ 3	0.039	0.16	0.116	No	0.204	--	No	7.84E-01	Below ESV	ECCL-SDSW-010
Pyrene	3/ 3	0.0375	0.12	0.0732	No	0.195	--	No	6.15E-01	Below ESV	ECCL-SDSW-012
Sediment – Pond West A											
Arsenic	**9/ 9**	**3.1**	**24**	**11.6**	**No**	**9.79**	**11**	**Yes**	**2.45E+00**	**Exceeds ESV**	**ECCL-SDSW-018**
Copper	**4/ 4**	**200**	**540**	**390**	**No**	**31.6**	**42**	**Yes**	**1.71E+01**	**Exceeds ESV**	**ECCL-SDSW-018**
Iron	**4/ 4**	**24000**	**53000**	**34800**	**No**	**--**	**44000**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SDSW-018**
Lead	**9/ 9**	**62**	**3500**	**988**	**Yes**	**35.8**	**47**	**Yes**	**9.78E+01**	**Exceeds ESV, PBT chemical**	**ECCL-SDSW-018**
Zinc	**4/ 4**	**250**	**480**	**375**	**No**	**121**	**190**	**Yes**	**3.97E+00**	**Exceeds ESV**	**ECCL-SDSW-017**
2-Methylnaphthalene	1/ 4	0.019	0.019	0.0268	No	0.0202	--	No	9.41E-01	Below ESV	ECCL-SDSW-018
Bis(2-ethylhexyl)phthalate	1/ 4	0.12	0.12	0.249	No	0.182	--	No	6.59E-01	Below ESV	ECCL-SDSW-016
Caprolactam	**1/ 4**	**0.31**	**0.31**	**1.13**	**No**	**--**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SDSW-017**
Di-*n*-butyl phthalate	1/ 4	0.1	0.1	0.244	No	1.114	--	No	8.98E-02	Below ESV	ECCL-SDSW-016
Fluoranthene	2/ 4	0.027	0.03	0.0313	No	0.423	--	No	7.09E-02	Below ESV	ECCL-SDSW-017

Table 4-16. Ecological Screening for Chemicals Detected in Sediment (Continued)

Analyte (mg/kg)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	SRV	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect
Phenanthrene	1/ 4	0.016	0.016	0.026	No	0.204	--	No	7.84E-02	Below ESV	ECCL-SDSW-018
Pyrene	2/ 4	0.024	0.027	0.0298	No	0.195	--	No	1.38E-01	Below ESV	ECCL-SDSW-018
Sediment - Pond West A											
Antimony	**2/ 2**	**1.7**	**2.2**	**1.95**	**No**	**--**	**0.84**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SDSW-013**
Arsenic	**2/ 2**	**9**	**13**	**11**	**No**	**9.79**	**11**	**Yes**	**1.33E+00**	**Exceeds ESV**	**ECCL-SDSW-014**
Copper	**2/ 2**	**78**	**100**	**89**	**No**	**31.6**	**42**	**Yes**	**3.16E+00**	**Exceeds ESV**	**ECCL-SDSW-014**
Iron	2/ 2	8800	13000	10900	No	--	44000	No	No ESV	Below SRV	ECCL-SDSW-014
Lead	**2/ 2**	**270**	**330**	**300**	**Yes**	**35.8**	**47**	**Yes**	**9.22E+00**	**Exceeds ESV, PBT chemical**	**ECCL-SDSW-013**
Zinc	**2/ 2**	**220**	**260**	**240**	**No**	**121**	**190**	**Yes**	**2.15E+00**	**Exceeds ESV**	**ECCL-SDSW-014**
Benzo(*a*)pyrene	1/ 2	0.012	0.012	0.011	No	0.15	--	No	8.00E-02	Below ESV	ECCL-SDSW-014
Benzo(*b*)fluoranthene	1/ 2	0.015	0.015	0.0125	No	10.4	--	No	1.44E-03	Below ESV	ECCL-SDSW-014
Chrysene	1/ 2	0.012	0.012	0.011	No	0.166	--	No	7.23E-02	Below ESV	ECCL-SDSW-014
Fluoranthene	2/ 2	0.012	0.024	0.018	No	0.423	--	No	5.67E-02	Below ESV	ECCL-SDSW-014
Pyrene	1/ 2	0.016	0.016	0.013	No	0.195	--	No	8.21E-02	Below ESV	ECCL-SDSW-014

All units in milligrams per kilogram (mg/kg).

COPEC = Chemical of Potential Ecological Concern
Eco = Ecological
ESV = Ecological Screening Value
HQ = Hazard Quotient
Max = Maximum Detected Concentration
PBT = Persistent, Bioaccumulative, and Toxic
Bold = Chemical selected as a COPEC
SRV = Sediment Reference Value (Ohio EPA 2018)
ESV Sources: MacDonald et al. (2000); USEPA 2003 (Region 5 Ecological Screening Levels) used when no value available.

Table 4-17. Ecological Screening for Chemicals Detected in Surface Water

Analyte (µg/L)	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	PBT Chemical?	ESV	COPEC?	Screening HQ (Max/ESV)	Eco Justification	Station at Maximum Detect
Surface Water – Pond East										
Antimony	1/ 3	0.24	0.24	0.747	No	900	No	2.67E-04	Below ESV	ECCL-SDSW-011
Arsenic	3/ 3	0.88	1	0.923	No	340	No	2.94E-03	Below ESV	ECCL-SDSW-011
Copper	3/ 3	4	4.2	4.13	No	14	No	3.00E-01	Below ESV	ECCL-SDSW-011
Iron	3/ 3	310	320	313	No	1000	No	3.20E-01	Below ESV	ECCL-SDSW-010
Lead	**3/ 3**	**2.4**	**2.6**	**2.48**	**Yes**	**120**	**Yes**	**2.17E-02**	**PBT chemical**	**ECCL-SDSW-011**
Zinc	3/ 3	65	67	65.8	No	120	No	5.58E-01	Below ESV	ECCL-SDSW-010
Surface Water – Pond West A										
Antimony	4/ 4	0.26	0.52	0.363	No	900	No	5.78E-04	Below ESV	ECCL-SDSW-015
Arsenic	4/ 4	0.62	0.9	0.72	No	340	No	2.65E-03	Below ESV	ECCL-SDSW-015
Copper	**2/ 4**	**22**	**24**	**16.1**	**No**	**14**	**Yes**	**1.71E+00**	**Exceeds ESV**	**ECCL-SDSW-017**
Iron	4/ 4	250	340	283	No	1000	No	3.40E-01	Below ESV	ECCL-SDSW-015
Lead	**4/ 4**	**19**	**27**	**22.8**	**Yes**	**120**	**Yes**	**2.25E-01**	**PBT chemical**	**ECCL-SDSW-017**
Tin	1/ 4	2.3	2.3	4.33	No	1600	No	1.44E-03	Below ESV	ECCL-SDSW-015
Zinc	4/ 4	44	55	50.3	No	120	No	4.58E-01	Below ESV	ECCL-SDSW-017
Caprolactam	**2/ 4**	**0.32**	**0.37**	**1.42**	**No**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SDSW-018**
Isophorone	1/ 4	0.35	0.35	0.461	No	7500	No	4.67E-05	Below ESV	ECCL-SDSW-015
Surface Water – Pond West B										
Arsenic	2/ 2	0.81	0.87	0.84	No	340	No	2.56E-03	Below ESV	ECCL-SDSW-013
Copper	2/ 2	3.9	4.4	4.15	No	14	No	3.14E-01	Below ESV	ECCL-SDSW-014
Iron	2/ 2	840	870	855	No	1000	No	8.70E-01	Below ESV	ECCL-SDSW-014
Lead	**2/ 2**	**27**	**28**	**27.5**	**Yes**	**120**	**Yes**	**2.33E-01**	**PBT chemical**	**ECCL-SDSW-014**
Zinc	2/ 2	63	64	63.5	No	120	No	5.33E-01	Below ESV	ECCL-SDSW-014
Caprolactam	**1/ 2**	**0.33**	**0.33**	**1.57**	**No**	**--**	**Yes**	**No ESV**	**Detected and no ESV**	**ECCL-SDSW-013**

All units in micrograms per kilogram (µg/L).

COPEC = Chemical of Potential Ecological Concern
Eco = Ecological
ESV = Ecological Screening Value
HQ = Hazard Quotient
PBT = Persistent, Bioaccumulative, and Toxic
Bold = Chemical selected as a COPEC
ESV Source: Ohio EPA Outside Mixing Zone Maximum (OMZM), except iron which is National Ambient Water Criteria (NAWQC).

Table 4-18. Ecological COCs at the ECCL Firing Range

EU	COC	Medium
Drainage Ditch	None	None
Former Clubhouse and Garage	None	None
Pistol Range (East)	Antimony	Surface Soil
	Lead	
	Lead	Subsurface Soil
Pistol Range (West)	Copper	Surface Soil
	Lead	
Rifle Range	Antimony	Surface Soil
	Copper	
	Lead	
	Lead	Subsurface Soil
Trap and Skeet Range	Antimony	Surface Soil
	Arsenic	
	Lead	
	Benz(*a*)anthracene	
	Benzo(*a*)pyrene	
	Chrysene	
Pond West A	Lead	Sediment
	Copper	
Pond West B	None	None
Pond East	None	None

COC = Chemical of Concern
ECCL = Erie County Conservation League
EU = Exposure Unit

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5. BASIS FOR REMOVAL ACTION

5.1 POTENTIAL HUMAN AND ECOLOGICAL IMPACTS

Soil, sediment, surface water, and groundwater exposure pathways were evaluated in the human health and ecological risk evaluations for the ECCL Firing Range. The human health risk evaluation concluded that a threat of unacceptable human health exposure for a hypothetical future resident, the most stringent risk scenario, to soil exists at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and sediment at Pond West A. The ecological risk evaluation also concluded that a threat of unacceptable ecological exposure to soil exists at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and sediment at Pond West A.

The primary risk driver at the ECCL Firing Range is human health exposure to contaminated soil exceeding lead and PAH SLs and wildlife exposure to sediment. The basis for soil and sediment removal action at the ECCL is discussed below in accordance with the NCP.

5.2 NCP REMOVAL ACTION CRITERIA

According to Section 300.410 (b) of the NCP, an RSE includes evaluation by agencies of factors necessary to determine whether a removal action is necessary. In addition, the RSE also includes a determination as to whether a non-Federal party is responsible for undertaking or assisting with a cleanup.

NASA is using its delegated authority under CERCLA Section 104 and Executive Order 12580 to assess impacts to human health and the environment posed by the historical operations at the ECCL Firing Range and to determine whether a removal action is warranted to protect human health and the environment. NASA has elected to use its CERCLA authority for the site to determine if a release of hazardous substances has occurred or if potential exists for a release or threat of release of CERCLA hazardous substances. In accordance with Section 300.415(b)(2)(i-viii) of the NCP, the appropriateness of a removal action shall be considered when one of the following factors is satisfied:

i. *Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances, pollutants, or contaminants*:

   A viable potential for human health exposure to lead and/or cPAH-contaminated soil exists at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and lead-contaminated sediment at Pond West A. A viable potential for wildlife exposure to lead, antimony, arsenic, copper and/or PAH-contaminated soils also exists at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range EUs, and lead and copper in sediment at Pond West A.

ii. *Actual or potential contamination of drinking water supplies or sensitive ecosystems:*

   At PBS domestic water is supplied by the Erie County Water Division (ECWD). The ECWD uses Lake Erie as its source of public, commercial, and industrial water supply. Neither local surface water nor wells are used for drinking water at PBS. The Facilities Division is responsible for the operation, maintenance, and long-term stewardship of the drinking water distribution system. Wells utilized at NASA PBS are solely intended for environmental monitoring purposes. Small ponds/wetland areas are present at the site. Lead was detected at less than 2 times the MCL at two of these ponds. Although lead did not exceed human health and ecological screening criteria in surface water, lead in sediment did exceed ecological screening criteria at the Pond West A wetland and was detected at 98 times the ESV and 74 times the Ohio SRV; copper also was elevated above its ESV and SRV in this wetland.

iii. *Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release:*

No evidence of any drums, barrels, tanks, or other bulk storage containers was found at the ECCL Firing Range. However, the site contains the earthen backstop berms that have been contaminated by historical operations at the ECCL Firing Range.

iv. *High levels of hazardous substances, pollutants, or contaminants in soils largely at or near the surface that may migrate:*

Sampling data indicate that most of the elevated contaminant concentrations are located in the surface soil of the EUs. Based on the elevated contaminant concentrations in Pond West A sediment, migration has already occurred at the ECCL.

v. *Weather conditions that may promote migration of hazardous substances:*

No unusual weather conditions occurred that may promote migration of hazardous substances. No potential for migration of contaminants via overland flow/runoff toward any low-lying surface features around the site.

vi. *Threat of fire or explosion:*

No known threat of fire or explosion exists.

vii. *Availability of other appropriate Federal or state response mechanisms to respond to the release:*

NASA will coordinate and engage with the Ohio EPA, as necessary, with regard to NASA's continuing obligations under CERCLA.

viii. *Other situations or factors that may pose threats to public health, welfare, or the environment:*

Lead and cPAHs in soil and lead in sediment at concentrations exceeding residential RSLs and ESVs pose a threat to human health, wildlife, and the environment. Antimony, arsenic, and copper in soil and copper in sediment also pose a threat to wildlife and the environment. While access to the site is limited, a potential for current and future receptors to be exposed to this contamination exists. Thus, it is recommended that appropriate removal action (i.e., an NTCRA) be conducted to attain soil concentrations below the applicable SLs and prevent future exposure threats and potentially allow for subsequent unrestricted reuse of the site. The detailed removal action scope and budgetary cost estimate are discussed in Section 6.

As discussed above, the contamination present at the ECCL Firing Range satisfies four of the eight factors to be considered in determining the appropriateness of a removal action as required by the NCP to address the impacts to human health and the environment by past site operations.

6. REMOVAL ACTION OBJECTIVES AND GOALS

This section identifies the removal action objectives, associated cleanup levels, statutory limits on removal, a brief evaluation of ARARs, the removal action scope, and a preliminary removal action schedule.

6.1 REMOVAL ACTION OBJECTIVES

Removal action objectives are intended to remove the site conditions that create the NCP factors for a removal action. The applicable NCP factors are:

(1) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.
(2) Actual or potential contamination of drinking water supplies or sensitive ecosystems.
(3) Hazardous substances, pollutants, or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release.
(4) High levels of hazardous substances, pollutants, or contaminants in soils largely at or near the surface that may migrate.

The contaminated soil exceeding residential RSLs at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range, and sediment at Pond West A, pose a threat to human health exposure if the property is released for residential use.

Based on these NCP removal action factors, the following removal action objectives are identified for the site:

- Minimize the risk associated with exposure to soil contamination (lead and cPAHs) in and around the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Range.
- Minimize the risk associated with exposure to sediment contamination (lead) in and around Pond West A.

Attaining these objectives is expected to result in mitigation of NCP removal action factors and the protection of human receptors. The proposed removal actions for protection of human health receptors also will be protective of ecological receptors. Once the removal action attains soil concentrations below the applicable residential RSLs, it will allow for subsequent potential unrestricted reuse of the site.

6.2 PRELIMINARY REMEDIATION GOALS

PRGs are used to guide removal actions at a site. Sections 6.2.1 and 6.2.2 discuss the selection and/or adequacy of PRGs for the protection of human health and the environment.

6.2.1 PRGs for Protection of Human Health

Lead and five cPAHs (benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a]h)anthracene, and indeno[1,2,3-cd]pyrene) were identified as COCs requiring remediation in soil and sediment (lead only). The PRGs and their recommended application for remediation of these COCs are described below.

Lead: The PRG for lead is conservatively set at the Residential soil RSL of 400 mg/kg. This concentration is intended to reduce the probability for young resident children's blood lead level to exceed a target level

of 10 µg/deciliter to less than 5%. The IEUBK takes into account background levels of lead in other media (e.g., food, air, and tap water) as well as background blood lead concentrations in the population.

At the areas identified as having potentially unacceptable risk associated with lead (Pistol Range [East], Pistol Range [West], Rifle Range, Trap and Skeet Range, and sediment at Pond West A), all areas showing lead results above 400 mg/kg will be remediated and confirmation samples will be collected. The goal is for all remaining sampled areas and all confirmation samples to be ≤400 mg/kg. The IEUBK recommends use of the arithmetic average concentration as the EPC for lead in soil. Therefore if, upon completion of remediation, the arithmetic average lead concentration in an area is ≤400 mg/kg, remediation will be considered complete.

cPAHs: The streamlined risk assessment identified five cPAHs as COCs. The PRG for cPAHs is conservatively set at the Residential soil RSL for benzo(*a*)pyrene of 1.1 mg/kg. The concentration of cPAHs is converted to an equivalent concentration of benzo(*a*)pyrene (BaPeq) using the following equation:

$$BaPeq = \sum(PAH_i * RPF)$$

where

BaPeq = Benzo(*a*)pyrene equivalent concentration for total cPAHs.

PAH_i = Concentration of individual cPAH COCs (i.e., benz[*a*]anthracene, benzo[*a*]pyrene, benzo[*b*]fluoranthene, dibenz[*a,h*]anthracene, and indeno[1,2,3-*cd*]pyrene).

RPF = Relative Potency Factor for each cPAH compared to benzo(*a*)pyrene from Table 8 of *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons* (USEPA 1993):

cPAH	RPF
Benz(*a*)anthracene	0.1
Benzo(*a*)pyrene	1
Benzo(*b*)fluoranthene	0.1
Dibenz(*a,h*)anthracene	1
Indeno(1,2,3-*cd*)pyrene	0.1

At the area identified as having potentially unacceptable risk associated with cPAHs (Trap and Skeet Range), all areas showing cPAH results as BaPeq above 1.1 mg/kg will be remediated and confirmation samples will be collected. The goal is for all remaining sampled areas and all confirmation samples to be ≤1.1 mg/kg BaPeq. If, upon completion of remediation the calculated EPC (i.e., the 95UCL BaPeq concentration) in an area is ≤1.1 mg/kg, remediation will be considered complete.

***Other COCs*:** Isolated elevated detections of antimony (Pistol Range [East], Pistol Range [West], Rifle Range, and Trap and Skeet Range) and arsenic (Trap and Skeet Range) also were identified as COCs. These isolated detections were located within areas identified as requiring remediation for either lead or cPAHs; therefore, remediation specifically for antimony and arsenic is not required. Copper was detected above the residential RSL (3,100 mg/kg) in one location (8,700 mg/kg at SL-115) within the discharge area of the Pistol Range (West). Detected concentrations in the remaining 31 samples were below the RSL. As only a single isolated concentration of copper was above the RSL, and the EPC (676 mg/kg) is well below the

RSL, copper was not identified as a COC for remediation; however, this and nearby samples also were identified as representing a potentially unacceptable risk to ecological receptors. Therefore, removal of soil in this area with collection of confirmation samples to demonstrate the remaining concentration is ≤3,100 mg/kg is recommended.

6.2.2 PRGs for Protection of Wildlife

Lead, three other metals (antimony, arsenic, and copper), and three PAHs (benz[a]anthracene, benzo[a]pyrene, and chrysene) were identified as ecological COCs requiring remediation in soil; lead and copper were identified as COCs requiring remediation in sediment. The PRGs and their recommended application for remediation of these ecological COCs are described below.

Lead in Soil: As stated above, the PRG for lead is set at the Residential soil RSL of 400 mg/kg. In addition to human health, this value is protective of soil invertebrates and avian and mammalian predators, which have Eco-SSLs ranging from 460 to 1,700 mg/kg (USEPA 2005). At the areas identified as having unacceptable risk associated with lead in soil (Pistol Range [East], Pistol Range [West], Rifle Range, and Trap and Skeet Range), all areas showing lead results above 400 mg/kg will be remediated and confirmation samples will be collected. The goal is for all remaining sampled areas and all confirmation samples to be ≤400 mg/kg. If replaced with clean fill (i.e., background levels of lead), it is anticipated average lead levels will be much lower (approximately twice background concentrations in most locations [**Table 6-1**]) and protective of a wider range of ecological receptors. If, upon completion of remediation the arithmetic average lead concentration in an area is ≤400 mg/kg, remediation will be considered complete.

***PAHs in Soil*:** As stated above, the PRG for PAHs is 1.1 mg/kg in soil at the Trap and Skeet Range. The related ecological COCs are benz(a)anthracene, benzo(a)pyrene, and chrysene. The most stringent ESV for these PAHs is also 1.1 mg/kg, and exceedances of the ESV for chrysene (not included in human health calculations) are co-located with other PAHs. Therefore, if remediation is complete for human health, it also will be complete for ecological risk, and no remediation specifically for PAHs in wildlife is required.

***Lead and Copper in Sediment*:** As stated above, the PRG for lead in soil is 400 mg/kg, and locations above 400 mg/kg will be remediated. However, in sediment, removal to 400 mg/kg would require remediation of seven out of nine locations in Pond West A. As sediment at the ponds/wetlands is much more relevant to ecological receptors rather than human health, ecological risk management will take precedence for remediation at Pond West A. The wetland at Pond West A is an ORAM Category 2, of moderate quality. Some remediation is necessary to reduce ecological risk from lead and copper, but this must be balanced with habitat disturbance caused by the remediation. For this reason, it is recommended that only the southern pond area of Pond West A where the highest lead and copper detections occur (including samples SDSW-017, SDSW-018, SD-028, and SD-029) be remediated. If upon completion of remediation the average lead concentration in Pond West A is <400 mg/kg, remediation will be considered complete.

***Other COCs*:** Antimony (Pistol Range [East], Rifle Range, and Trap and Skeet Range), arsenic (Trap and Skeet Range), and copper (Pistol Range [West] and Rifle Range) also were identified as COCs in soil. Most detections exceeding ESVs were located within areas identified as requiring remediation for either lead or PAHs, and average concentrations of antimony and arsenic are anticipated to be below background concentrations after remediation (see **Table 6-1**); therefore, remediation specifically for antimony and arsenic is not required. Similarly, copper at the Rifle Range is being remediated with the other COCs. However, two detections, which result in potential unacceptable risk to wildlife from copper, the MDC (8,700 mg/kg at SL-115) and a second location (660 mg/kg at SL-117), were sampled within the discharge area of the Pistol Range (West), which is not included in the area of remediation for lead. Therefore, removal of soil in this area with collection of confirmation samples to demonstrate the remaining copper concentration averages ≤70 mg/kg is recommended.

6.3 STATUTORY LIMITS ON REMOVAL ACTION

Statutory limitations on removal action are found at CERCLA Section 104. Limitations provided in CERCLA Section 104(a)(3) prevent removal actions in response to a release or threat of release:

(A) Of naturally occurring substances in their unaltered form (or that have been altered solely through natural processes);

(B) From products that are part of the structure of, and result in exposure within, residential buildings or business or community structures; and

(C) Into public or private drinking water supplies due to deterioration of the system through ordinary use.

None of the preceding statutory limitations apply to the ECCL Firing Range. Limitations at CERCLA Section 104(c)(1) prohibit expenditure of more than $2,000,000.00 or a removal duration of more than 12 months for Time-Critical Removal Actions (TCRAs) funded out of the Superfund account. This limit on funds and duration does not apply to removal actions at the ECCL Firing Range because this removal action is not financed by the Superfund account, and the proposed response action is a Non-Time-Critical Removal Action, not a TCRA.

Section 300.415(b)(4)(i) of the NCP provides for the completion of an Engineering Evaluation/Cost Analysis <u>or its equivalent</u> whenever a planning period of at least 6 months exists before onsite activities must be initiated. In this RSE Report, NASA has included a detailed removal scope and budgetary cost estimate in **Appendix H** that will allow for an expeditious path forward for NASA to attain the removal action objective for this site.

Section 300.415(g) of the NCP specifies that if the removal action does not fully address threats posed by the release, an orderly transition from removal to remedial response activities will be provided. NASA will provide for an orderly transition to remedial response if the recommended removal actions do not fully address threats posed by the release.

Section 300.415(j) of the NCP requires that Superfund-financed removal actions attain ARARs to the extent practicable and considering the exigencies of the situation. While this is not a Superfund-financed action, this requirement is normally adhered to for removal actions completed under the NCP.

6.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

ARARs include those Federal and state regulations that are designed to protect the environment. Applicable requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site" (40 *Code of Federal Regulations* [*CFR*] §300.5).

Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting law that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well suited to the particular site" (40 *CFR* §300.5).

In the absence of Federal- or state-promulgated regulations, many criteria, advisories, guidance values, and proposed standards are not legally binding but may serve as useful guidance for setting protective cleanup levels. These are not potential ARARs but are "to-be-considered" (TBC) guidance (40 *CFR* §300.400(g)(3)).

CERCLA remedial actions at a site must comply only with the substantive requirements of a regulation (CERCLA Section 121(e)). Substantive requirements are those that pertain directly to the actions or conditions at an AOC, while administrative requirements facilitate their implementation. USEPA recognizes that certain administrative requirements (e.g., consultation with state agencies and reporting) also should be observed if they are useful in determining cleanup standards at the AOC (55 *CFR* §8757).

USEPA classifies ARARs as chemical-, action-, and location-specific to provide guidance for identifying and complying with ARARs (USEPA 1988):

- Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, allow numerical values to be established. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.
- Action-specific ARARs are rules, such as performance or design or other activity-based rules, which place requirements or limitations on actions.
- Location-specific ARARs are rules that place restrictions on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

6.4.1 Chemical-specific ARARs

Chemical-specific TBC ARARs include the USEPA residential RSLs and ESVs discussed in the human health and ecological risk evaluations. The removal action will satisfy the chemical-specific ARARs once the PRGs are met.

6.4.2 Action-specific ARARs

Under the recommended removal action of soil at Pistol Range (East), Pistol Range (West), Rifle Range, Trap and Skeet Range, and sediment at Pond West A at the ECCL Firing Range, the following action-specific ARARs are considered:

- Because the removal action of soil at the Pistol Range (East), Pistol Range (West), Rifle Range, Trap and Skeet Range, and sediment at Pond West A would include generating and managing contaminated environmental media and materials, Resource Conservation and Recovery Act (RCRA) requirements would be considered potential ARARs for this activity. The RCRA requirements mandate that a generator must determine whether a material is (or contains in the case of environmental media) hazardous waste under Ohio Administrative Code (OAC) 3745-52-11. If a material is determined to be or contain a listed hazardous waste, or exhibits a hazardous waste characteristic, additional management requirements under RCRA must be followed as an ARAR under CERCLA. If the excavated soil is determined to be characteristically hazardous and requires stabilization to render it non-hazardous for disposal, the requirements under OAC 3745-52-34 would be applicable. OAC 3745-52-34 specifies that generators are allowed to treat and accumulate waste onsite up to 90 days without requiring a hazardous waste permit from Ohio EPA. Treatment as defined in OAC 3745-50-10(A) includes any method, technique, or process designed to change the physical, chemical, or biological composition of the waste to render the waste non-hazardous or less hazardous.

- In 1998, USEPA created a new unit for the temporary management of remediation wastes known as the staging pile. The staging pile is an accumulation of solid, non-flowing remediation wastes that may be used for storage of those wastes for 2 years. The requirements for staging piles include the performance criteria of 40 *CFR* 264.554(d) and OAC 3745-57-74. These standards require that the staging pile must be designed to prevent or minimize releases of hazardous waste or hazardous constituents into the environment. Storage in a staging pile includes mixing, sizing, blending, or other similar physical operations as long as they are intended to prepare the wastes for subsequent management or treatment.
- Shipments of contaminated soils and materials will comply with Federal, state, and local rules, laws, and regulations. In addition to the identified ARARs for the selected action, NASA will comply with requirements applicable to offsite actions including RCRA hazardous waste transportation requirements under OAC 3745-52-20 through OAC 3745-52-33, offsite treatment prior to land disposal as required by RCRA's land disposal restrictions (LDRs) under OAC 3745-270, and alternative LDR treatment standards for contaminated soil under OAC 3745-270-49.
- Implementing excavation activities also would trigger potential ARARs associated with land disturbance and emission controls. OAC 3745-15-07 requires that nuisance air pollution emissions be controlled. This includes controlling potential fugitive dust from the soil and sediment excavation activities. In addition, any construction (i.e., soil disturbance activities that would encompass more than 1 acre) would trigger the stormwater requirements contained in 40 *CFR* Part 450. These requirements mandate that erosion and sedimentation control measures be designed and implemented to control erosion and sediment runoff. The proposed removal action is anticipated to disturb more than 1 acre; therefore, erosion controls and best management practices will be developed in a stormwater pollution prevention plan and utilized during the removal action.
- In the event solid waste material is found to be contaminated but not a RCRA hazardous waste, management and disposal of this material would be subject to the requirements associated with managing and disposing solid waste within the State of Ohio. The OAC Section 3745-27-05 requirements would be potential ARARs for disposing of non-hazardous contaminated waste material generated during excavation and subsequent disposal at an offsite location.

6.4.3 Location-specific ARARs

Location-specific requirements include those established for potential removal activities conducted within wetlands, within a floodplain area, or with respect to threatened and/or endangered species. The ECCL Firing Range site is not within a floodplain area. Twelve wetlands have been identified and delineated and one open water pond was identified within the ECCL Firing Range site boundary. One wetland area identified as W-07-028, located along the eastern side of Pond East, contained populations of two plant species listed as potentially threatened in the state of Ohio: handsome-Harry (*Rhexia virginica*, OBL) and bog white violet (*Viola lanceolata*, OBL) (EnviroScience 2019). However, no threatened and/or endangered species were encountered at the site. The following location-specific ARARs are TBC:

- Due to the presence of sensitive resources (e.g., wetlands) within the ECCL Firing Range, if any remedial activities affect these wetlands, Executive Order 11990 (40 *CFR* 6, Appendix A) and OAC 3745-1-54 would be TBC guidance for the site. In that event, the following actions should be taken during the design and implementation of remedial actions: 1) Identify potential wetland impacts (e.g., impact to water quality, impact to habitat quality, or impact to vegetative community); and 2) Avoid wetland and water impacts where practicable, minimizing potential impacts to wetlands and water, and compensate for any remaining, unavoidable impacts to wetlands or waters through activities to enhance or create wetlands and/or waters (e.g., mitigation banks).

- Two plant species listed as potentially threatened in the State of Ohio have been identified at the ECCL Firing Range. If any remedial activities affect these plant species, requirements established under the Endangered Species Act (16 United States Code 1531 et seq., 50 *CFR* Parts 200 and 402) and the Ohio Revised Code (ORC) 1518 and 1525 would be TBC guidance for the site.
- 50 *CFR* Part 17, Endangered Species Act requires action, including consultation with the Department of Interior, to conserve ecosystems, habitats, and endangered and threatened species. In addition, ORC 1531.25 and 1501:31-23 provide protections for endangered and threatened species in Ohio. To protect the critical habitat for two bat species (Indiana bat [FE] and Northern long-eared bat [Federal threatened (FT)]), tree clearing must take place outside of the restricted time frame of April 1st through September 30th. Consultation with the U.S. Fish and Wildlife Service and ODNR may occur, if tree clearing occurs within the restricted time frame.

6.5 EVALUATION OF EFFECTS ON MINORITY COMMUNITIES AND LOW-INCOME COMMUNITES

The streamlined risk assessment for ECCL soil, sediment, surface water, and groundwater was conducted in accordance with USEPA's guidance on conducting NTCRAs (USEPA 1993) and utilized federally published SLs as evaluation criteria that do not discriminate on the basis of race, color, or national origin. The recommended removal action will have minimal effect on the surrounding community including minority communities and low-income communities. NASA will provide opportunities for community input on this evaluation by holding a public forum and provide a copy of the report that will be accessible to the public. The public will be notified of these opportunities through a public notice in a local newspaper.

6.6 REMOVAL ACTION SCOPE

This RSE Report presents the removal scope and budgetary cost estimate to attain the removal action objective. The proposed removal action will be completed by NASA under contract awarded to Firelake-Arrowhead NASA Services.

The removal action at the ECCL Firing Range will be conducted in a two-phased approach (Phases 1 and 2) to efficiently attain the removal action objective. Phase 1 of the removal action will include site preparation activities (e.g., vegetation clearing, set-up of erosion controls). Phase 2 of the removal action will include lead- and cPAH-contaminated soil excavation, pond dewatering and sediment dredging, onsite lead-contaminated soil and sediment stabilization treatment, and waste disposal activities. Pre-planning and site restoration/reporting activities will be completed before and after the proposed field activities, respectively. It is estimated that the removal action field activities will be completed over an approximately 8-month period. It is estimated that a 10-person field crew (Field Manager, Site Health and Safety Officer, QC Manager, Operators [up to three], Laborers [up to two], Off-road Truck Driver, and Field QC Engineer/Technician) will be required for conducting the removal action activities.

The contaminated soil exceeding PRGs at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges, and sediment at Pond West A pose a threat to human health exposure if the property is released for residential use and to ecological receptors. At the areas identified as having potentially unacceptable risk associated with lead (Pistol Range [East], Pistol Range [West] Rifle Range, Trap and Skeet Ranges, and sediment at Pond West A), all areas showing lead results above 400 mg/kg will be remediated and confirmation samples will be collected. The goal is for all remaining sampled areas and all confirmation samples to be <400 mg/kg. The IEUBK recommends use of the arithmetic average concentration as the EPC for lead in soil. Therefore, if, upon completion of remediation the arithmetic average lead concentration in each EU is <400 mg/kg, remediation will be considered complete. At the area identified as having potentially unacceptable risk associated with cPAHs (Trap and Skeet Ranges), all areas showing cPAH results as BaPeq greater than 1.1 mg/kg will be remediated and confirmation samples

will be collected. The goal is for all remaining sampled areas and all confirmation samples to be <1.1 mg/kg BaPeq. If, upon completion of remediation, the calculated EPC (i.e., the 95UCL BaPeq concentration) in an area is <1.1 mg/kg, remediation will be considered complete.

Based on visual and land surveys and ArcGIS mapping conducted during the RSE for the earthen berms, it is estimated that the earthen backstop berms are approximately as follows: Pistol Range (West) – 135 ft long by 17 ft high by 50 ft wide; Pistol Range (East) – 110 ft long by 15 ft high by 55 ft wide; and Rifle Range – 170 ft long by 14 ft high by 50 ft wide. The estimated removal quantities include the soil contained in the Pistol Range (East), Pistol Range (West) and Rifle Range backstop berms and northern ends of the side berms, and target areas that exceed the site Residential RSL for lead. The soil on the top of each berm will be removed to applicable trench sample depth intervals that no longer exceed the RSL for lead. Therefore, the top 6 ft, 3.5 ft, and 6 ft of soil will be removed for the Rifle Range, Pistol Range (West), and Pistol Range (East) berms, respectively. The identified target areas for the Rifle Range, Pistol Range (West), and Pistol Range (East) will be excavated to depths of 1.5 ft, 1.0 ft, and 1.0 ft bgs, respectively. Additional excavation to a depth of 1 ft bgs of isolated "hot spot locations" that exceed the copper ESV (i.e., SL-115 and SL-117 in the Pistol Range [West] discharge area) and for removal of surficial spent casings at the Pistol Ranges (West and East) discharge areas will be performed.

The estimated removal quantities include the soil in the Trap and Skeet Range that exceeds the site Residential RSLs. The area of the Trap and Skeet Range that requires soil removal consists of three distinct zones: a northern zone with only lead exceedances (this is the largest zone of the three), a central zone with exceedances for both lead and cPAH exceedances, and a southern zone with only cPAH exceedances. The lead-only northern zone of the Trap and Skeet Range is divided into two areas that will be excavated to a depth of 1 or 1.5 ft bgs. The main portion of lead-only northern zone encompassing 8.8 acres will be excavated to a depth of 1.0 ft bgs and a rectangular inset of the zone encompassing 2.0 acres will be excavated to a depth of 1.0 ft bgs. The lead and cPAH central zone will be excavated to a depth of 1.5 ft bgs to address cPAH exceedances in the 0- to 1-ft bgs depth at these areas. The cPAH-only southern zone will be excavated to a depth of 1.5 ft bgs to address cPAH exceedances in the 0- to 1-ft bgs depth at these areas. Additionally within the southern zone, location SL-176 will be excavated to a depth of 2 ft bgs to address deeper cPAH exceedances. **Figures 13** and **14** present the sample locations with COCs exceeding human health or ecological screening levels. **Figures 15, 16,** and **17** present the "Extent of Soil Removal," at the Pistol Range (East), Pistol Range (West), Rifle Range, and Trap and Skeet Ranges areas targeted for removal at the ECCL Firing Range. **Figure 18** presents the "Extent of Sediment Removal" in the southern portion of Pond West A targeted for removal at the ECCL Firing Range. Note that some of the locations within proposed removal extents shown in **Figures 15, 16**, and **17** (e.g., SL-199, SL-214, SL-215, SL-229, and SL-263) are not targeted for removal based on the detailed risk evaluation results presented in Section 4; however, these locations are based on XRF screening data for shallower intervals. The parameters, assumptions, excavation dimensions, and removal volume estimates for the removal action are presented in detail in **Appendix H**.

Pre-Removal Activities:

Prior to mobilizing for Phase 1 construction activities, detailed planning efforts will be undertaken to include updating existing site-specific plans (e.g., HASP, QAPP); developing a removal action work plan and stormwater pollution prevention plan; procuring necessary subcontracts (e.g., waste disposal facilities, analytical laboratory services, major construction equipment rental); and completing a pre-removal readiness review, including dig permits, utility clearances, etc.

Removal Action Activities – Phase 1:

Prior to initiating removal of the earthen backstop berms and the Trap and Skeet Range soils, waste characterization sampling will be conducted for the soil contained within the berms and the Trap and Skeet Range soils. Five-part composite samples will be collected from the soil in the earthen berms and Trap and Skeet Ranges at a frequency of 1 sample per 300 cubic yards (CY) per landfill requirements. One five-part composite sample also will be collected from the concrete retaining block wall at the Rifle Range berm. The samples will be submitted for laboratory analysis for hazardous waste determination. In addition, the lateral earthen berms with no lead or cPAH exceedances will be sampled for full suite analyses to determine potential reuse as backfill onsite. Similarly, five-part composite samples also will be collected from the Trap and Skeet Ranges at a frequency of two samples per range for hazardous waste determination. All hazardous waste determination samples will be tested in the laboratory for TCLP SVOCs, TCLP VOCs, TCLP metals, TCLP pesticides, TCLP herbicides, PCBs, paint filter test, and reactivity (total cyanide, total sulfide), corrosivity, and ignitability [RCI] analysis.

Based on the RSE bench test study results for the site (discussed in Section 3.2.3), it is anticipated that the soil in the earthen backstop berms and the majority of Trap and Skeet Range excavations will generally be characterized as hazardous waste, however, onsite lead stabilization treatment will allow for non-hazardous disposal. Based on historical soil sampling results, it is anticipated that the cPAH-contaminated soil (not co-located with lead contamination) in the Trap and Skeet Ranges will generally be characterized as non-hazardous waste. In summary, prior to actual removal of the earthen berms and range soils, a clear determination will be made as to the disposal of the berms and range soils.

Site preparation will involve vegetation clearing to facilitate efficient soil removal and set-up of erosion controls (e.g., filter logs and silt fences), as necessary, to protect surface drainage features. Vegetation clearing will occur at the majority of the Trap and Skeet Ranges; the earthen berms of the Pistol Range (East), Pistol Range (West), and Rifle Range; immediately surrounding the southern portion of Pond West A; surrounding the former Clubhouse; and along the entry roads to the site. To protect the critical habitat for two bat species (Indiana bat [FE] and Northern long-eared bat [FT]), tree clearing will take place outside of the restricted time frame of April 1st through September 30th; therefore, clearing may be expedited.

Removal Action Activities – Phase 2:

The removal activities will begin with removal and segregation, as needed, of the earthen berms and then proceed with the adjacent target areas and Trap and Skeet Ranges. In addition, the old fencing, gates, and signage at the Fox Road entrance to the Rifle and Pistol Ranges will be removed during Phase 2. The appropriate equipment (e.g., excavator with hydraulic extension, skid steer, bulldozer, front-end loader, off road haul truck, and soil sifting machine) will be mobilized to the site for the removal activities. The upper contaminated intervals of the earthen backstop berms will be removed first prior to the target areas (directly in front of backstop berms). Once confirmed that contaminated berm soils have been removed, staged, and treated to render non-hazardous, the adjacent target areas will be excavated to the required depth, ranging from 1 to 1.5 ft bgs (or bedrock refusal) and treated. The soil at the Trap and Skeet Ranges will be removed to a depth ranging from 1 to 1.5 ft bgs (or bedrock refusal), treated (if lead-contaminated), staged, and ultimately loaded into dump trucks for offsite disposal. A cPAH hot spot excavation within the Trap and Skeet Ranges will be excavated deeper to 2 ft bgs (around SL-176). It is estimated that a total of approximately 45,466 tons of soil will be generated from the removal activities. It is anticipated that the removal and disposal of the soil will be completed in 7 months. The soil quantity estimate includes both the soil within the earthen berms and soil excavations to address specific lead and cPAH exceedances in the ECCL Firing Range (see **Appendix H** for detailed volume estimates).

Following the removal of the Rifle Range earthen backstop berm, a concrete block retaining wall will be removed from the backstop berm. It is anticipated that all non-hazardous concrete waste generated from the removal activities will be disposed of at the Erie County Landfill located approximately 5 miles from NASA PBS. It is anticipated that removal and disposal of the concrete block wall and will be completed in 3 days. Based on the dimensions of the retaining block wall, it is estimated that approximately 103 tons of concrete debris will be generated for offsite disposal.

Following the removal of the Rifle Range earthen backstop berm, the contaminated sediment will be removed until bedrock refusal from the southern portion of Pond West A. A temporary cofferdam (not earthen berm due to wetland requirements) may be installed in the channel between each portion of Pond West A. The surface water in the southern portion will be dewatered into the northern portion of Pond West A, or the adjacent Pond West B. It is estimated that a total of approximately 624 tons of sediment will be generated from the removal activities (refusal at less than 1 ft during RSE). It is anticipated that the removal and disposal of the sediment will be completed in 2 weeks.

Waste Management:

- Soil Disposal Option 1 – If the waste characterization sampling determines the waste to be hazardous due to TCLP results, the soil will be excavated from the berms, target areas, and Trap and Skeet Ranges, and temporarily stored in containers (as per OAC 3745-52-34 requirements) at an onsite staging location. The container shall be made of or lined with materials that will not react with, and are otherwise compatible with, the waste to be stored, so that the ability of the container to contain the waste is not impaired. Sediment also will be staged similarly. An appropriate amendment (e.g., calcium or potassium phosphate amendment) will be thoroughly mixed with the soil or sediment in the containers to render it non-hazardous for disposal. Following confirmation TCLP sampling to ensure that the soil waste is non-hazardous, the soil will be ultimately loaded into dump trucks for offsite disposal. The details regarding the type and quantity of each amendment was determined during bench-scale testing conducted as part of the RSE activities.

  Under 40 *CFR* 261.6(a)(3)(ii), recycled scrap metal is classified as "recyclable material" that is not subject to requirements for generators, transporters, and storage facilities of hazardous wastes. Any metal debris reclaimed from the site would qualify as "scrap metal" for recycling as per 40 *CFR* 261.6(a)(3)(ii) (62 *Federal Register* 6631, February 12, 1997).

  Under this disposal option, it is anticipated that the excavated soil and sediment from the ECCL Firing Range will be disposed of offsite at the Erie County Landfill as non-hazardous waste (either with or without amendment addition for soil stabilization). Areas identified in this RSE that exhibit concentrations below amendment criteria (e.g., only cPAH contamination) will be live-loaded into dump trucks for offsite disposal at Erie County Landfill. All haul trucks transporting bulk soil and sediment waste will be weighed both empty and loaded on a portable scale, and weight information will be recorded for reporting purposes.
- Soil Disposal Option 2 – Alternatively, if the waste characterization sampling determines the waste to be hazardous due to TCLP results, the waste may be directly disposed of offsite at a RCRA Subtitle C facility such as the Envirosafe Services of Ohio, Inc. facility in Oregon, Ohio, approximately 60 miles from NASA PBS. This option will allow for a potentially faster completion of the removal action as the steps of amendment mixing and confirmation sampling would be eliminated. As in Soil Disposal Option 1, metal debris will be recycled as "scrap metal." Areas identified in this RSE that exhibit concentrations below amendment criteria (e.g., only cPAH contamination) will be live-loaded into dump trucks for offsite nonhazardous disposal at Erie County Landfill.

Confirmation Sampling:

Following completion of removal activities at each range at the site, confirmation soil sampling will be conducted at the Rifle and Pistol Range target excavation locations and Trap and Skeet Range excavations at the ECCL Firing Range. The Trap and Skeet Ranges will be subdivided into a grid due to its very large size prior to soil removal. Discrete confirmation samples will be collected from below the total depth at each excavation area/grid (i.e., floor). Samples will be collected and analyzed either for lead only, lead and other metals (antimony, arsenic, or copper), lead and PAHs, or only PAHs, depending on the PRGs for each excavation area. Samples generally will be collected at an approximate spacing of one sample per every 50 to 75 ft grid of excavation, but final confirmation sample locations will depend on actual field observations during the removal action. Due to shallow refusal in Pond West A, no confirmation sediment samples are anticipated. The confirmation soil sampling will determine whether the removal action was fully successful in attaining PRGs. Depending on the initial confirmation results, the potential need for extending the excavation footprint will be evaluated.

Site Restoration Activities and Reporting:

Site restoration will be completed following completion of removal activities at each range of the site. Site restoration of the Rifle and Pistol Ranges will include backfilling the removal areas with clean fill material obtained from a NASA-approved location and/or uncontaminated soil material from the firing ranges berms (all backfill material must pass NASA soil reuse standards); the top 6 inches of the backfilled areas will be backfilled with clean topsoil obtained from a NASA-approved location for vegetation re-establishment. Following completion of backfilling activities, the backfilled area will be seeded with NASA-approved seed mixture, and a post-removal inspection will be conducted. Site restoration of Pond West A will not include backfilling and will be limited to restoring any side banks disturbed during sediment removal. Erosion controls will be removed once at least 70% grass growth is observed during weekly inspections. A Removal Action Completion Report will be prepared to document in detail the removal activities at the ECCL Firing Range.

Removal Action Budgetary Cost Estimate:

Appendix H presents the parameters, assumptions, and estimated costs to implement the proposed removal action at the ECCL Firing Range. The estimated total cost for removal action including development of the RA work plan and reporting under Soil Disposal Option 1 (amendment and non-hazardous waste disposal) is $8,380,099. The estimated cost for removal action and reporting under Soil Disposal Option 2 (hazardous waste disposal) is $18,335,261.

In accordance with CERCLA cost-estimating guidance (USEPA 1988), an order-of-magnitude cost estimate is expected to be within +50 to -30% of the actual project cost. However, a Class 3 estimate (as defined by ASTM E2516-11, "Standard Classification for Cost Estimate Classification System") was prepared for budget authorization and to form the initial control estimate against which all actual costs and resources can be monitored. The Class 3 cost estimate presented in Appendix H involved deterministic estimating methods and a high degree of unit cost line items with an accuracy range of +20% to -10% and the inclusion of an 10% contingency for constructability, over-excavation quantities, etc. Please note that changes in the cost elements may accrue as a result of new information and data collected during the detailed planning phase of the removal action. Major changes would be documented in the form of a memorandum in the Administrative Record file for NASA PBS.

6.7 REMOVAL ACTION SCHEDULE

It is estimated that the removal action field activities will be completed over a duration of approximately 8 months. Tree clearing may be expedited to take place outside of the restricted time frame of April 1st through September 30th (estimated 4 weeks); and Phase 2 activities may occur in second mobilization (7 months). However, a detailed removal action schedule will be developed during the planning phase for the field activities at a future date.

Table 6-1. Impact of Lead Removal on Ecological Risk

Exposure Unit	Pre-Removal Lead Average Concentration (mg/kg)	Post-Removal Lead Average Concentration (mg/kg)	Are other Ecological COCs Co-Located with Lead Removal?	Comments
Pistol Range (East) Surface Soil	4,879	96	Yes for antimony, as resulting average concentration below background after lead removal.	Post-removal lead concentration protective of ecological receptors.
Pistol Range (East) Subsurface Soil	594	181	NA	While the post-removal lead concentration is elevated compared to the other EUs, less exposure for ecological receptors to subsurface soil exists. Reducing the average any lower would require a lower PRG, which would not be practical unless also applied to the surface soil.
Pistol Range (West) Surface Soil	2,303	80	Copper only partially co-located; copper MDC not co-located. Copper average decreases from 504 to 349 mg/kg after lead removal.	Post-removal lead concentration protective of ecological receptors; recommend including two more copper locations (ECCL-SL-115 and ECCL-SL-117) for removal so the resulting copper concentration (59.9 mg/kg) would be close to background and protective of ecological receptors. Copper PRG for these two locations would be the lowest Eco-SSL above background (70 mg/kg for soil invertebrates).
Rifle Range Surface Soil	2,301	88	Yes for antimony (all detections above background would be removed) and copper (post-removal average similar to background of 56.2 mg/kg).	Post-removal lead concentration protective of ecological receptors.
Rifle Range Subsurface Soil	476	88	NA	Post-removal lead concentration protective of ecological receptors.
Trap and Skeet Ranges Surface Soil	6,170	111	Yes for antimony and arsenic, as resulting average concentrations below background. Minimal co-location for PAHs.	Post-removal lead concentration protective of ecological receptors. Although lead removal has minimal impact on PAH concentrations, post-PAH removal concentration protective of ecological receptors.

Table 6-1. Impact of Lead Removal on Ecological Risk (Continued)

Exposure Unit	Pre-Removal Lead Average Concentration (mg/kg)	Post-Removal Lead Average Concentration (mg/kg)	Are other Ecological COCs Co-Located with Lead Removal?	Comments
Pond West A Sediment	1,104	260	Yes for copper as two highest detections would be removed, lowering the average from 390 to 144 mg/kg.	Given Pond West A is between the Trap and Skeet Range and the berm of the Rifle Range, removal below 400 mg/kg would not be prudent. Removal to 400 mg/kg would result in seven of eight samples being removed and an average resulting concentration of 90 mg/kg. However, most of the wetland would need to be remediated. Instead, suggest focusing the removal on the four southern samples (which include the hot spots) and their removal which would result in an average lead concentration of 260 mg/kg. Partial removal seems a good balance by removing the highest lead concentrations but retaining the northern portion of this Category 2 wetland.

Note: Post-removal concentration assumes removal of lead above 400 mg/kg and replacement with clean (e.g., background-level) fill.

All units in milligrams per kilogram (mg/kg).

COC = Chemical of Concern
Eco-SSL = Ecological Soil Screening level
EU = Exposure Unit
MDL = Maximum Detection Limit
NA = Not Applicable
PAH = Polycyclic Aromatic Hydrocarbon
PRG = Preliminary Remediation Goal

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FIGURES

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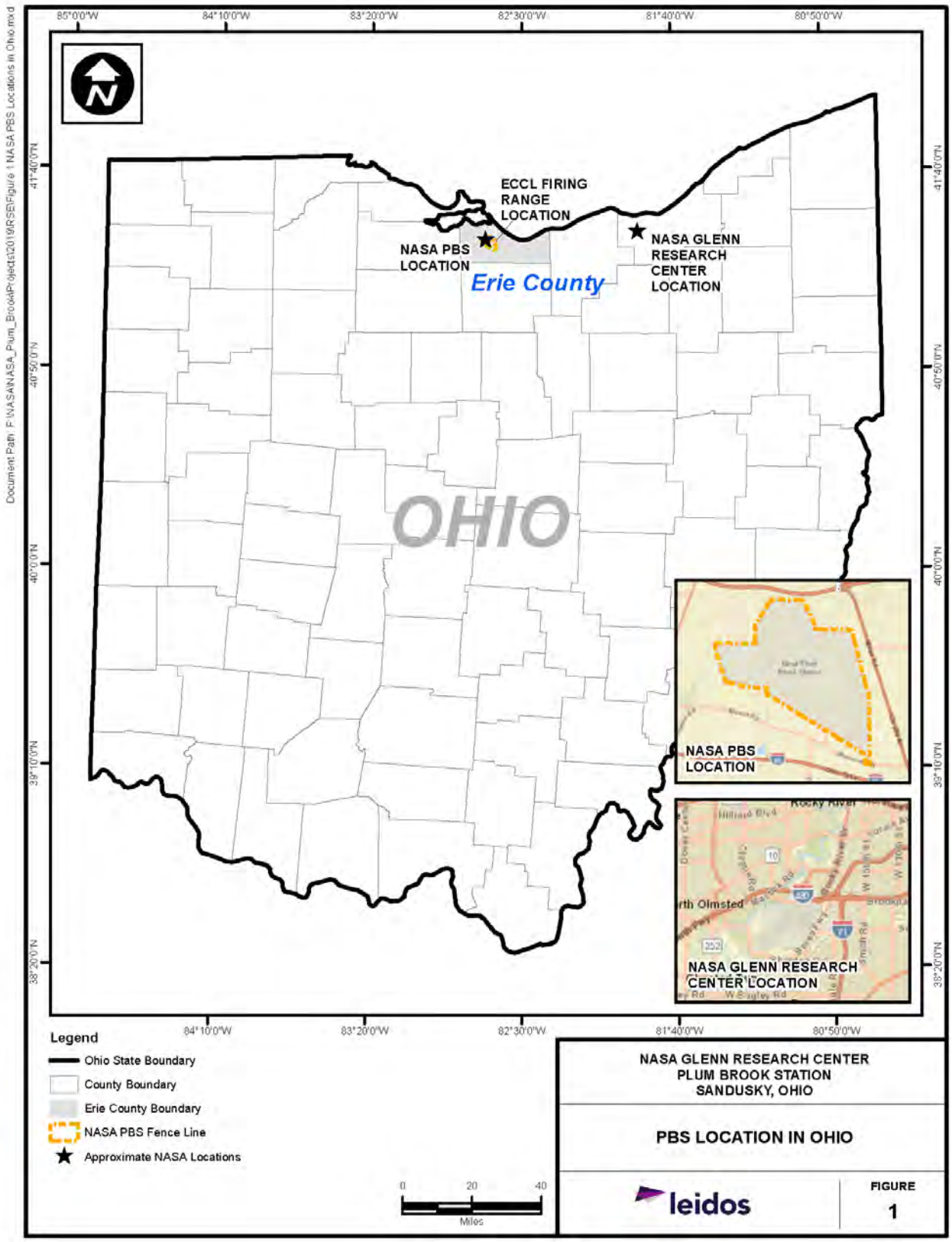

Figure 1. PBS Location in Ohio

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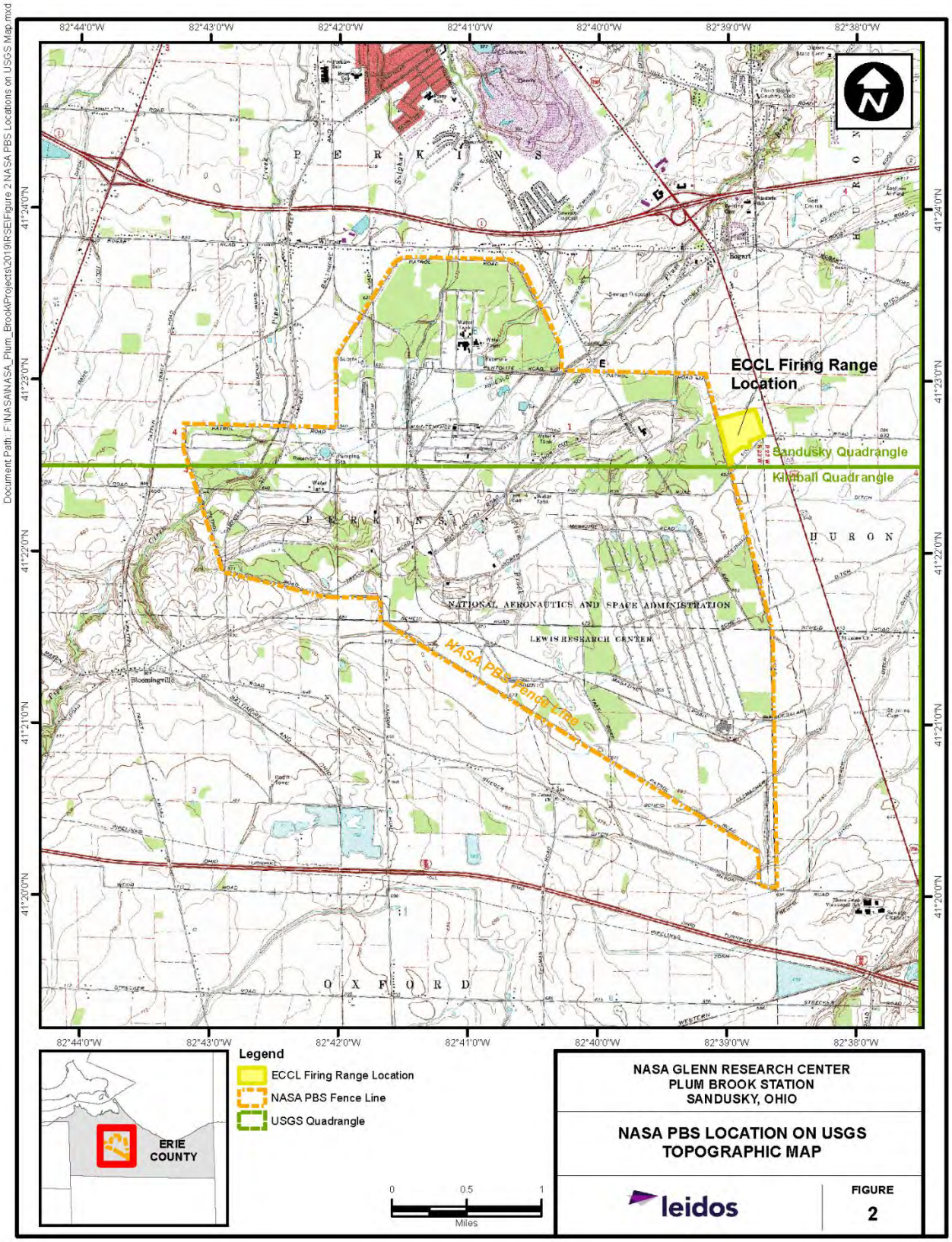

Figure 2. NASA PBS Location on USGS Topographic Map

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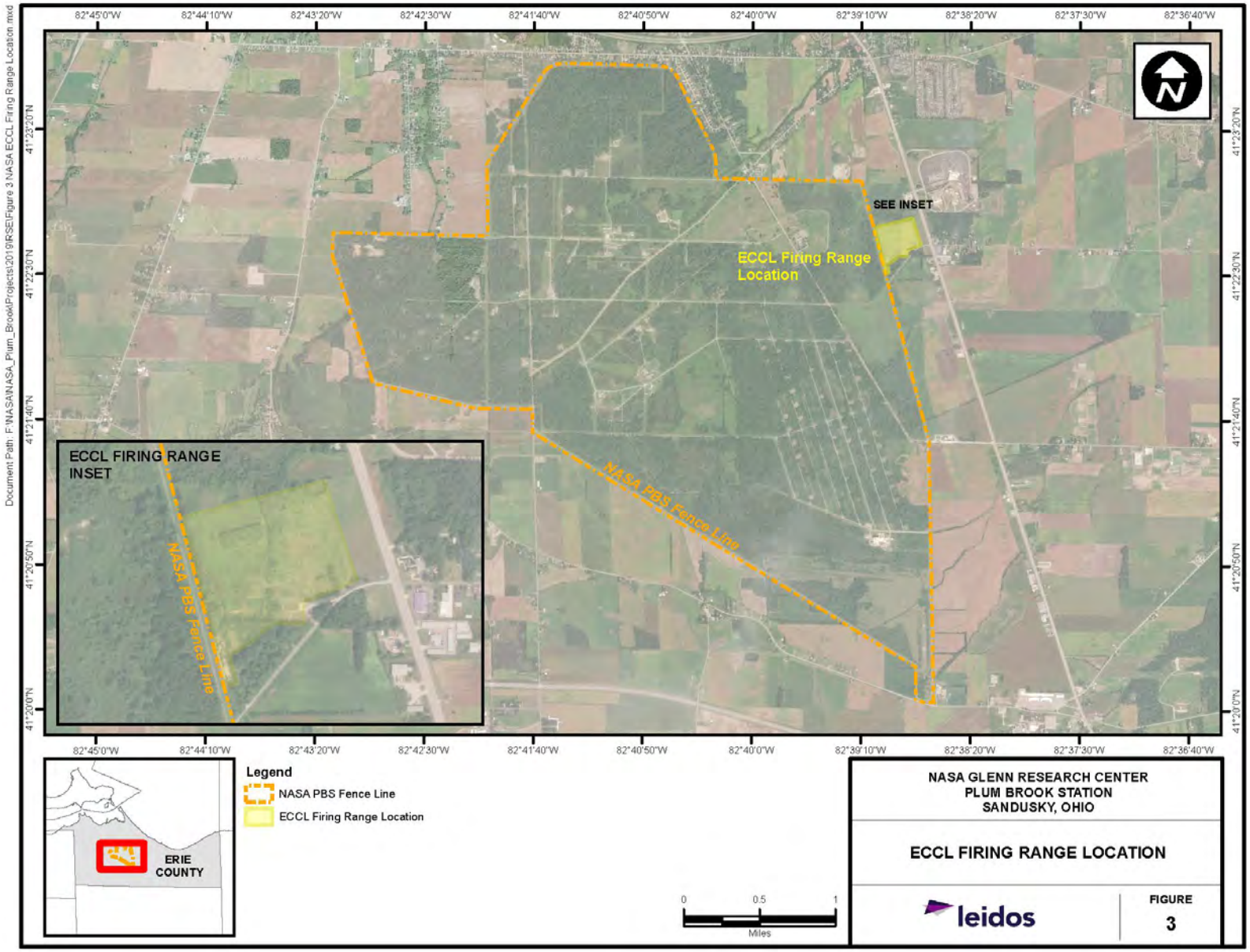

Figure 3. ECCL Firing Range Location

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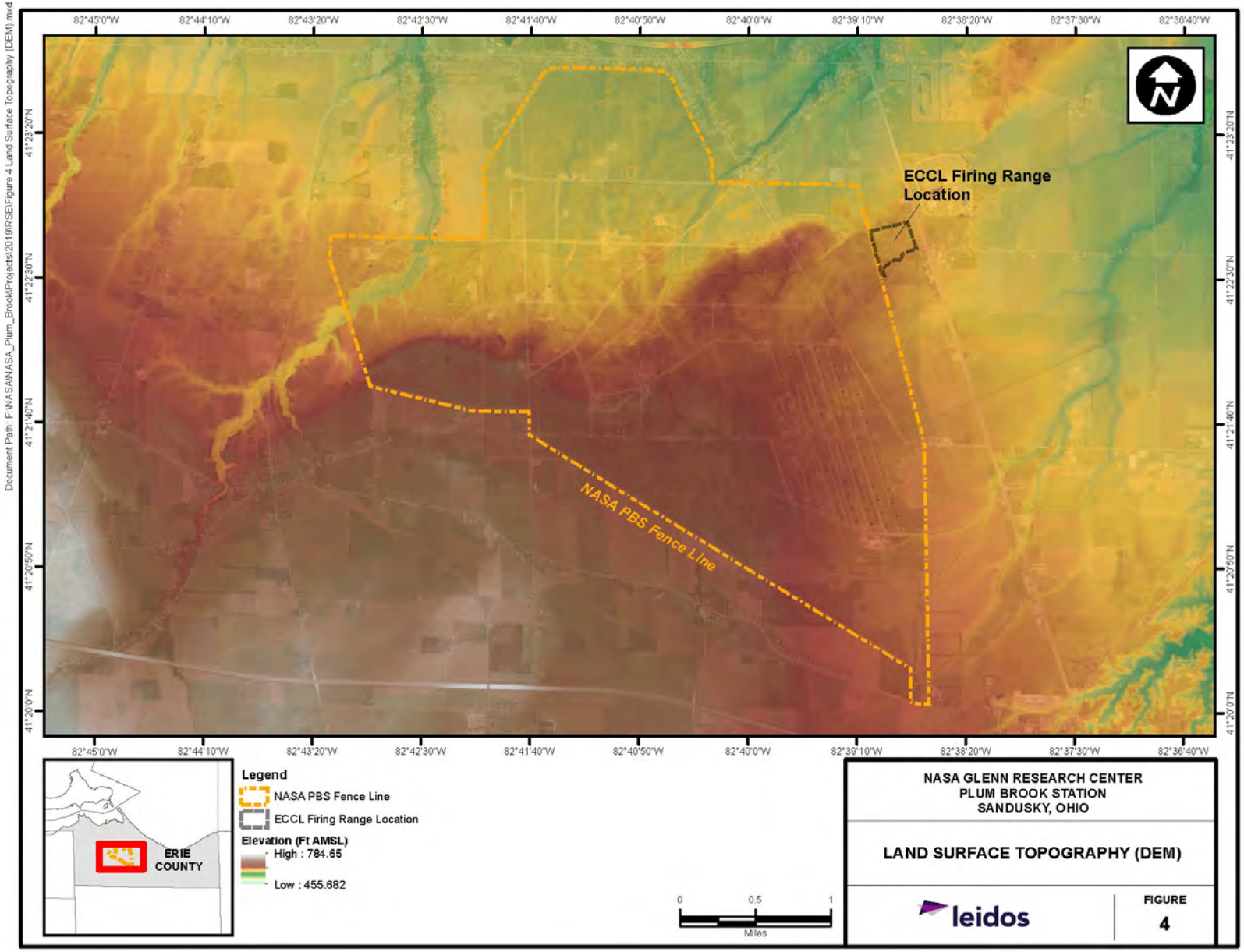

Figure 4. Land Surface Topography (DEM)

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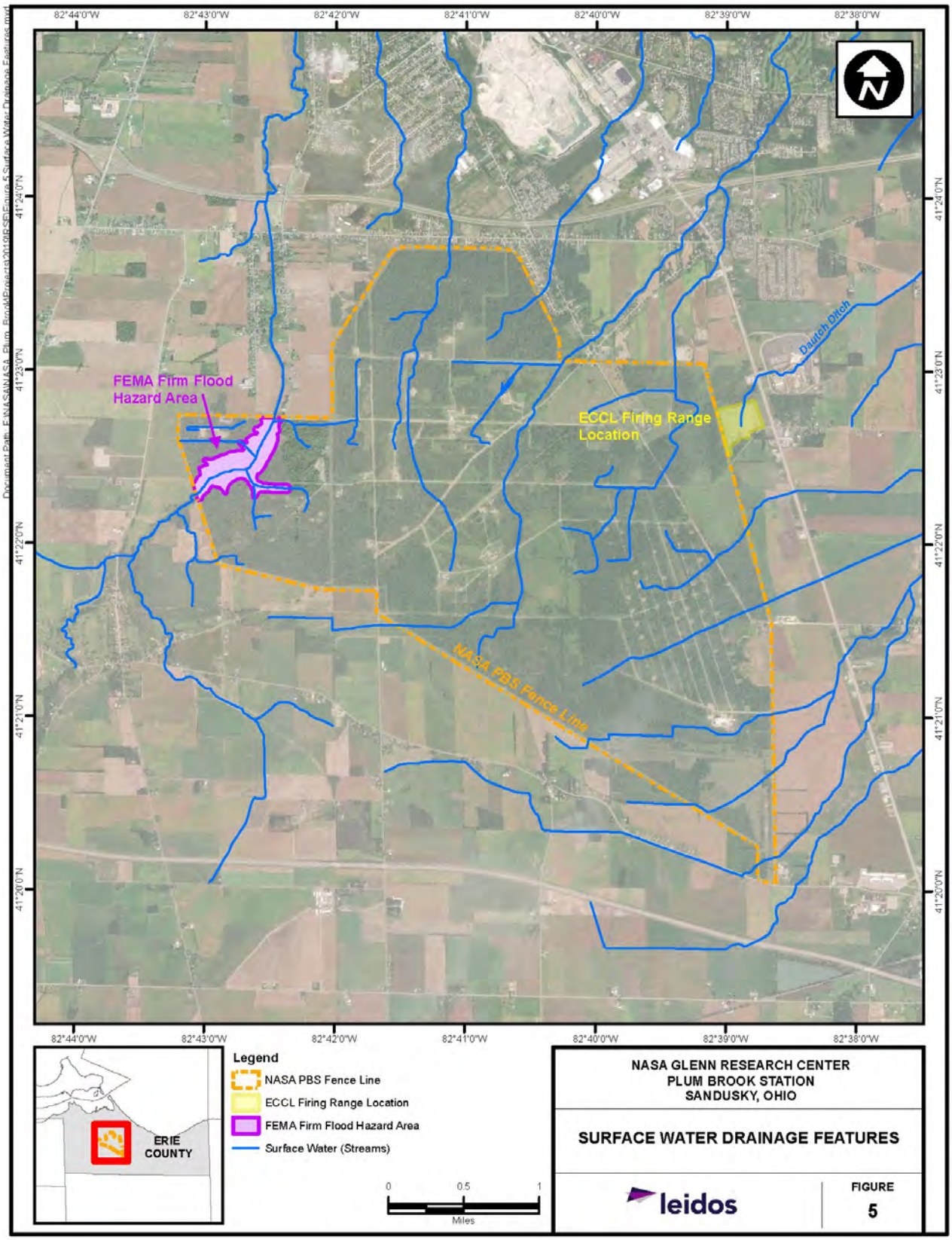

Figure 5. Surface Water Drainage Features

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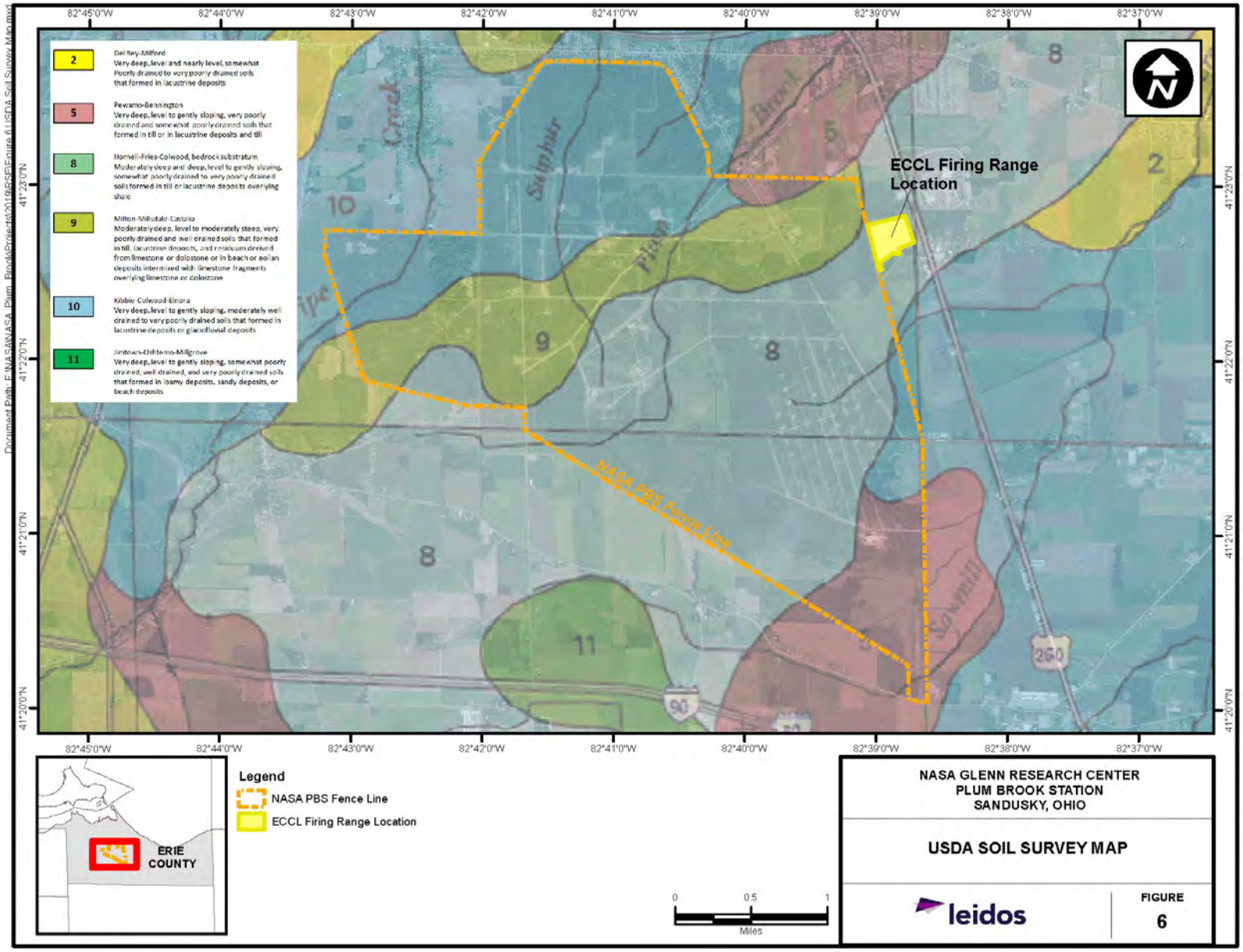

Figure 6. USDA Soil Survey Map

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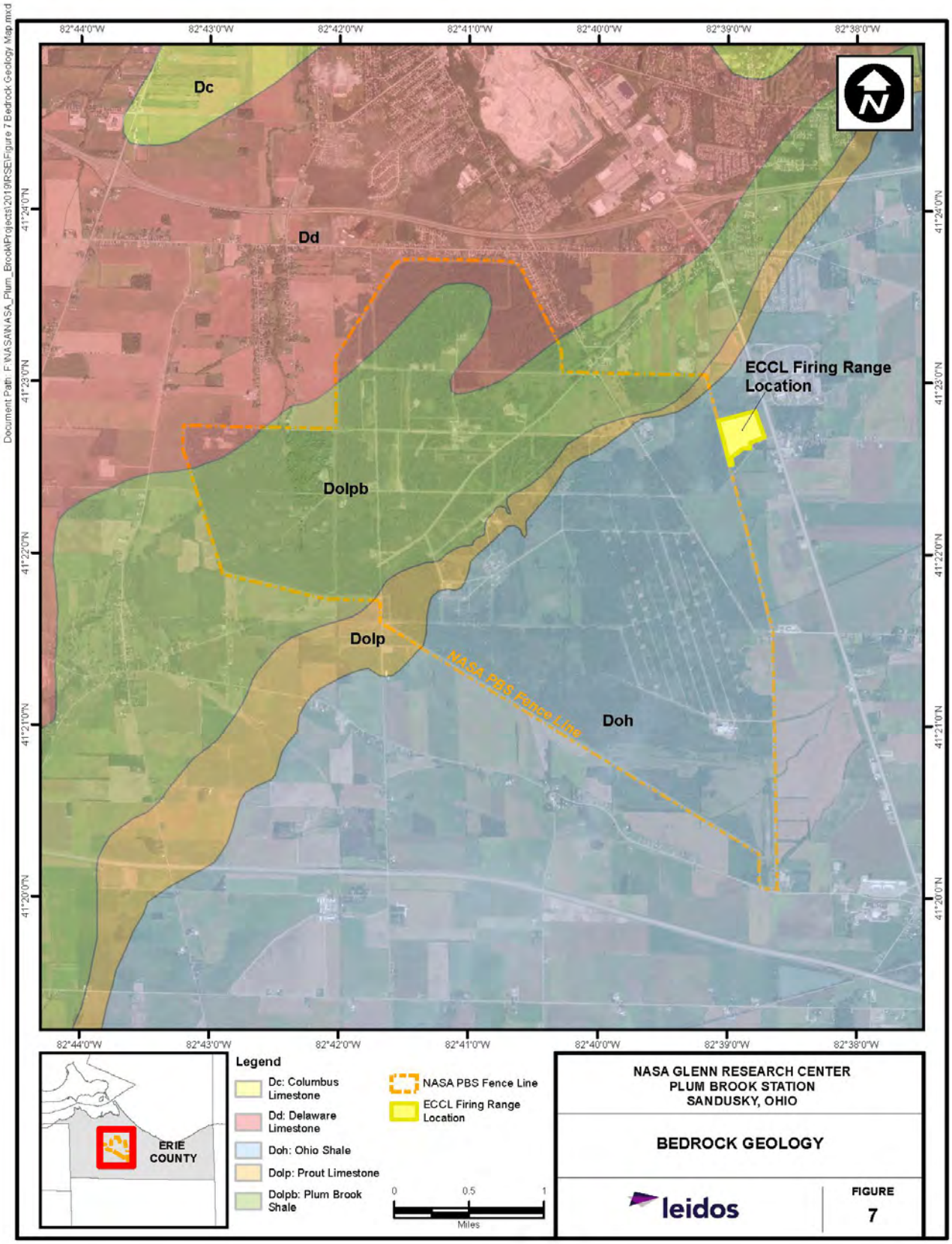

Figure 7. Bedrock Geology

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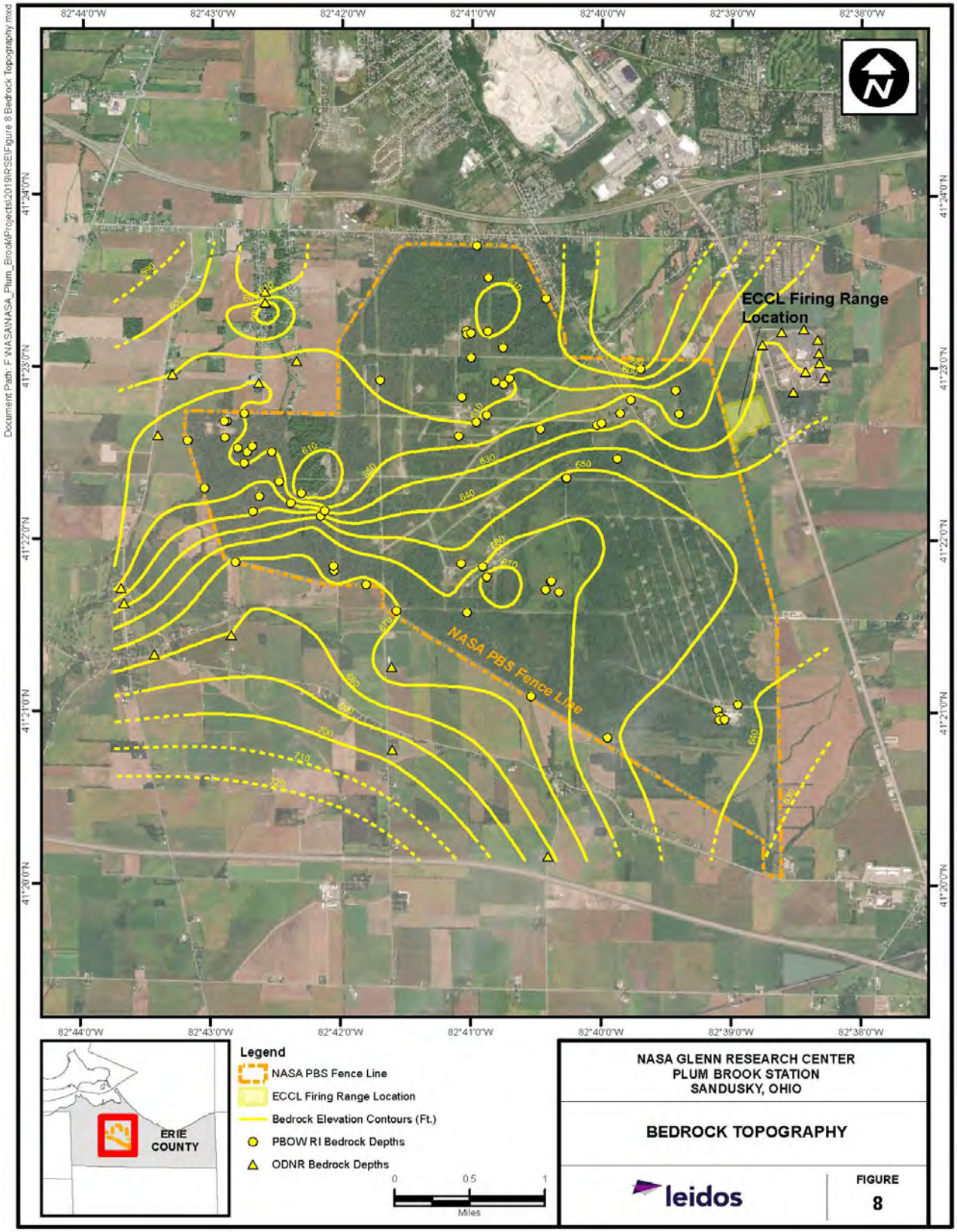

Figure 8. Bedrock Topography

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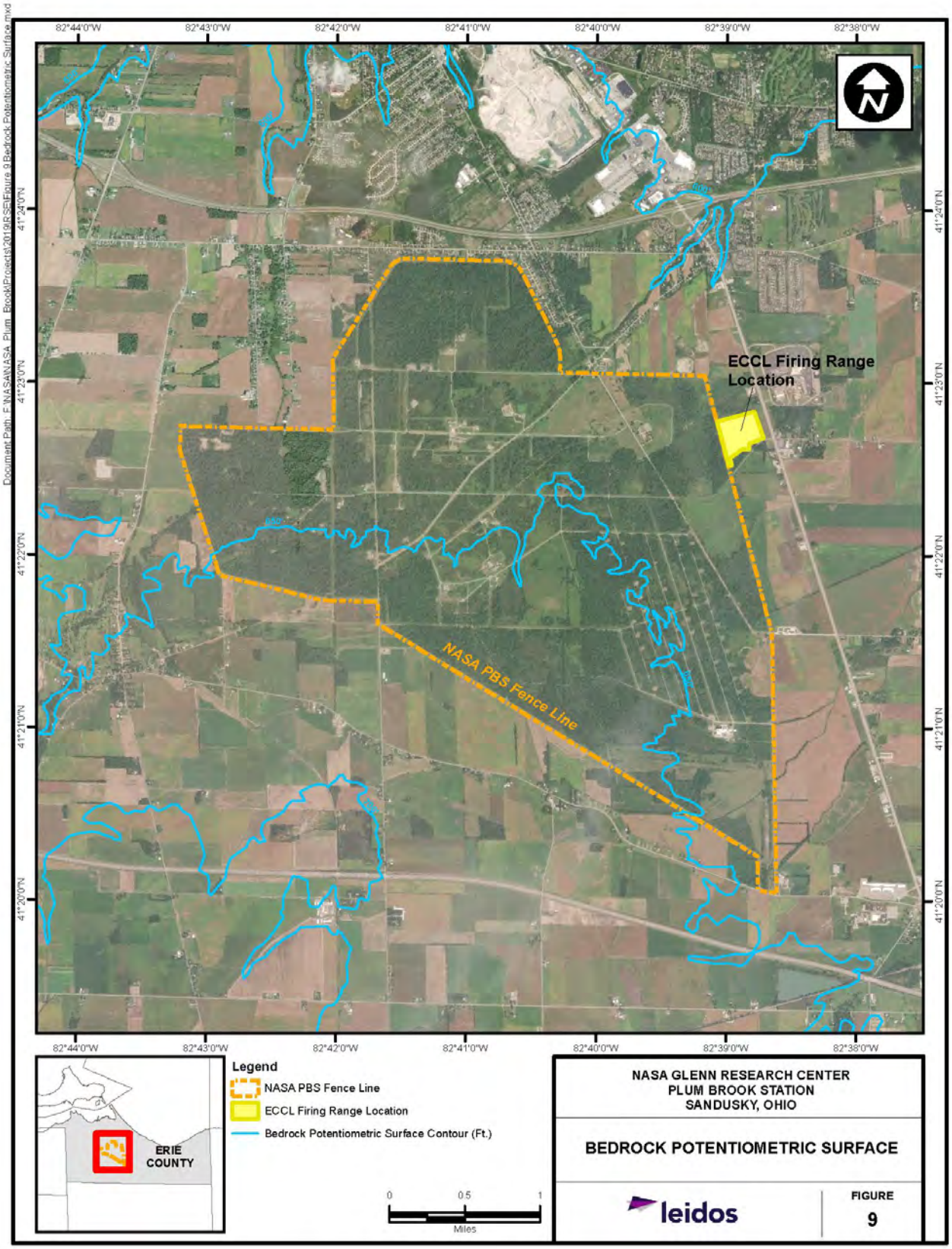

Figure 9. Bedrock Potentiometric Surface

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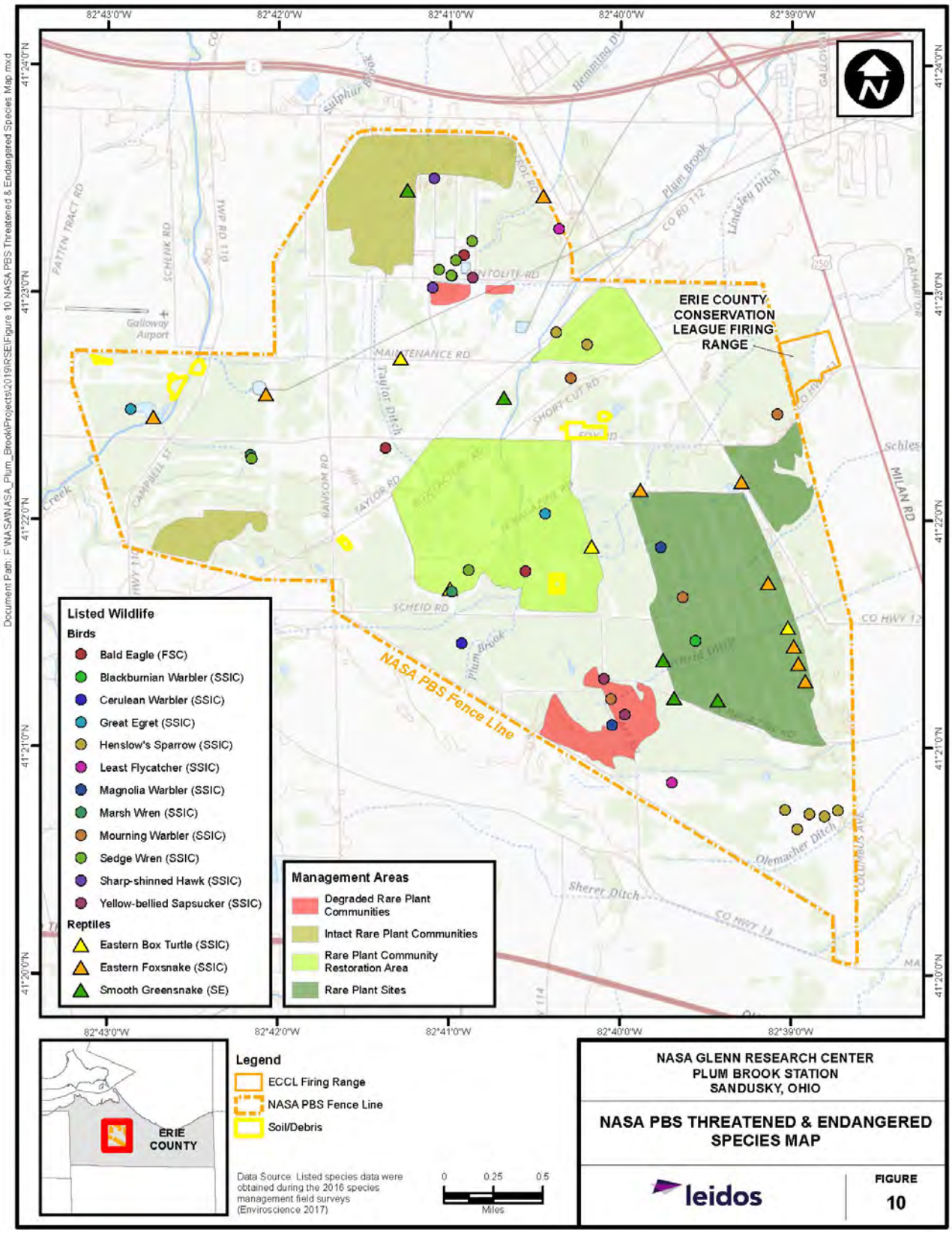

Figure 10. NASA PBS Threatened and Endangered Species

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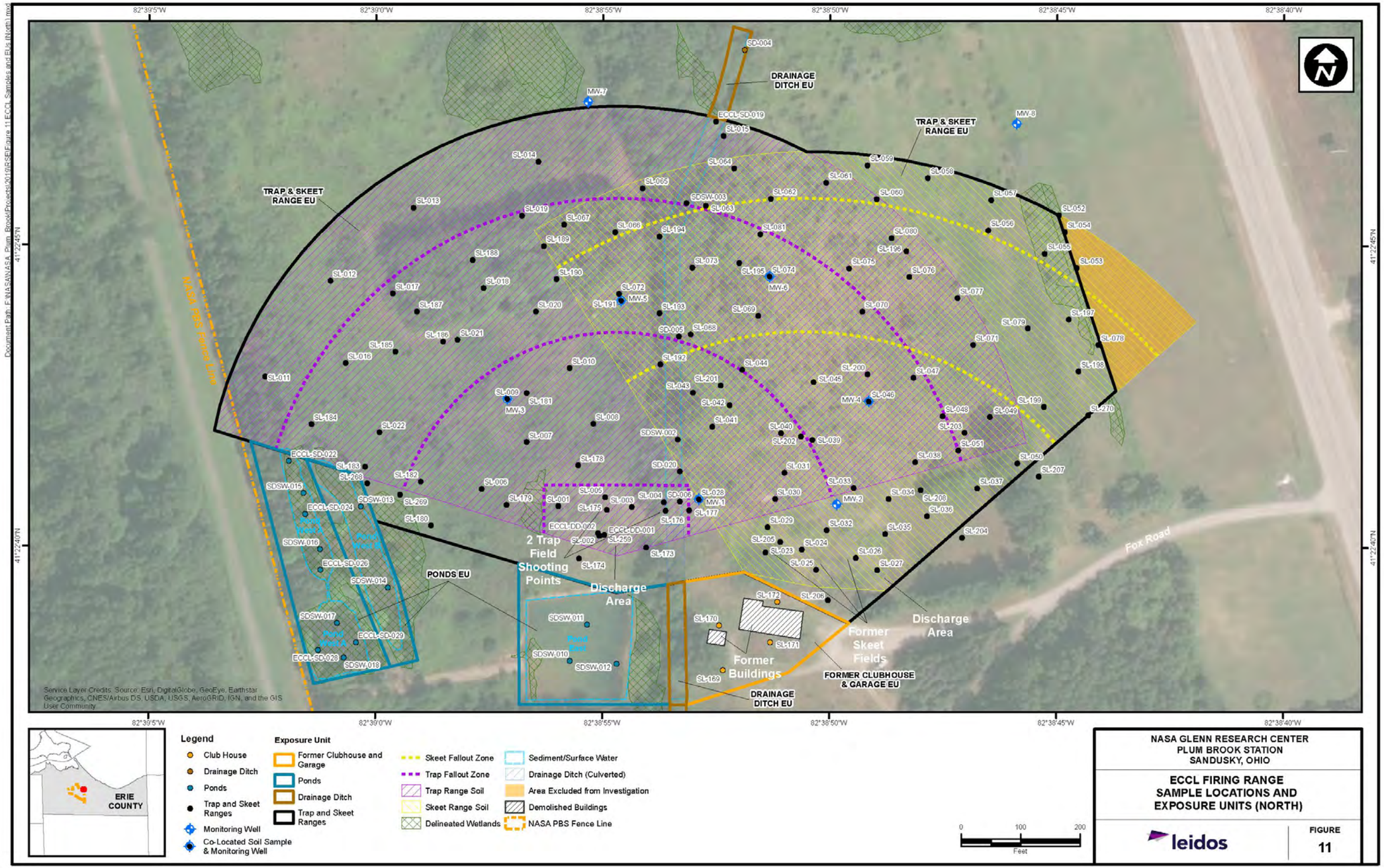

Figure 11. ECCL Firing Range Sample Locations and Exposure Units (North)

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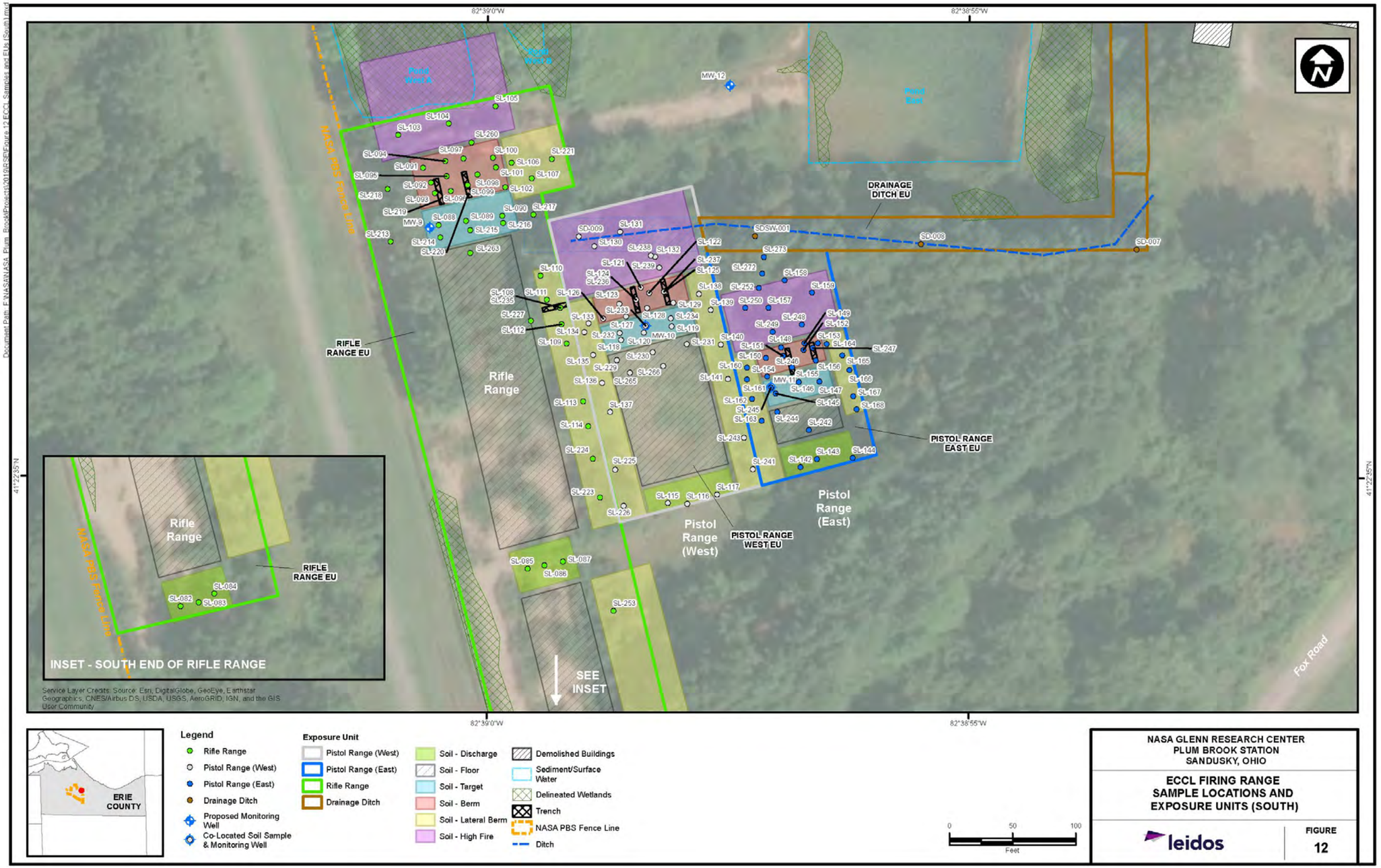

Figure 12. ECCL Firing Range Sample Locations and Exposure Units (South)

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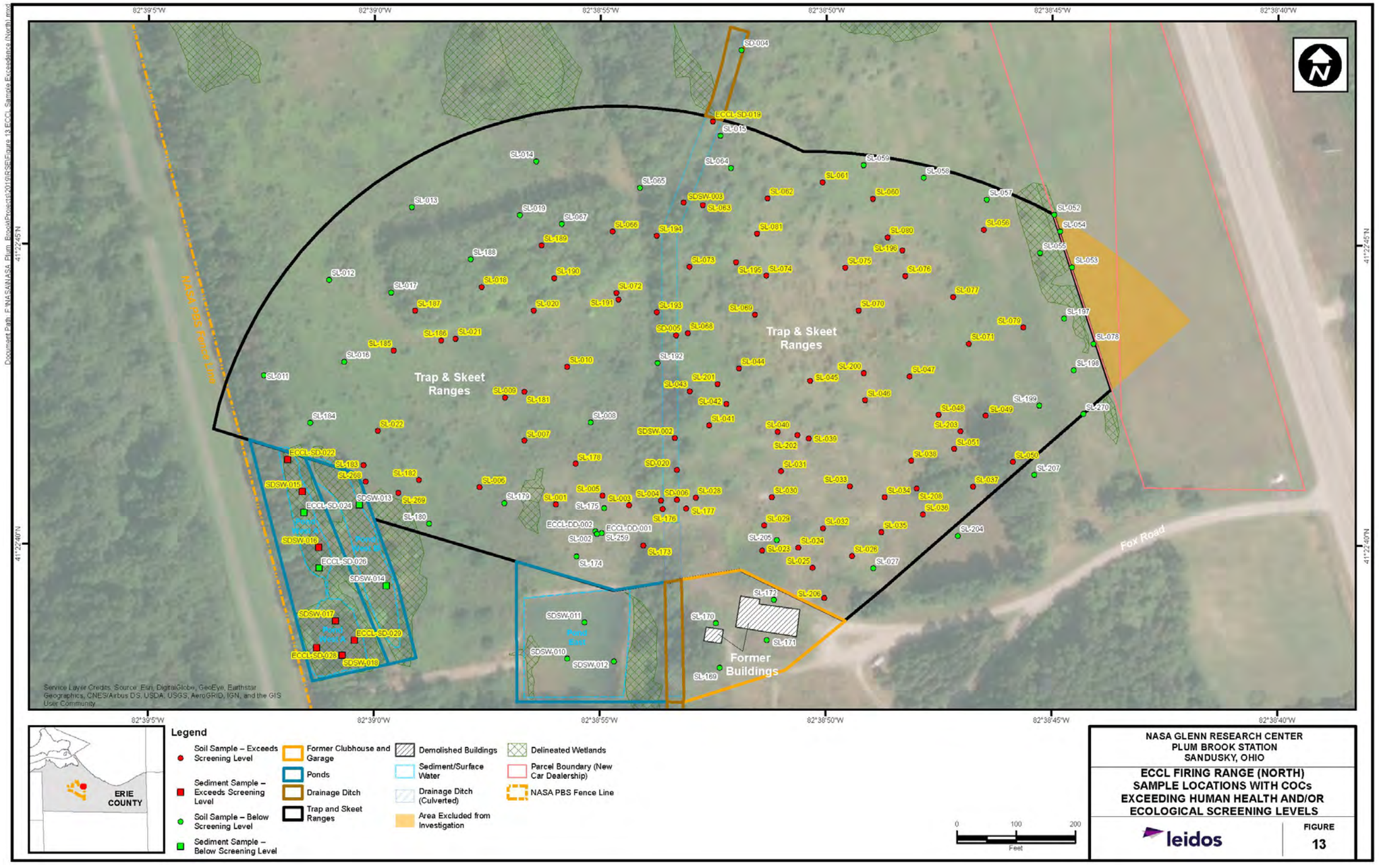

Figure 13. ECCL Firing Range (North) Sample Locations with COCs Exceeding Human Health and/or Ecological Screening Levels

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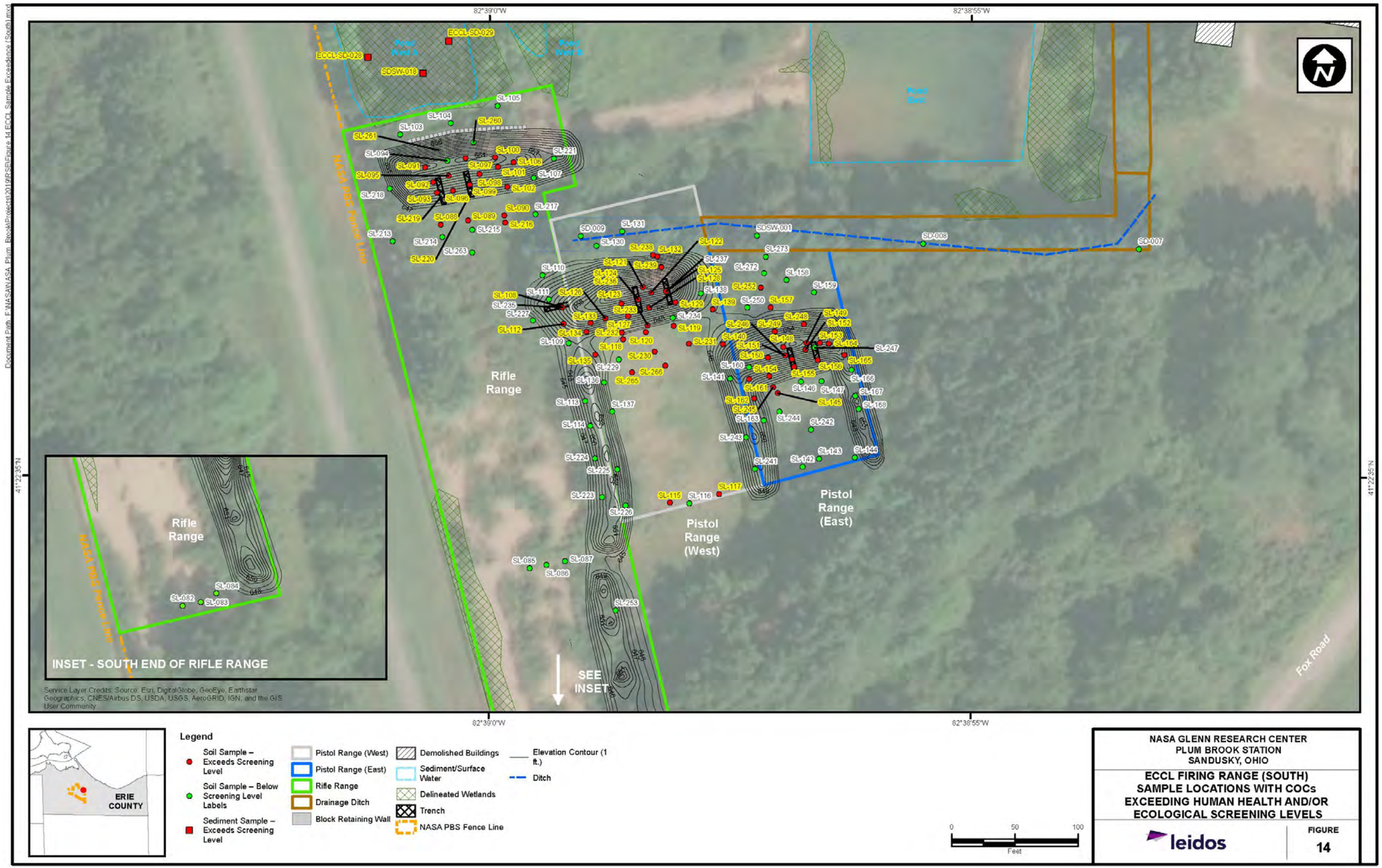

Figure 14. ECCL Firing Range (South) Sample Locations with COCs Exceeding Human Health and/or Ecological Screening Levels

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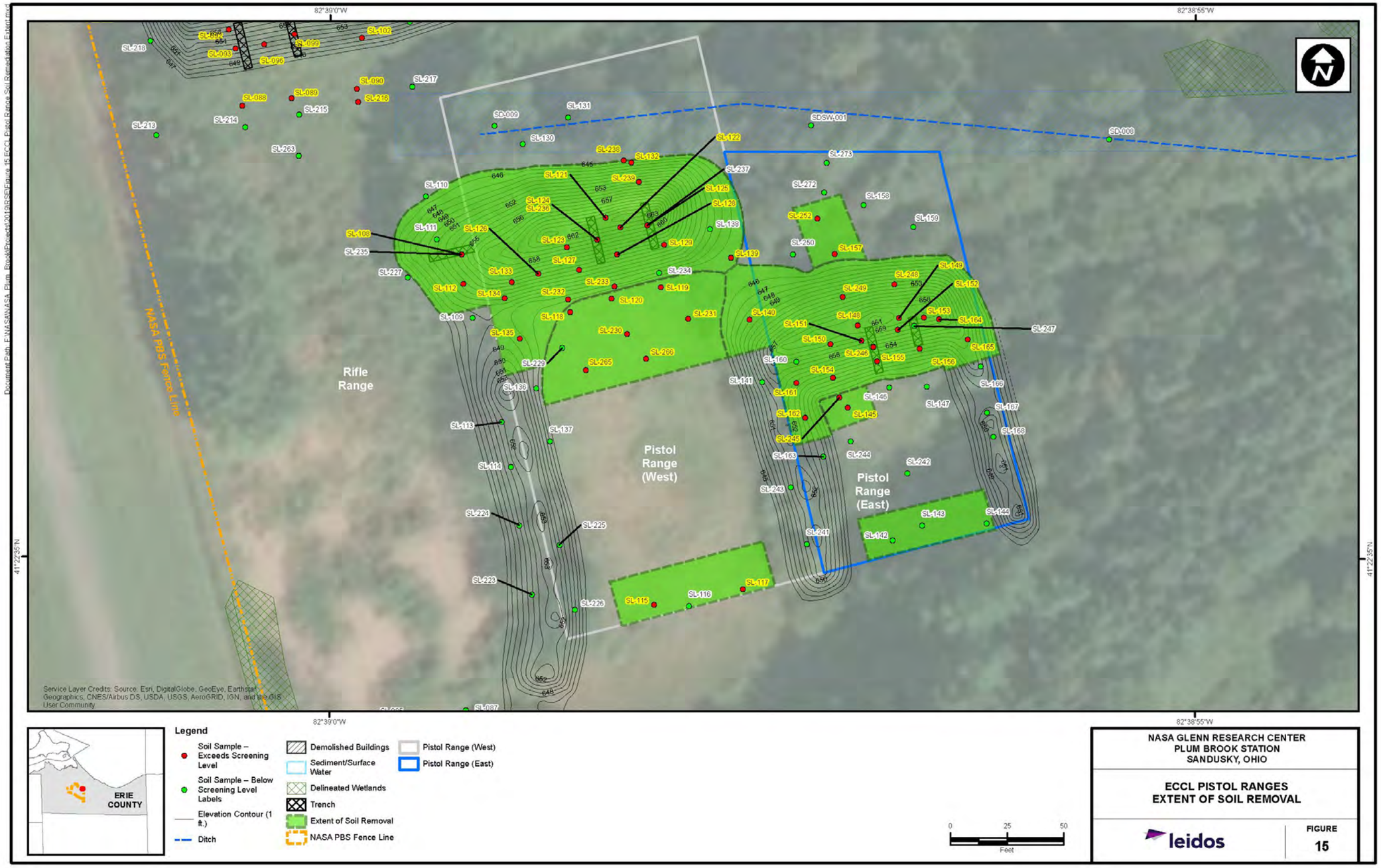

Figure 15. ECCL Pistol Ranges Extent of Soil Removal

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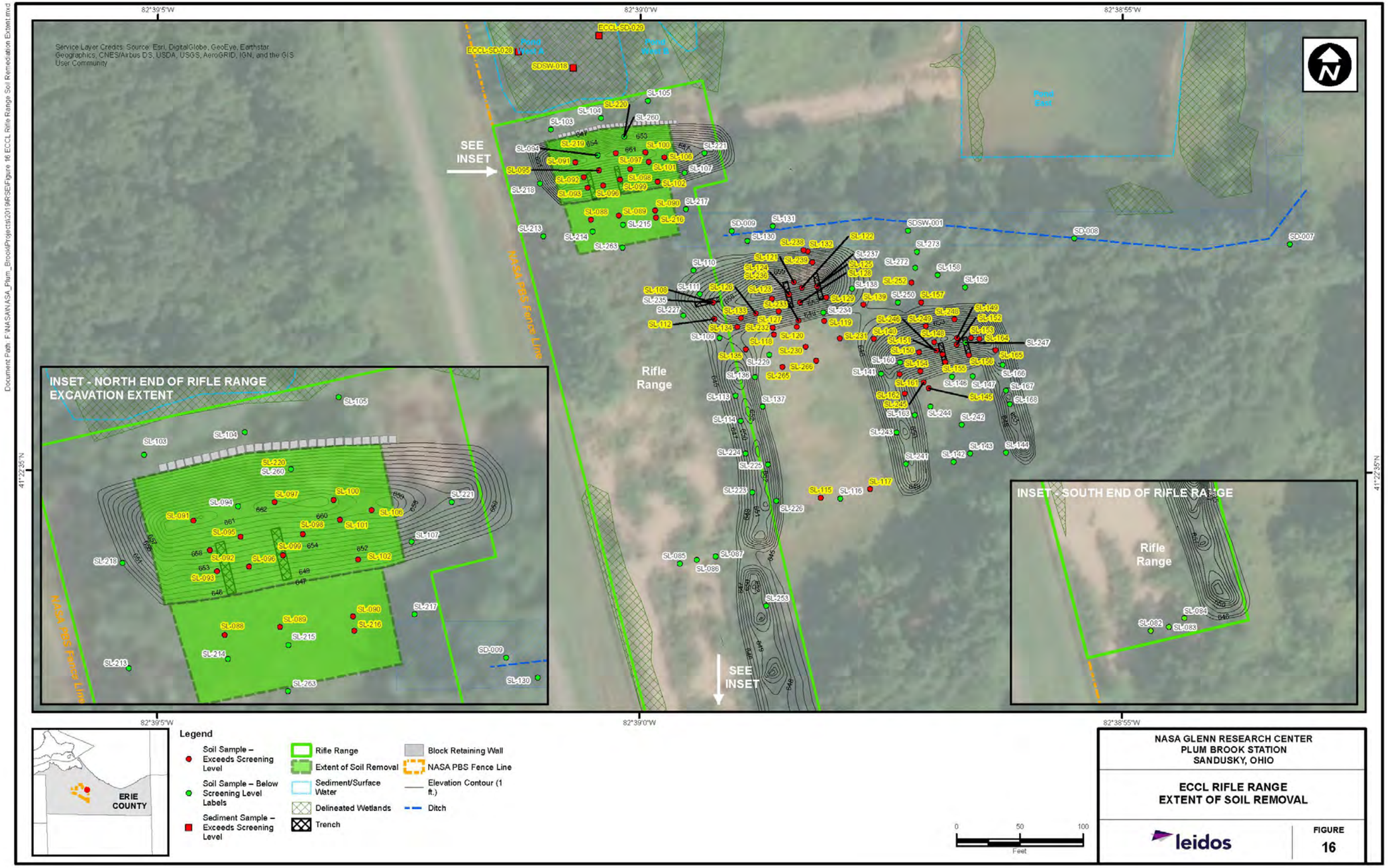

Figure 16. ECCL Rifle Range Extent of Soil Removal

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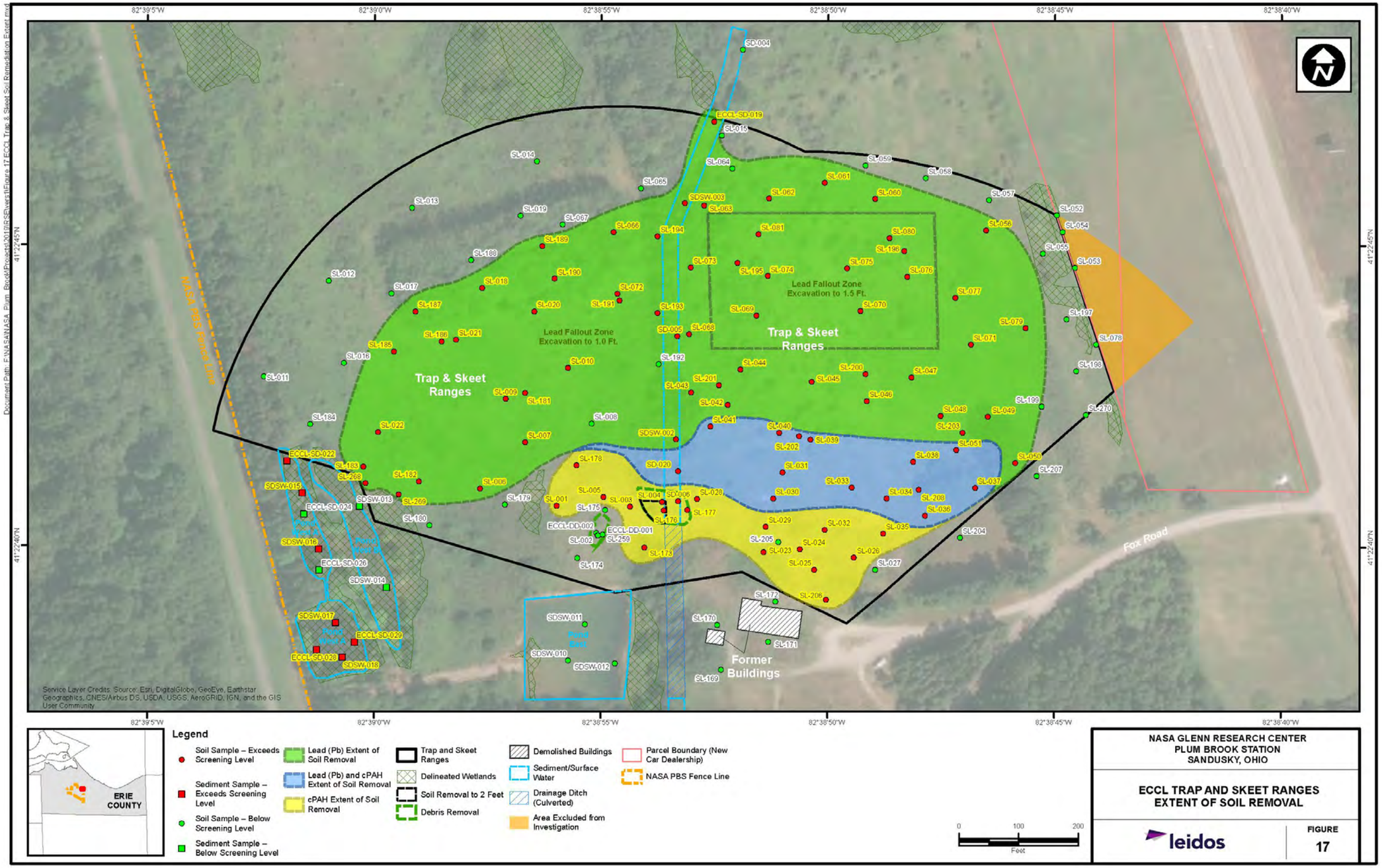

Figure 17. ECCL Trap and Skeet Ranges Extent of Soil Removal

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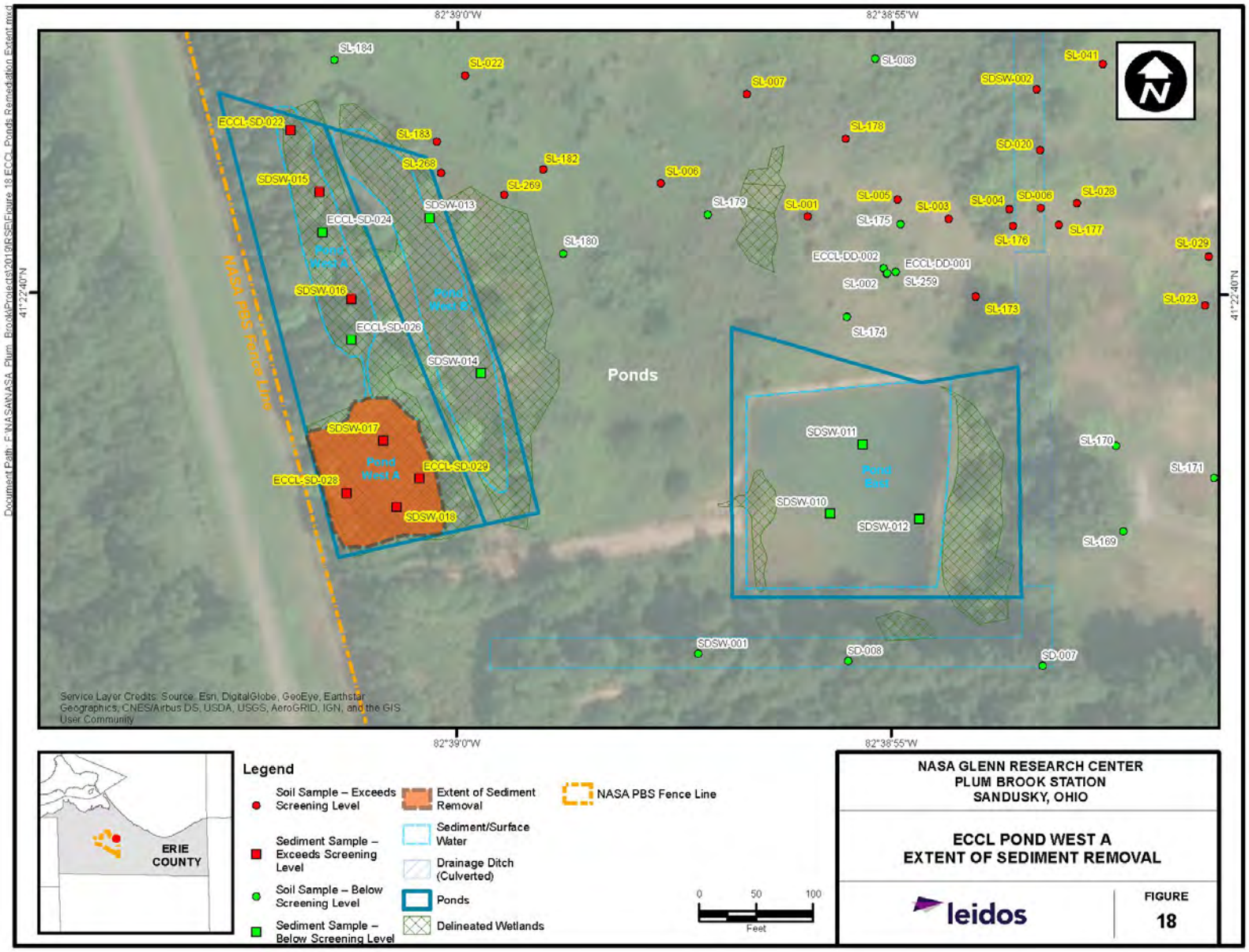

Figure 18. ECCL Ponds Extent of Sediment Removal

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Appendix A

ECCL Firing Range Site Photographs

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Photograph A-1. Subsurface Soil Core from Soil Boring ECCL-SL-177 in Trap and Skeet Range

Photograph A-2. Temporary Well MW-5 in Trap and Skeet Range

Photograph A-3. Eastern Portion of Trap and Skeet Range, Looking West (February 2019)

Photograph A-4. Dautch Ditch Covered in Clay Skeet Debris, Looking North

Photograph A-5. Sediment Sampling at ECCL-SD-020, Clay Skeet Debris, Looking South

Photograph A-6. Clay Skeet Debris Area near ECCL-SL-003 in Trap and Skeet Range, Looking North

Photograph A-7. Clay Skeet Debris Areas near ECCL-SL-039/040 in Trap and Skeet Range, Looking East

Photograph A-8. Pistol Range (West) – Range and Berms, Looking North

Photograph A-9. Pistol Range (East), Looking North

Photograph A-10. Concrete Block Retaining Wall Behind Rifle Range Impact Berm

Photograph A-11. Pistol Range (East) Shooting Stand Debris (not Lead-Based Paint or Asbestos)

Photograph A-12. Trenching at ECCL-SL-219 at Rifle Range Impact Berm (Rubber Bullet Backstop), Looking North

Photograph A-13. Trenching at ECCL-SL-237 at Pistol Range (West) Impact Berm, Looking Northeast

Photograph A-14. Trenching (Backfilled) ECCL-SL-236/237 at Pistol Range (West) Impact Berm, Looking North

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Photograph A-20. Pistol Range (East) Impact Berm Surveying, Looking Northeast

Photograph A-21. Water Level Gauging at Temporary Well MW-12 North of Pistol Ranges, Looking West

Photograph A-22. Concrete Slab near Soil Boring ECCL-SL-169 in Former Clubhouse and Garage

Photograph A-23. Former Clubhouse, Looking West

Photograph A-24. Sediment Sampling in Pond A – West (Southern Pond), Looking North

Photograph A-25. Pond A – West (Northern Pond), Looking North

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Appendix B

Boring Logs and Field Forms

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ECCL FIRING RANGE
2016
SOIL, SEDIMENT, AND SURFACE WATER
SAMPLE LOGS

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-001
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TFDA
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 0855
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

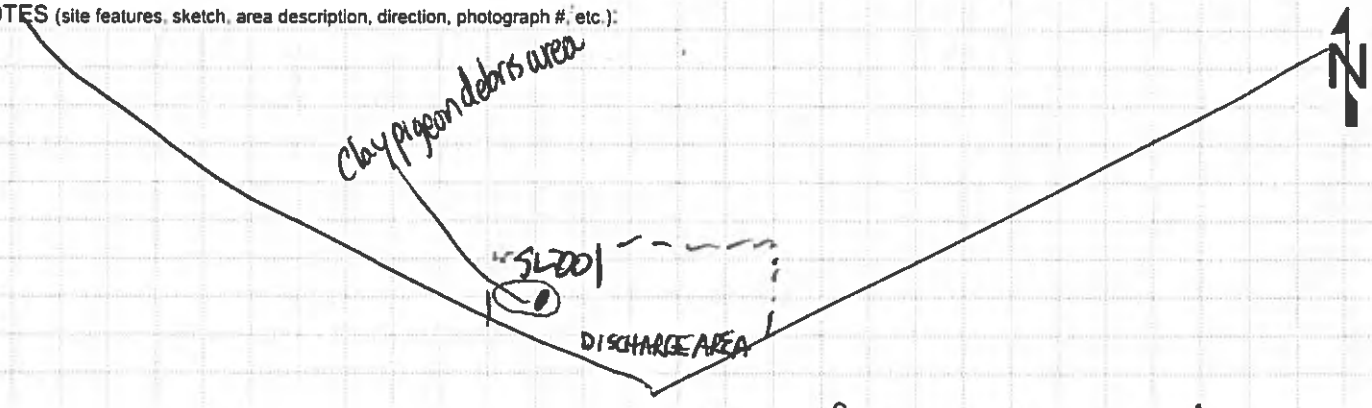
Sample ID: ECCLSL0001 | Sample Date / Time: 6.10.16 0855 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 2000: 10YR 2/2 4/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, moist, very dark brown (10YR 2/2), low plasticity, soft	N/A	clay pigeon debris and shotgun shell
1	CL	CLAY, and silt, ~~with sand~~ M, moist, brown 10YR 4/3, med plasticity, soft		
2		TD=1.0		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFDA, huge pile of clay pigeon debris and shotgun walls

GEOLOGIST SIGNATURE/DATE: [signature] 6.10.16

QA/QC SIGNATURE/DATE: [signature] 6.29.16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-002
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TFDA BLDG DEBRIS BURN AREA
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 0930
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1
DEPTH TO WATER	NA

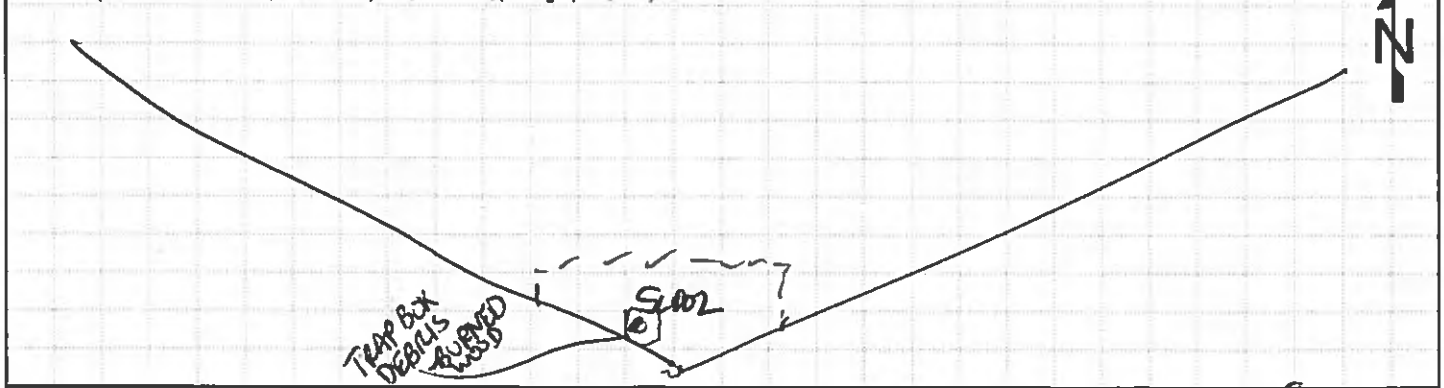
Sample ID: ECCLSL002 ECCLSL9001 | Sample Date / Time: 6.10.16 0930 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals (Fe), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/2 5/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY and silt with sand, very dark greyish brown (10YR 3/2), soft, moist, low plasticity		(burned) wood, nails, bldg debris, potential asbestos, concrete, clay pigeon debris
1	CL	CLAY and silt with sand, yellowish brown (10YR 5/6), soft, moist, med plasticity,		
2		TD = 1'		collect field duplicate
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: target field discharge area, bldg debris burn area (TrapBox)

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-10-16	Q. Meyer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-003
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TFDA
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 0900
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

Sample ID: ECCLSL0003 ECCLSL0003MS/MSD

Sample Date / Time: 6.10.16 0900

Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

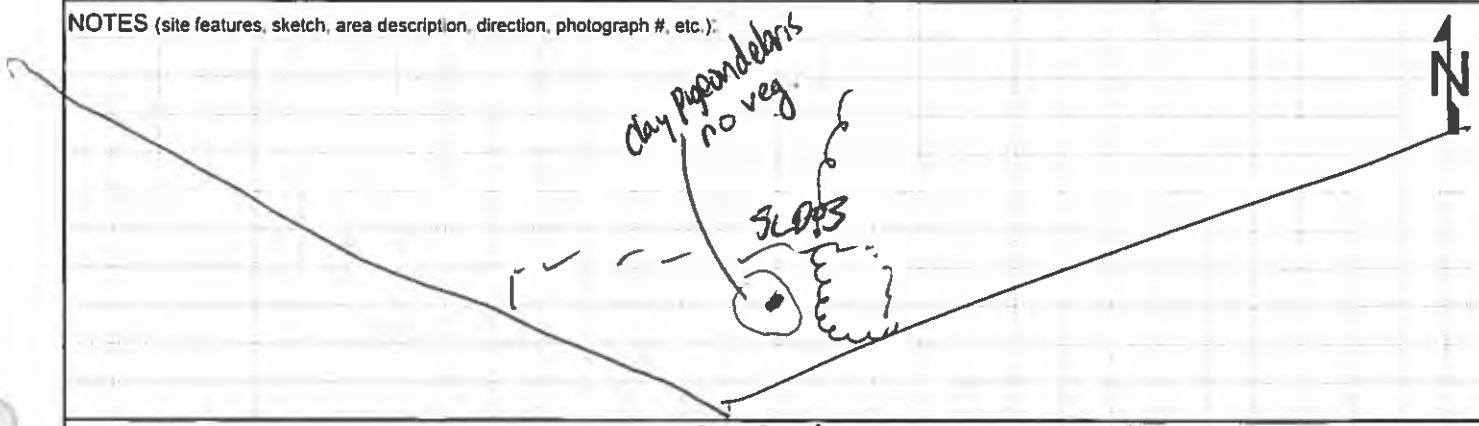
PID MAKE/MODEL: NA

PID SERIAL#: NA

Colors from Munsell Soil Color Chart, Rev 10YR 2/2 and 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY and silt, moist, very dark brown (10YR 2/2), low plasticity soft	NA	shave 5" debris prior to augering; pigeon and shotgun rods observed below
1	CL	CLAY, and silt, moist, brown (10YR 4/3) med plasticity, soft		
2		TD = 1.0'		collect MS/MSD
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target Fill discharge area, large clay pigeon debris pile

GEOLOGIST SIGNATURE/DATE: [signature] 6-10-16

QA/QC SIGNATURE/DATE: [signature] 8-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-004
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR JF
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1005
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	
DEPTH TO WATER	NA

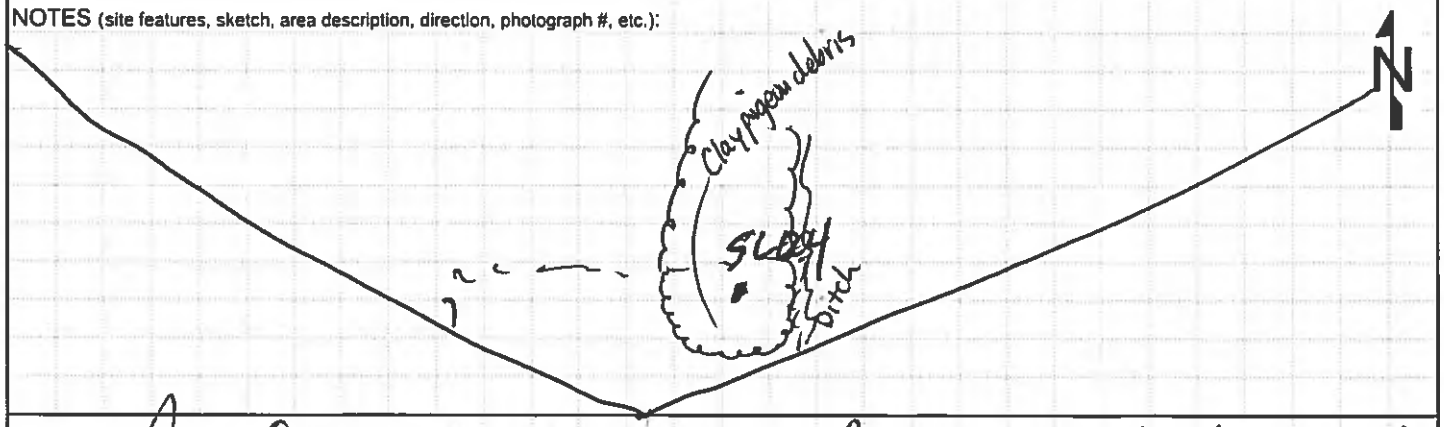
Sample ID: ECCLSL	Sample Date / Time: 6.10.16 1005	Sample Depth: 0-1

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, and silt, dark brown (10YR 3/3), damp soft, low plasticity, organic material	NA	Removed 8+" clay pigeon debris to clear to soil (via shovel)
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Forward field, discharge area, huge pile clay pigeons, walls, shells in woods

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-10-16	[signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-005
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL TFDA
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED 6-10-16 COMPLETED 0830
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1
DEPTH TO WATER	NA

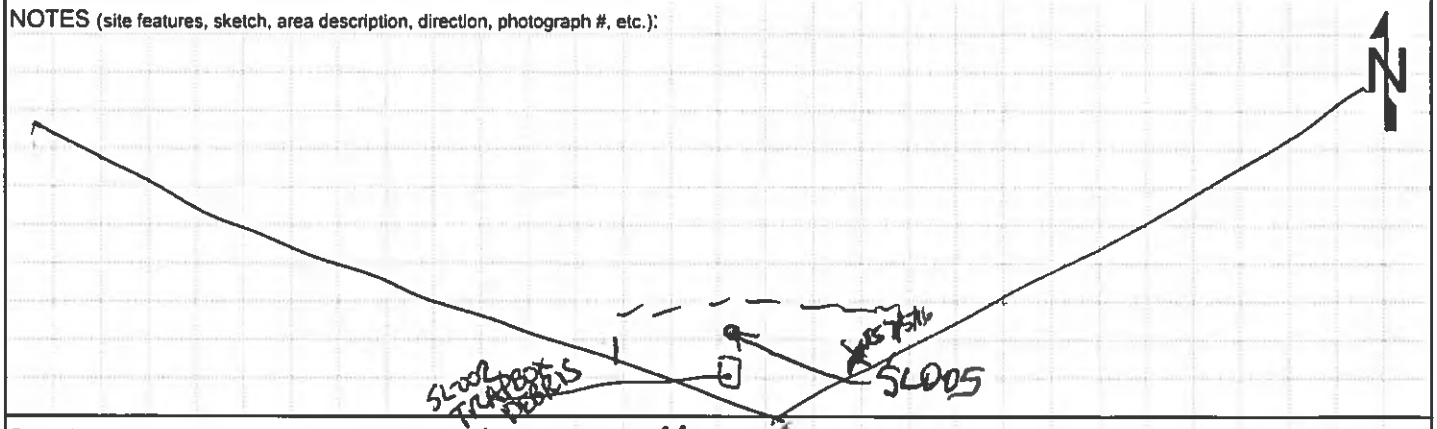
Sample ID: ECCLSL0005 | Sample Date / Time: 6.10.16 0830 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2500

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, and silt, soft, moist, organic, low plasticity, dark brown (10YR3/3)	NA	clay pigeon and shotgun wad debris
2		TD = 1.0		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: target field discharge area, clay pigeon debris and shotgun wads

GEOLOGIST SIGNATURE/DATE: 6-10-16

QA/QC SIGNATURE/DATE: 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-006
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFSF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1000
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

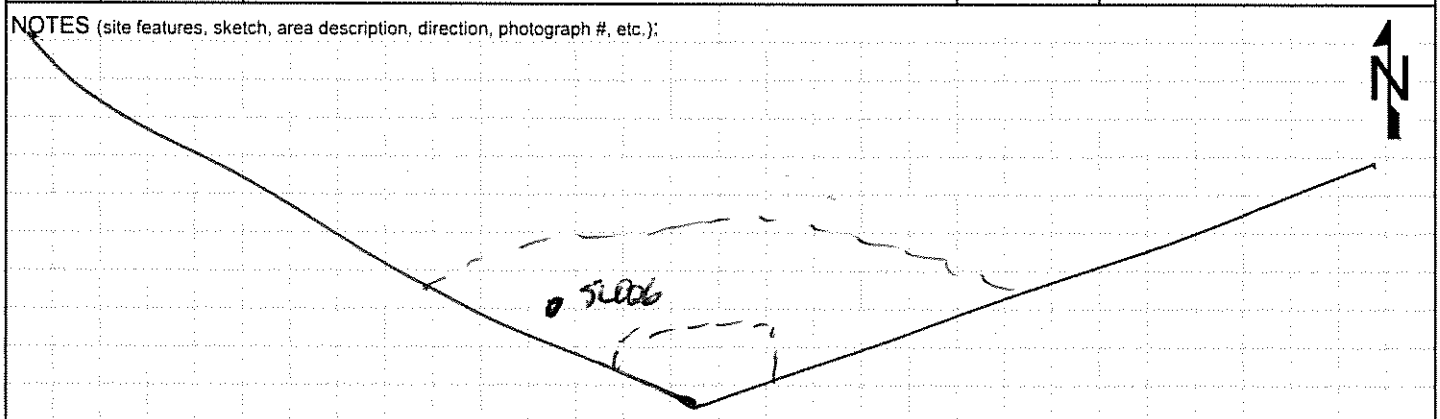
Sample ID: ECCLSL0006 | Sample Date / Time: 6.10.16 1000 | Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, organic, dry, soft, low plasticity, dark brown (10YR 3/3)	NA	
1		TD=0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: STANDARD FALLOUT ZONE OF TRAP FIELD, HEAVY BRUSH

GEOLOGIST SIGNATURE/DATE: [signature] 6-10-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-007
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFSF
NAME OF DRILLER	LM JR
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1030
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

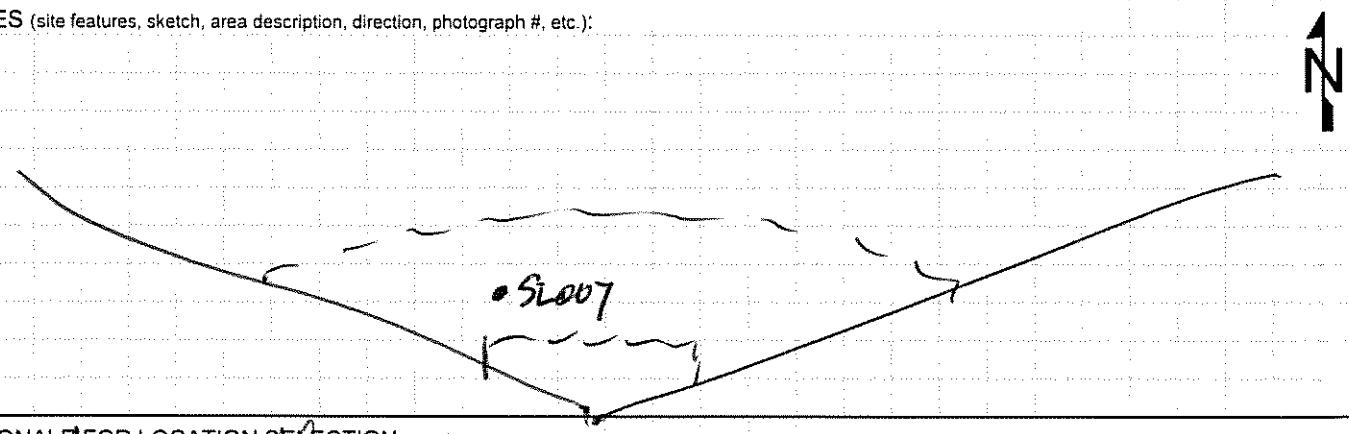
Sample ID: ECCLSL007 | Sample Date / Time: 6.10.16 1030 | Sample Depth: 0-0.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals/FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, organic material, dark brown (10YR3/3) dry, low plasticity	NA	grassy area
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: target soil standard fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: A. Moyer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-008
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/10/16 COMPLETED: 1055
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

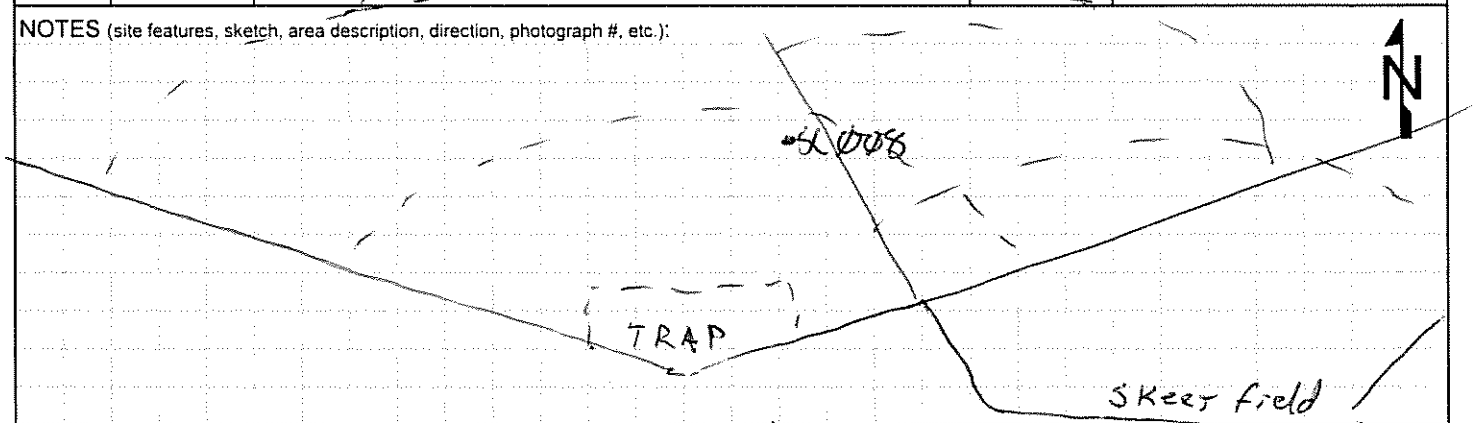
Sample ID: ECCLSL008	Sample Date / Time: 6.10.16 1055	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle) VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, DARK BROWN (10YR 3/3), SOFT, DRY, ROOTS	NA	Brushy area
		TD 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: ~~Skeet field~~ JR 6/10/16 Trap field, std fallow zone

GEOLOGIST SIGNATURE/DATE	Mike Rolly 6-10-16
QA/QC SIGNATURE/DATE	L. Moyer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-009
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFSF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1025
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5'
DEPTH TO WATER	NA

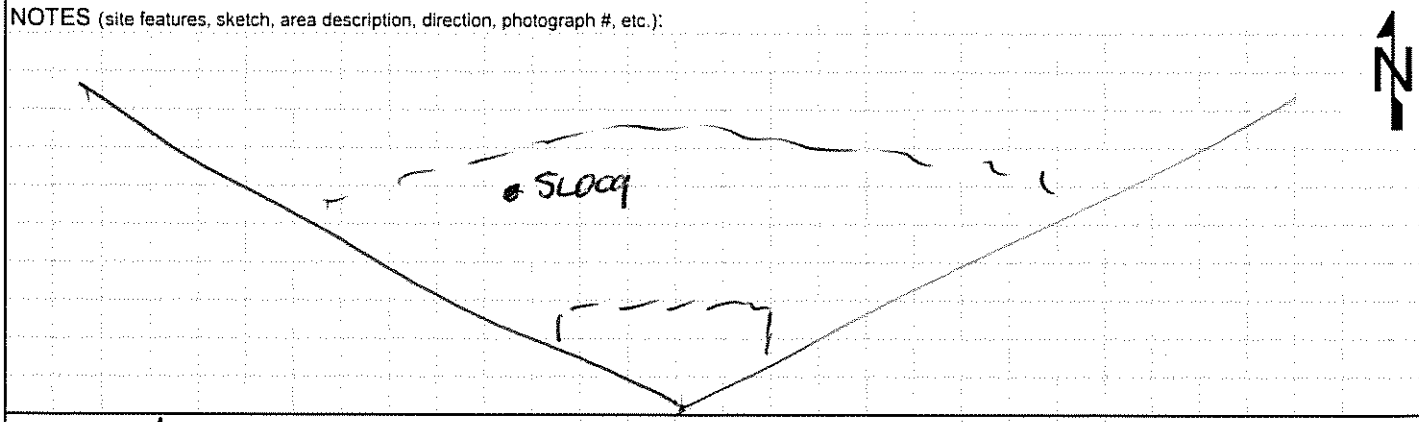
Sample ID: ECCLSL0009	Sample Date / Time: 6.10.16 1025	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle) VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA	PID SERIAL#: NA	Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, organic, dark brown, (10YR 3/3) dry, low plasticity	NA	grassy area
1		TD = 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field standard fallout zone, field area

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-10-16	D. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-010
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFSF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1040
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5'
DEPTH TO WATER	NA

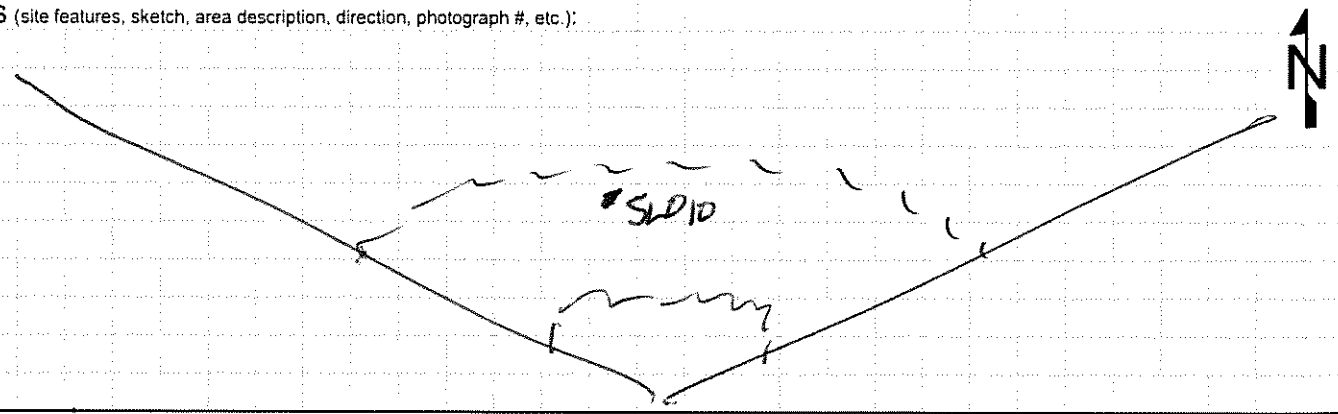
Sample ID: ECCLSL0010 | Sample Date / Time: 6.10.16 1040 | Sample Depth: 0-0.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, dark brown (10YR 3/3) dry, low plasticity, soft, organic material	NA	grassy area
1		TD=0.5'		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field standard fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-10-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-011
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TF M
NAME OF DRILLER	FL
DRILL DATE/TIME	STARTED: 6-10-16 COMPLETED: 1140
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

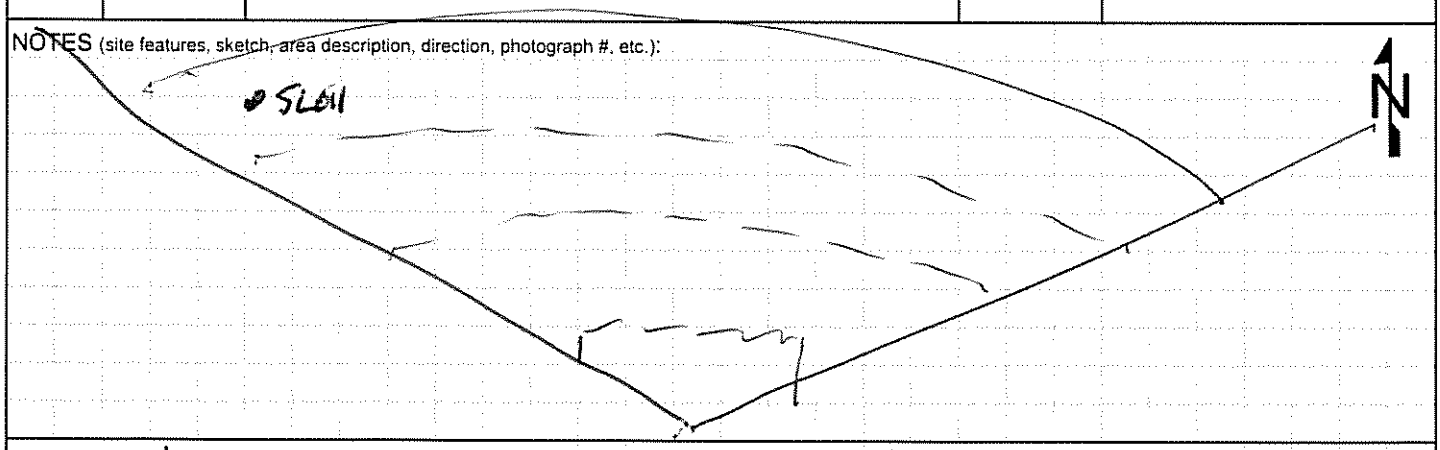
Sample ID: ECCLSL0011 | Sample Date / Time: 6-10-16 1140 | Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals-FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, DARK YELLOWISH BROWN (10YR 3/4), SOFT, DAMP, NON PLASTIC ROOTS, ORGANIC MATTER.	NA	just inside treeline near NASA prop boundary
1		TD-0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field also part of standard shot fallout zone, just inside treeline

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
Mike Rilly 6-10-16	L. Moser 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-012
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-10-16 COMPLETED: 1110
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

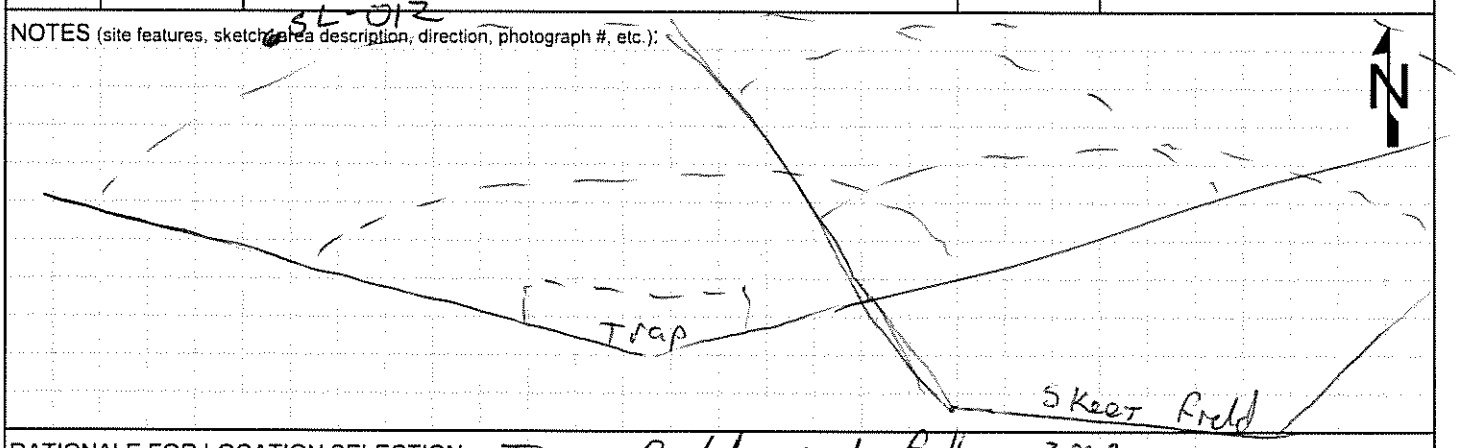
Sample ID: ECCLSL0012 | Sample Date / Time: 6-10-16 1110 | Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, VERY DARK BROWN (10YR 3/3), SOFT, DRY, ROOTS, ORGANIC MATTER	NA	open clearing low veg
		TD - 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Trap field, std fallow zone

GEOLOGIST SIGNATURE/DATE: Neal Rills 6-10-16

QA/QC SIGNATURE/DATE: D. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-013
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-10-16 COMPLETED: 1120
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

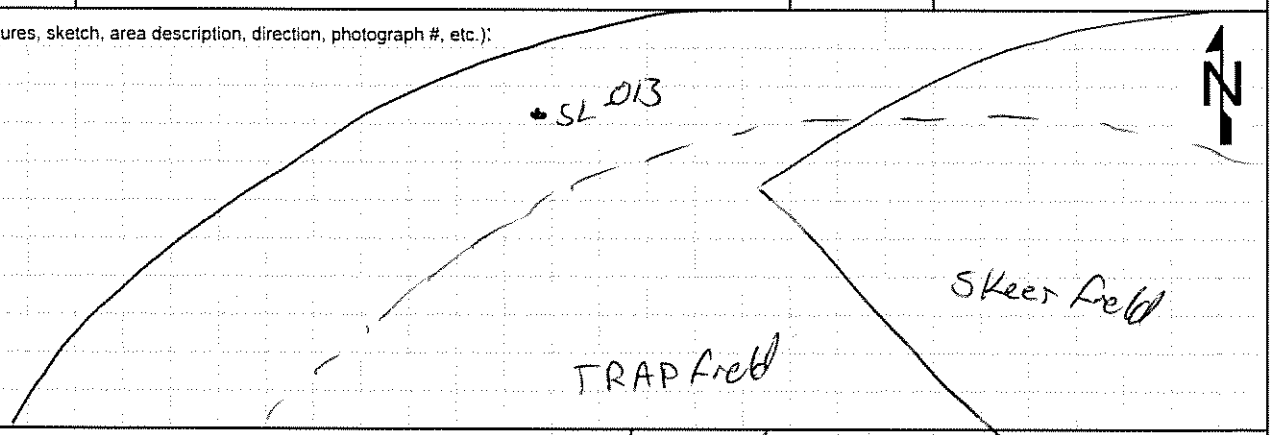
Sample ID: ECCL SL0013	Sample Date / Time: 6-10-16 1120	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle) VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: NA	PID SERIAL#: NA	Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY ~~AND~~ AND SILT, BLACK (10YR 2/1), FIRM, DAMP, MED PLASTIC, ROOTS AND ORGANIC ~~MATTER~~ MATTER	NA	Heavy Shrubs
1		TD - 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Trap field, std fallow zone.

GEOLOGIST SIGNATURE/DATE	Mike Reilly
QA/QC SIGNATURE/DATE	D. Moser 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-014
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-10-16 COMPLETED: 1130
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

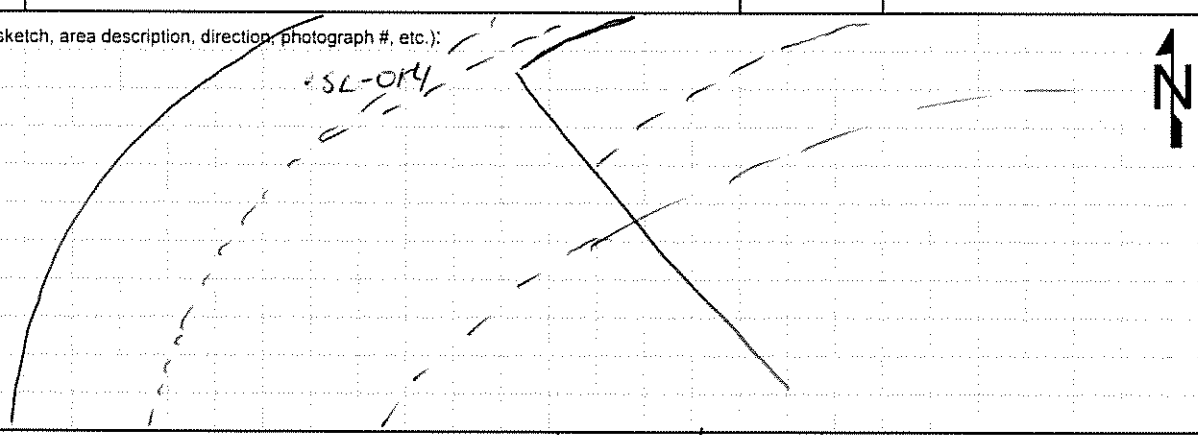
Sample ID: ECCLSL0014 ECCLSL9002	Sample Date / Time: 6-10-16 1130	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, VERY DARK GRAYISH BROWN (10YR 3/2), HARD, DRY, ROOTS, ORGANIC MATTER	NA	shrub/scrub
1		TD - 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Trap field, std fallow zone.

GEOLOGIST SIGNATURE/DATE	[signature] 6-10-16
QA/QC SIGNATURE/DATE	L. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-015
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME STARTED:	6/9/16
COMPLETED:	1525
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

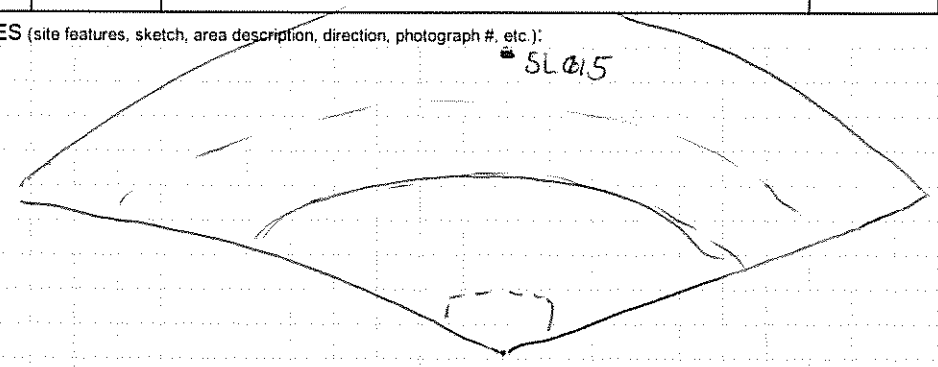
Sample ID: ECCL SL0015	Sample Date / Time: 6-9-16 1525	Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT AND CLAY, VERY DARK BROWN (10YR 3/3), SOFT, DAMP, LOW PLASTIC, ROOTS	NA	Near ditch, Dense veg.
1		TD - 0.5 TF - Trap field AP - Also part of standard shot fallout zone		
2				
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: Near ditch Trap Range, TF AP

GEOLOGIST SIGNATURE/DATE	Mind Rilly
QA/QC SIGNATURE/DATE	A. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-016
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR # TFMF
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1150
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

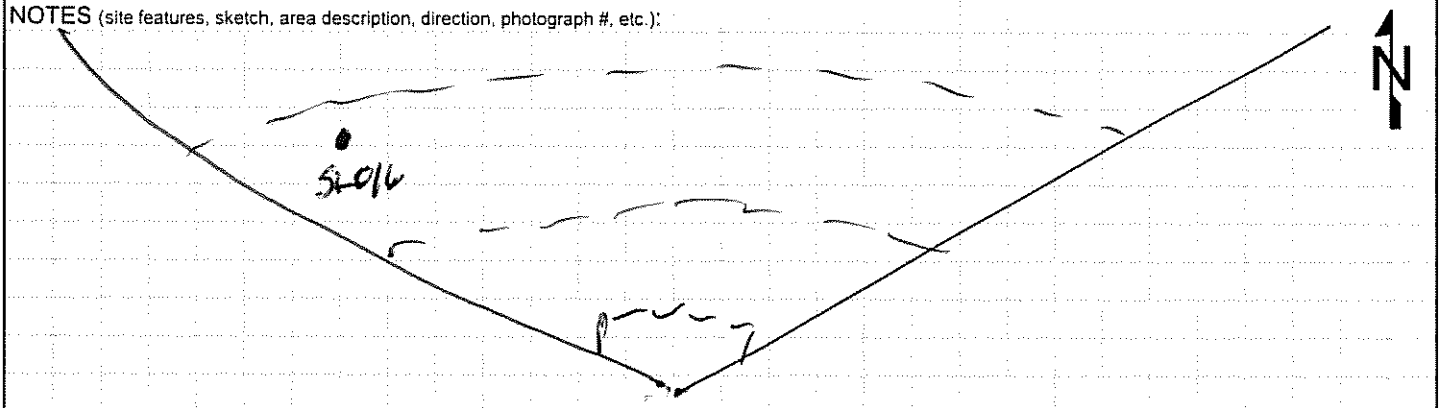
Sample ID: ECCLSL0016	Sample Date / Time: 6.10.16 1150	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, DARK BROWN (10YR 3/3) SOFT, DAMP, NON PLASTIC. ROOTS, ORGANIC MATERIAL	NA	Heavy brush
1		TD - 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: target field max shot fallout zone

GEOLOGIST SIGNATURE/DATE	[signature] 6-10-16
QA/QC SIGNATURE/DATE	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-017
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TPMF
NAME OF DRILLER	PL
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1200
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

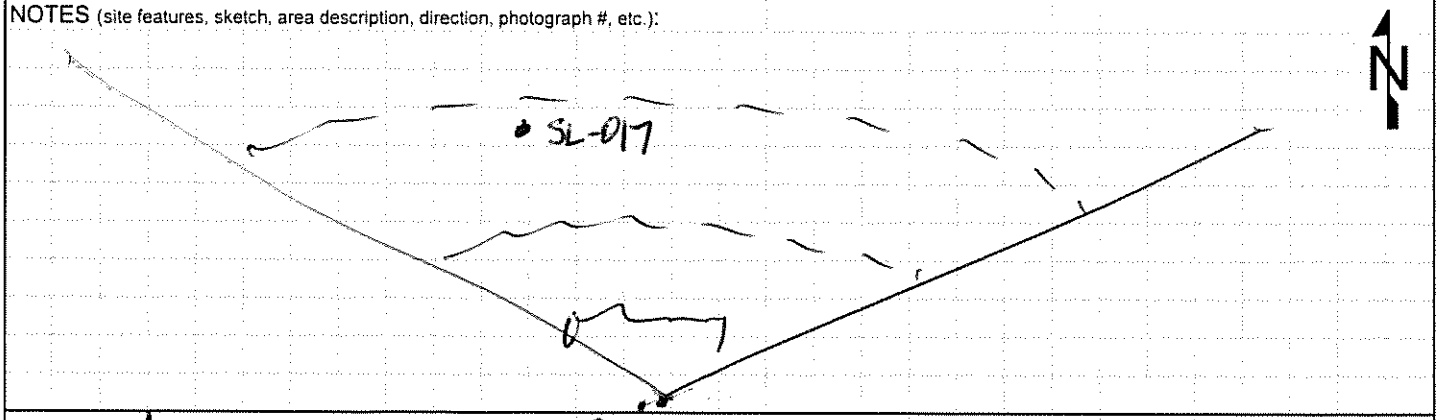
Sample ID: ECCLSL0017 | Sample Date / Time: 6.10.16 1200 | Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals-FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, VERY DARK BROWN (10YR 3/2), SOFT, DRY, NON-PLASTIC, ROOTS	NA	heavy brush near treeline
1		TD - 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field max fallout zone

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
Mike Rill 6-10-16	D. Moyer 6.29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-018
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TF MF
NAME OF DRILLER	~~JR~~ LM
DRILL DATE/TIME	STARTED: 6-13-16 COMPLETED: 0900
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0 - 0.5
DEPTH TO WATER	NA

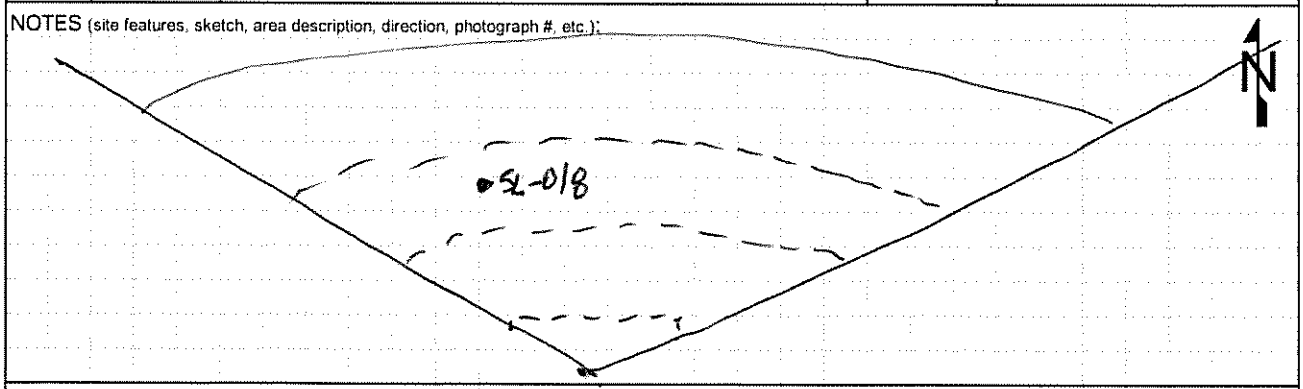
Sample ID: ECCLSL0018 | Sample Date / Time: 6.13.16 0900 | Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY and silt, very dark brown 10YR 2/2 firm, non plastic, organic material, roots	NA	location in the woods
		TD = 0.5'		
1				
2				
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field Max fallout zone

GEOLOGIST SIGNATURE/DATE: Paul Laubin 6-13-16

QA/QC SIGNATURE/DATE: D. Meier 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-019
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PR JFMF
NAME OF DRILLER	LM JP
DRILL DATE/TIME	STARTED: 6-13-16 COMPLETED: 0850
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

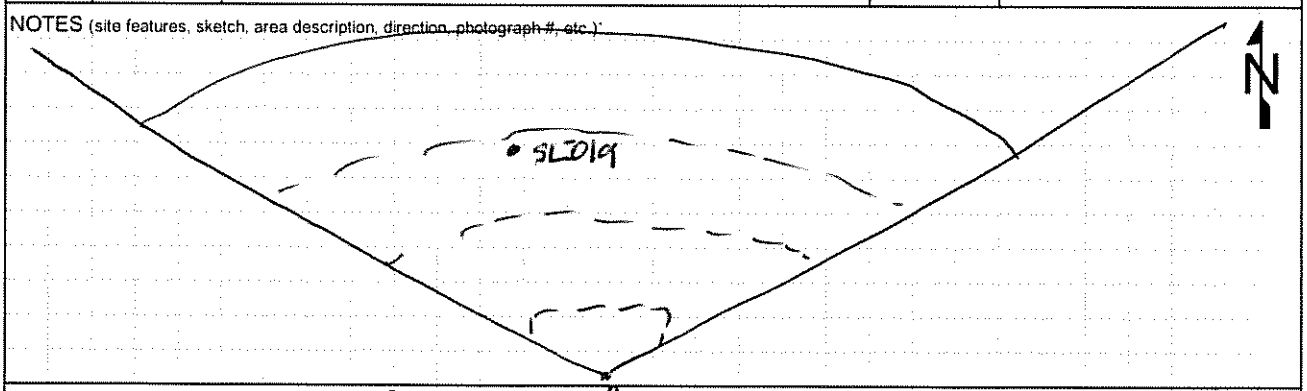
Sample ID: ECCLSL019 | Sample Date / Time: 6-13-16 0850 | Sample Depth: 0-0.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FP, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
0.5	CL	CLAY and silt with sand, dark yellowish brown (10YR 3/6), dry, firm, organic material	NA	wooded area near treeline
1		TD = 0.5'		
1.5		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field map fallout zone

GEOLOGIST SIGNATURE/DATE: Frank Landrum 6-13-16

QA/QC SIGNATURE/DATE: L. Mason 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-020
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF
NAME OF DRILLER	PL
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1250
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0
DEPTH TO WATER	NA

Sample ID: ECCLSL0020

Sample Date / Time: 6.10.16 ~~1250~~ 1250 2M 6.29.16

Sample Depth: 0-0.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

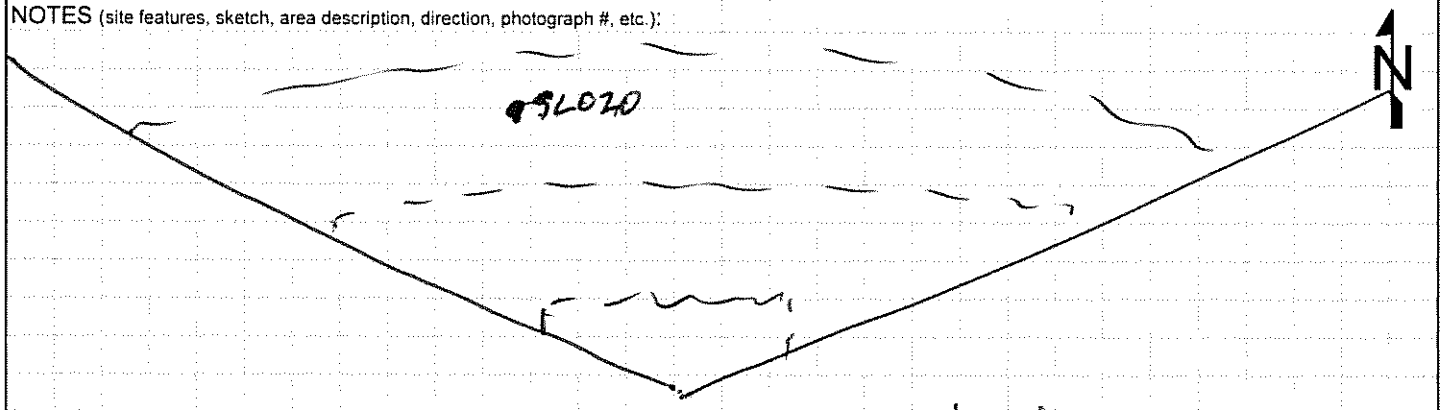
PID MAKE/MODEL: NA

PID SERIAL #: NA

Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, DARK GRAYISH BROWN (10YR 4/2), FIRM, DRY, NON PLASTIC FEW ROOTS.	NA	near treeline
1		TD - 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field max fallout zone near treeline

GEOLOGIST SIGNATURE/DATE: [signature] 6.10.16

QA/QC SIGNATURE/DATE: A Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-021
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1300
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

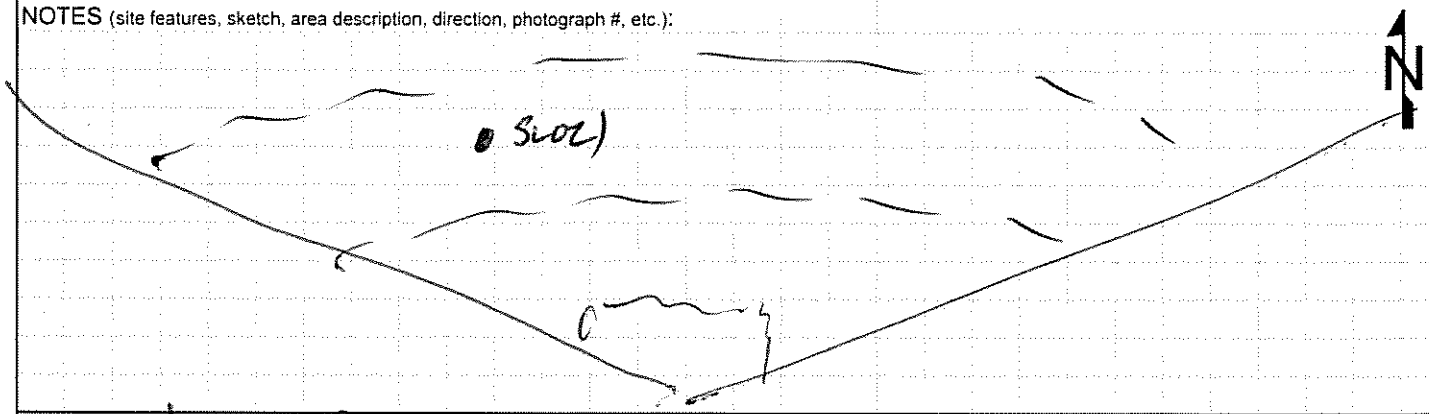
Sample ID: ECCLSL0021 | Sample Date / Time: 6.10.16 1300 | Sample Depth: 0-0.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals (FE), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, DARK GRAYISH BROWN (10YR 4/2), FIRM, DRY, NON-PLASTIC, ROOTS, ORGANIC MATTER.	NA	grassy area near treeline
1		TD - 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field max fallout zone grass area near treeline

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-10-16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-022
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TF MF
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 1210
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

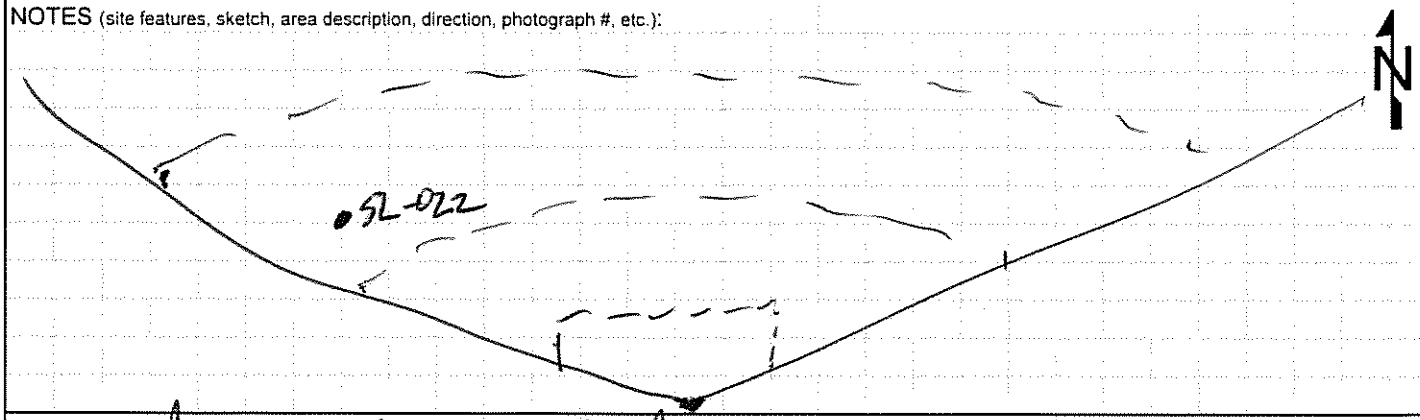
Sample ID: ECCLSL0017 | Sample Date / Time: 6-10-16 1210 | Sample Depth: 0-0.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, DARK BROWN (10YR 3/3), SOFT, DRY, NON-PLASTIC, ROOTS	NA	heavy brush
1		TD -0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field max fallout zone

GEOLOGIST SIGNATURE/DATE: Mark Reilly 6-10-16

QA/QC SIGNATURE/DATE: R. Major 6-28-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-023
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	jason rajan
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 0940
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1'
DEPTH TO WATER	N/A

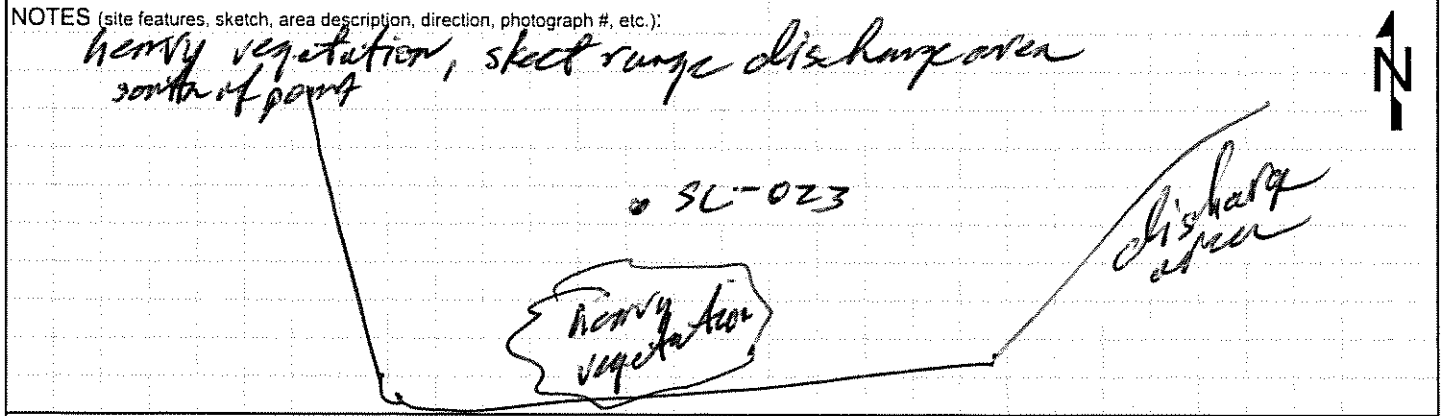
Sample ID: ECCLSL0023	Sample Date / Time: 6-7-16 0940	Sample Depth: 1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PL, Asbestos, Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1 and 10YR 6/8

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		dark brown clay, organic to 3", non-plastic, damp, soft to 8"	NA	pieces of clay pigeons
1		8"-12" sand, well sorted, fine, moist		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):
heavy vegetation, skeet range discharge area south of pond



RATIONALE FOR LOCATION SELECTION: skeet range discharge area

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6/10/16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-024
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	Lindsey Moyer
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 0930
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1'
DEPTH TO WATER	N/A

Sample ID: ECCLSL024	Sample Date / Time: 6.7.16 0930	Sample Depth: 1'

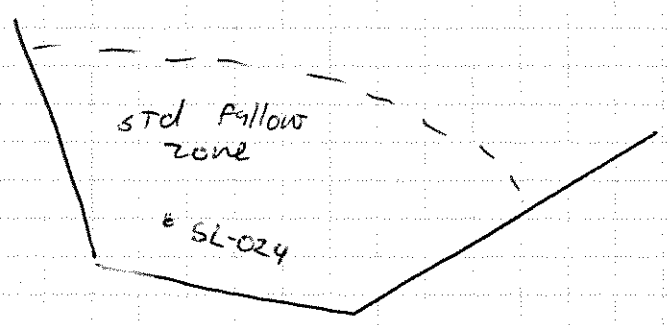
CHEMICAL ANALYSES (circle) VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1 and 10YR 5/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown, organic to 2", non-plastic, soft to 7"	NA	
		7"-12" yellowish brown, tan clay, dry, firm		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):

grassy area, skeet range discharge area



N

RATIONALE FOR LOCATION SELECTION: skeet range discharge area

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-7-16	[signature] 6/10/16

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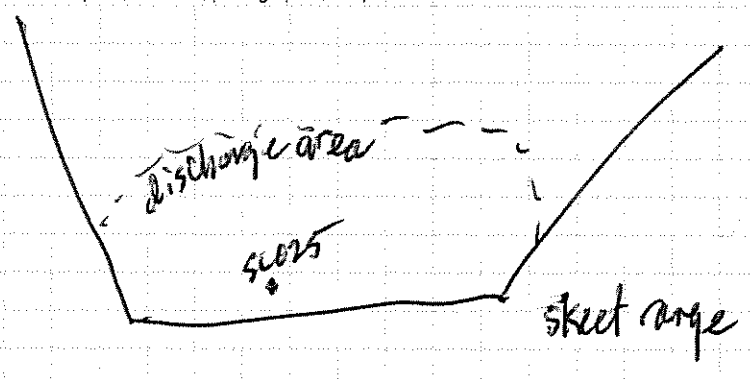
BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-025
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	Jason Rojas
DRILL DATE/TIME	6-7-16 STARTED: 0845 COMPLETED: 0850
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1'
DEPTH TO WATER	N/A
Sample ID:	ECCL SL0025 ↑ DUP ECCL SL9003
Sample Date / Time:	6-7-16 0850
Sample Depth:	0-1
CHEMICAL ANALYSES (circle)	VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, FR Metals, Asbestos, Lead Paint
PID MAKE/MODEL	N/A
PID SERIAL#:	N/A
Colors from Munsell Soil Color Chart, Rev 2000	10YR 5/4 yellowish brown

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1		Brown silty fill, with sand, little gravel organic to 0.3', dry, parts of clay pigeons, pea gravel at ~ 1'	NA	shotgun shell observed
2		TD - 1.0'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKEET RANGE DISCHARGE AREA

GEOLOGIST SIGNATURE/DATE: 6-7-16

QA/QC SIGNATURE/DATE: 6/10/16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-026
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	Lindsey Moyer
DRILL DATE/TIME	STARTED: 0850 COMPLETED: 0855
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1'
DEPTH TO WATER	N/A

Sample ID: ECCLSL0026	Sample Date / Time: 6-7-16 0855	Sample Depth: 0-1

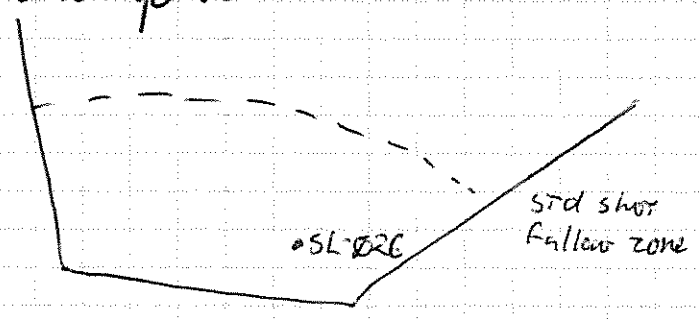
CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: N/A PID SERIAL: N/A Colors from Munsell Soil Color Chart, Rev 10YR 3/1 very dark gray 10YR 5/8 yellowish brown

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay, dry, organic first 2", non-plastic, soft	NA	parts of pigeons
1		Tan clay, dry, firm		
		TD - 1.0'		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):

grassy area, skeet range discharge area



RATIONALE FOR LOCATION SELECTION: SKEET RANGE DISCHARGE AREA

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-7-16	[signature] 6/10/16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-027
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	Jason Rajan
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 0910
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1'
DEPTH TO WATER	N/A

Sample ID: ECCL-SL027	Sample Date / Time: 6-7-16 0910	Sample Depth: 1'

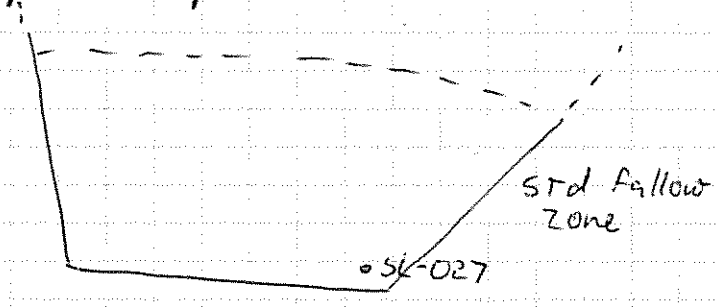
CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, FR Metals, Asbestos, Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 2000 10YR 3/1 and 10YR 5/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown, damp, organic, non-plastic, soft to 10"	NA	Clay pigeon parts observed
		10"-12" yellowish brown tan clay, dry, firm		
1				
		TD - 1.0		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):

grassy area, skeet range discharge area



RATIONALE FOR LOCATION SELECTION: skeet range discharge area

GEOLOGIST SIGNATURE/DATE	6-17-16
QA/QC SIGNATURE/DATE	6/10/19

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-028
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1530
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

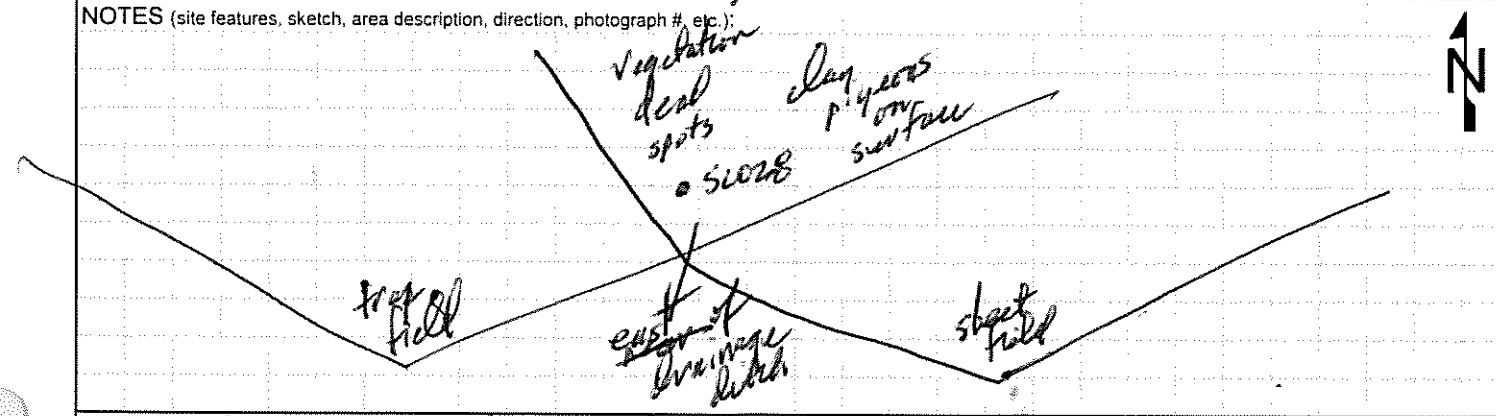
Sample ID: ECCLSL0028 | Sample Date / Time: 6-7-16 1530 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL #: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1		Dark brown (10YR 3/1) clay with silt and sand, moist, soft, low plasticity TD - 0.5	NA	clay pigeon debris, shotgun wads, shotgun shell
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet and trap field fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6-10-16

leidos	CLIENT: NASA	LOCATION NUMBER/STATION ID: ECCL-SL-029
BORING LOG	LOCATION: NASA Plum Brook Station Sandusky, Ohio	SHEET 1 OF 1

PROJECT: Multi-site Site Characterization (**ECCL FR**)	BOREHOLE SITE: ECCL FR
NAME OF DRILLER: JP	DRILL DATE/TIME: STARTED: 6.7.16 COMPLETED: 1215
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle): (3" Hand Auger) Scoop/Spoon	TOTAL DEPTH OF BOREHOLE: 0.5
	DEPTH TO WATER: NA

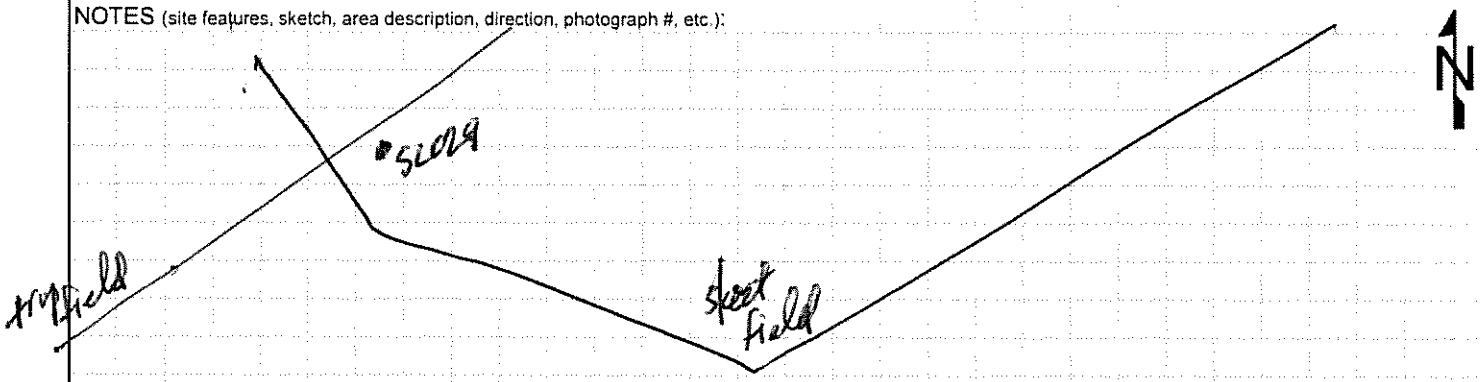
Sample ID: ECCLSL0029	Sample Date / Time: 6.7.16 1215	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay 10YR 3/1, moist, organic, low plasticity	NA	shotgun wads and clay pigeons
		TD - 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Skeet field standard Fallout zone

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-7-16	[signature] 6.10.16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-030
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1030
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

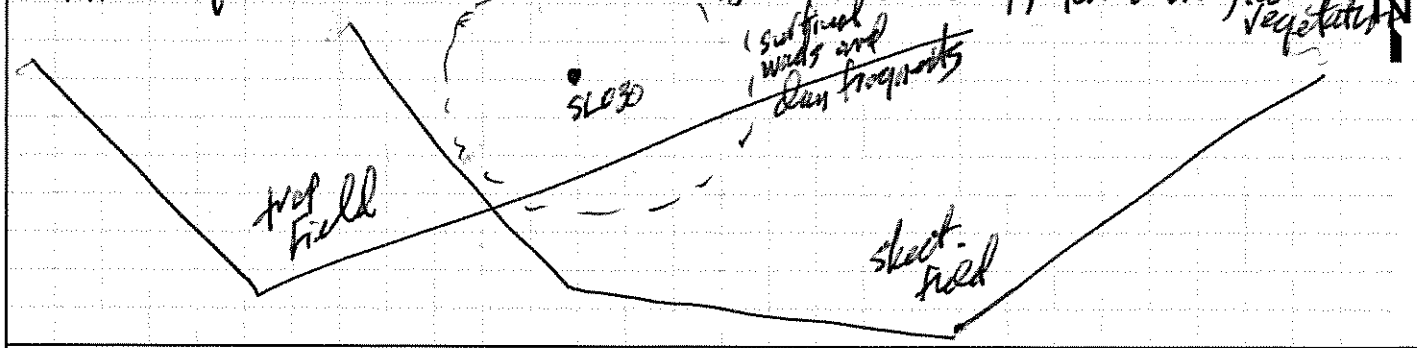
Sample ID: ECCLSL0030 | Sample Date / Time: 6-7-16 1030 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: N/A | PID SERIAL#: N/A | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/2 and 10YR 3/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay, little silt and sand, damp, little plastic, soft to 4"	N/A	shotgun wads and clay pigeons
1		Tan and brown clay, firm, damp little plasticity		
		TD - 0.5		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.): middle of ~20' diameter circle with shotgun wads and clay pigeon debris, limited to surfaced wads and clay fragments, no vegetation



RATIONALE FOR LOCATION SELECTION: skeet field, trap field

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6/10/16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-031
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1240
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

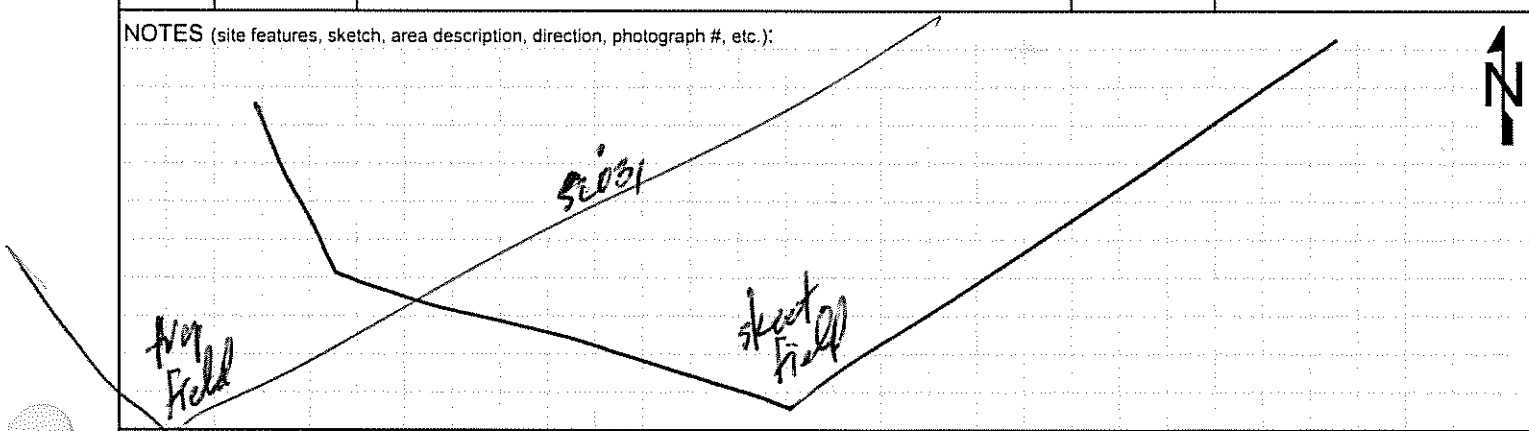
Sample ID: ECCL SL0031	Sample Date / Time: ~~ECCL~~ 6-7-16 1240	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay with silt 10YR 3/1 moist, organic, low plasticity, soft TD - 0.5		shotgun wads and pigeon pieces
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Skeet field std fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16	QA/QC SIGNATURE/DATE: [signature] 6-10-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-032
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1000
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

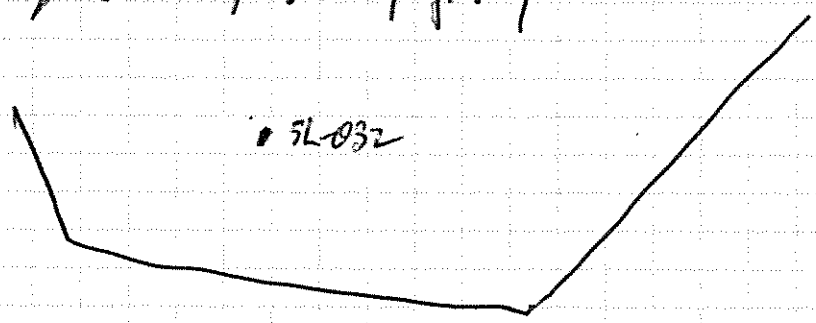
Sample ID: ECCLSL0032 | Sample Date / Time: 6-7-16 1000 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: N/A | PID SERIAL: N/A | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/4, 10YR 5/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Brown clay, dry, organic material to 2", non-plastic, soft to 6"	NA	Many shotgun wads and clay pigeon pieces
		Tan clay, slightly firm, dry		
1		TD ~ 0.5'		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):
skeet range discharge area, grassy area



N

RATIONALE FOR LOCATION SELECTION:
skeet range discharge area

GEOLOGIST SIGNATURE/DATE: [signature] 6/7/16

QA/QC SIGNATURE/DATE: [signature] 6/10/16

leidos	CLIENT: NASA	LOCATION NUMBER/STATION ID: ECCL-SL-033
BORING LOG	LOCATION: NASA Plum Brook Station Sandusky, Ohio	SHEET 1 OF 1

PROJECT: Multi-site Site Characterization (**ECCL FR**)	BOREHOLE SITE: ECCL FR
NAME OF DRILLER: LM	DRILL DATE/TIME STARTED: 6-7-16 COMPLETED: 1015
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle): (3" Hand Auger) Scoop/Spoon	TOTAL DEPTH OF BOREHOLE: 0.5
	DEPTH TO WATER: N/A

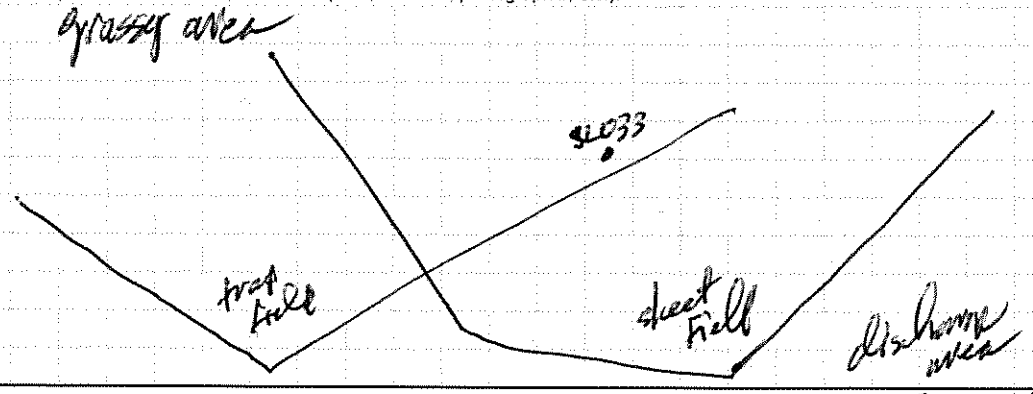
Sample ID: ECCLSL0033 + dupe ECCLSL0004 | Sample Date / Time: 6.7.16 1015 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: N/A | PID SERIAL #: N/A | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown, damp, organic, nonplastic soft to 6"		shotgun wads and clay pigeons
		TD-0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet range / trap field discharge area

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-10-16	[signature] 6/10/16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-034
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1115
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

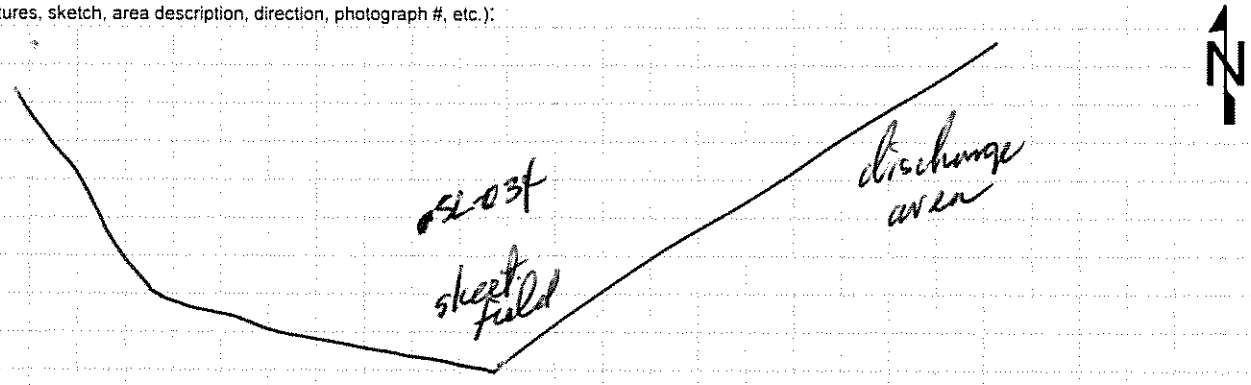
Sample ID: ECCLSL0034	Sample Date / Time: 6-7-16 1115	Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1		Dark brown clay, moist, little silt, organic material, low plasticity TD - 0.5	NA	shotgun wads and clay pigeons present
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet field

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16	QA/QC SIGNATURE/DATE: [signature] 6/10/16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-035
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR SK DA
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 0950
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger ✓ Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5 ft
DEPTH TO WATER	NA

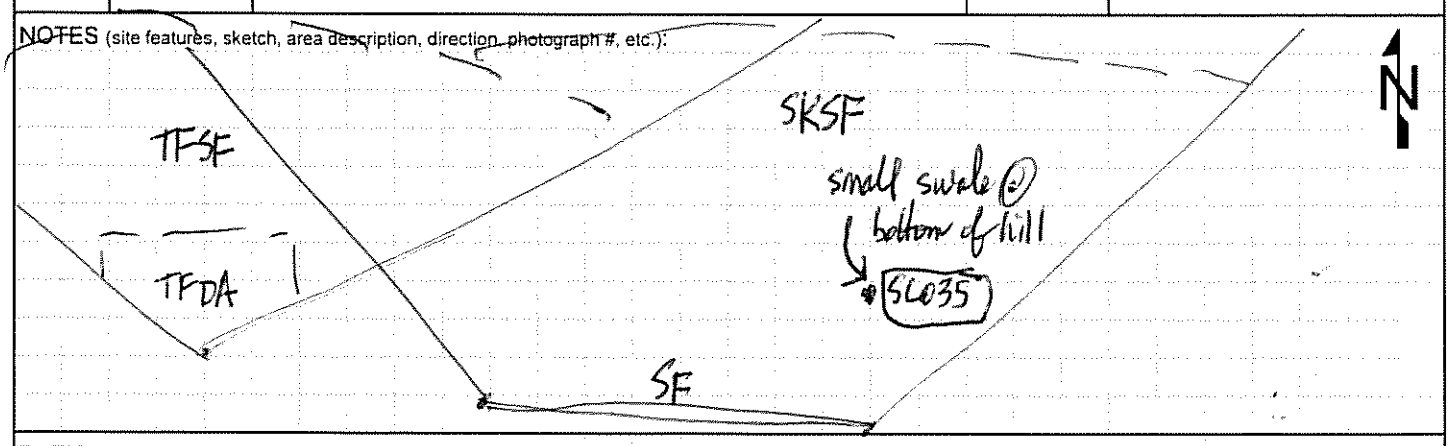
Sample ID: ECCLSL0035 | Sample Date / Time: 6-7-16 0950 | Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, (SVOCs), PCBs, Herbicides, Pesticides, Explosives, (Metals FR), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, very dark grey (10YR 3/1), very soft, moist, low plasticity, SH and CP observed	NA	SH, CP
		TD = 0.5		
1		Notes: SH - shotgun wads/fragments; CP - clay pigeon debris/fragments; TF - trap field; SK - skeet field; DA - discharge area; SF - standard shot fallout zone; MF - maximum shot fallout zone; AP - also part of standard shot fallout zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION:
TFDA, TFSF, TFMF, TFAP, (SKDA), SKMF, SKSF, SFAP

GEOLOGIST SIGNATURE/DATE: Paul Tondinelli 6-7-16

QA/QC SIGNATURE/DATE: Michael Reilly 6-10-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-036
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: ~~1050~~ 1040 PM
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

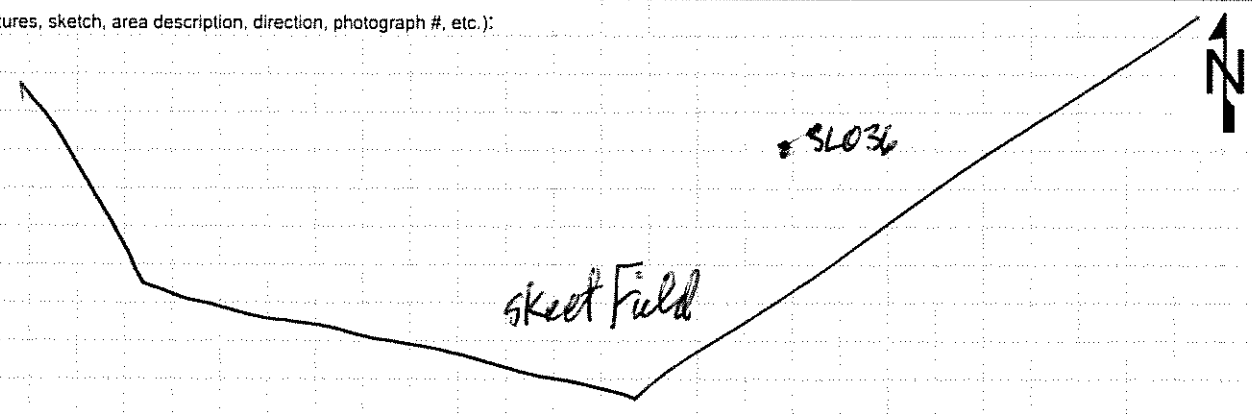
Sample ID: ECCLSL0036 | Sample Date / Time: 6-7-16 1040 ~~1050~~ 2MGB-6 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: N/A | PID SERIAL#: N/A | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Brown clay, dry, organic to 2", soft, little gravel	NA	shotgun wads and clay pigeons
		TD - 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet field

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-7-16	[signature] 6-10-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-037
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1100
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

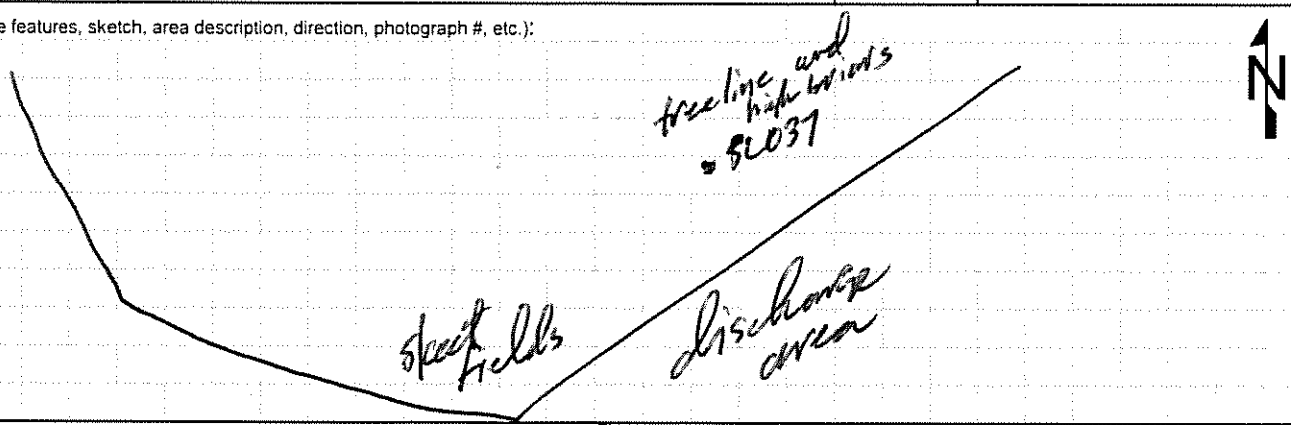
Sample ID: ECCLSL0037 | Sample Date / Time: 6-7-16 1100 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: N/A | PID SERIAL#: N/A | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay, moist with silt, little organic, low plasticity	NA	clay pegs on parts
		TD = 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: sheet field

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6/10/16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-038
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1500
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

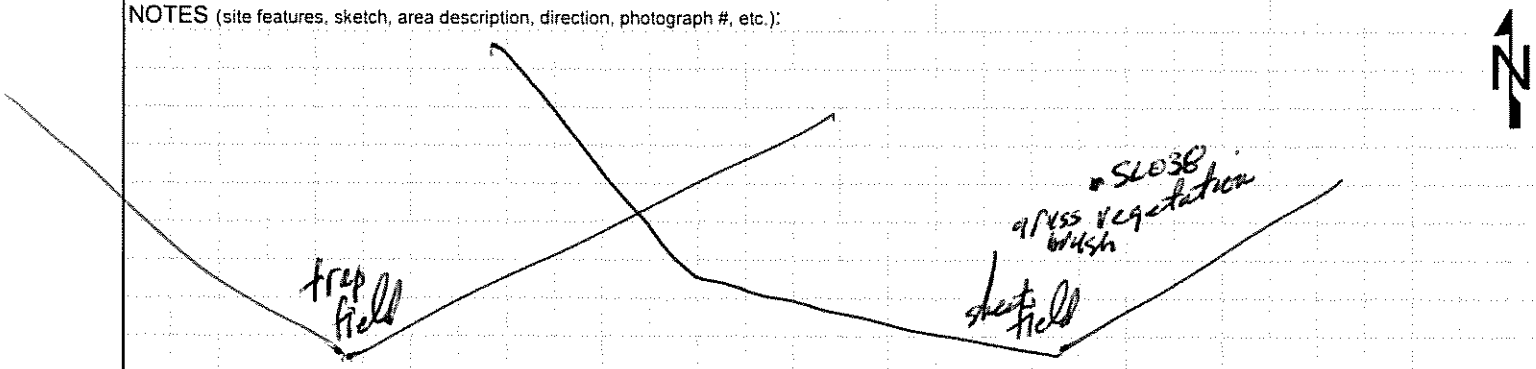
Sample ID: ECCLSL038 | Sample Date / Time: 6-7-16 1500 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay (10YR 3/1) with silt and sand organic, moist, soft, low plasticity	NA	clay pigeon debris
		TD - 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet field fallout

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6-10-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCLSL-039
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JN
DRILL DATE/TIME	STARTED: 6.7.16 COMPLETED: 14:30
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

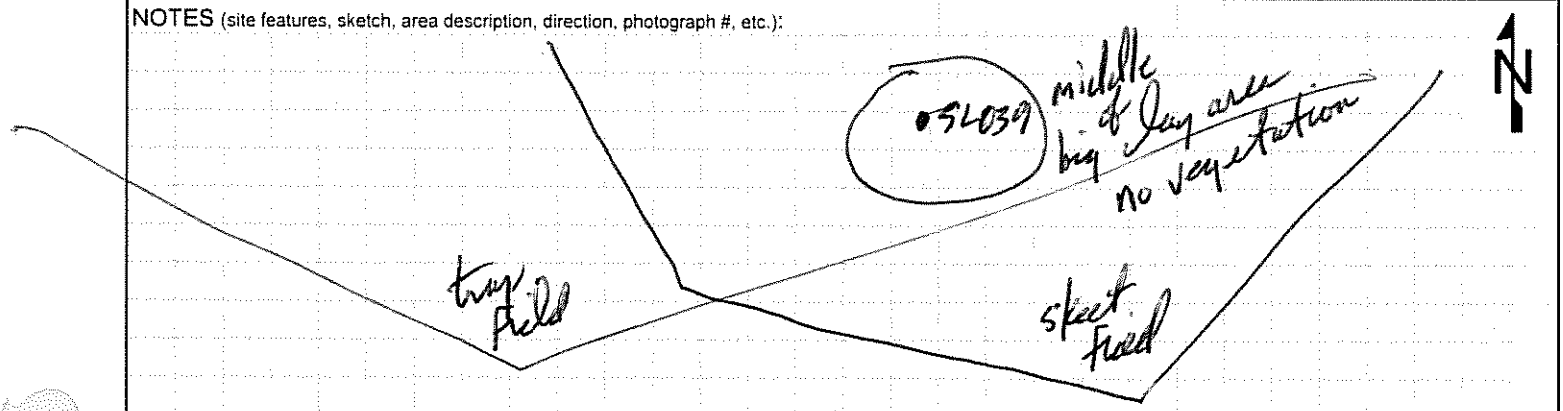
Sample ID: ECCLSL0039 | Sample Date / Time: 6.7.16 14:30 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay (10YR 3/1), some silt, little sand, moist, soft	NA	clay pigeon pieces on surface, shotgun wads
		TD - 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Skeet field and trap field fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6-10-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-040
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1415
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

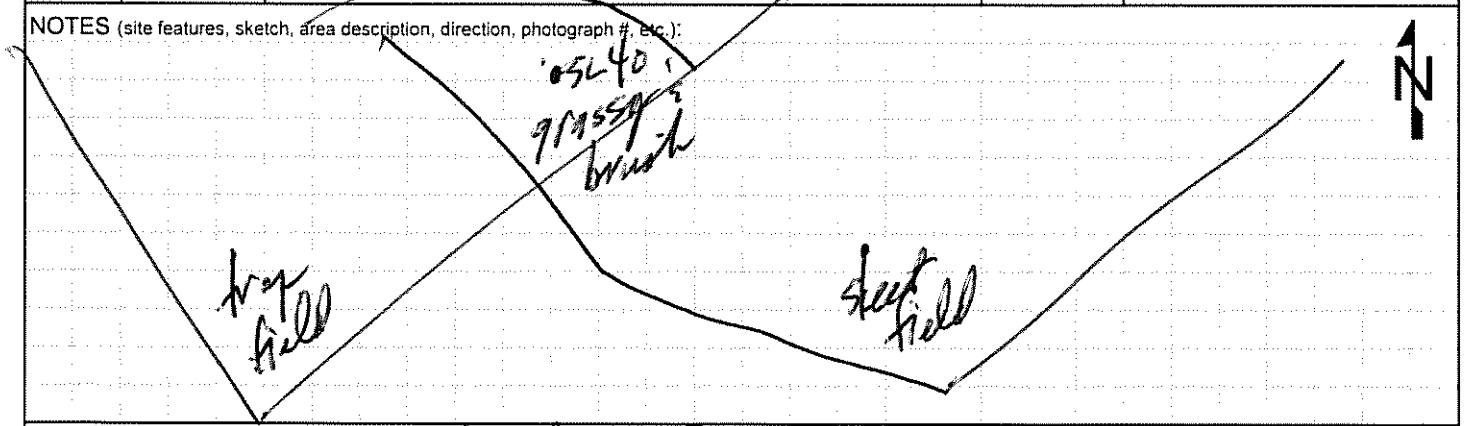
Sample ID: ECCLSL0040 | Sample Date / Time: 6-7-16 1415 | Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay (10YR 3/1), some silt, little sand, moist, organic at top, soft TD - 0.5	NA	clay pigeon pieces on surface shotgun wads
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet field and trap field

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6-10-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-041
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	CM
DRILL DATE/TIME	STARTED: 6.7.16 COMPLETED: 1535
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

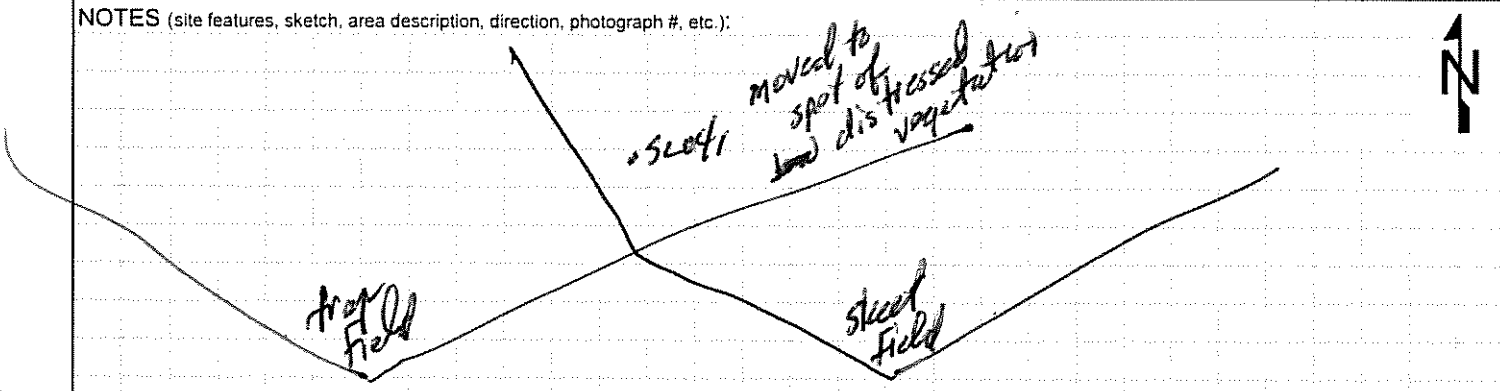
Sample ID: ECCLSL0041 | Sample Date / Time: 6.7.16 1535 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay (10YR 3/1), little organic, with silt and sand, moist, soft low plasticity TD - 0.5	NA	clay pigeon debris
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: trap and skeet field fallout

GEOLOGIST SIGNATURE/DATE: [signature] 6.7.16

QA/QC SIGNATURE/DATE: [signature] 6.10.16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-004/2
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JL
DRILL DATE/TIME	STARTED: 6.7.16 COMPLETED: 1545
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

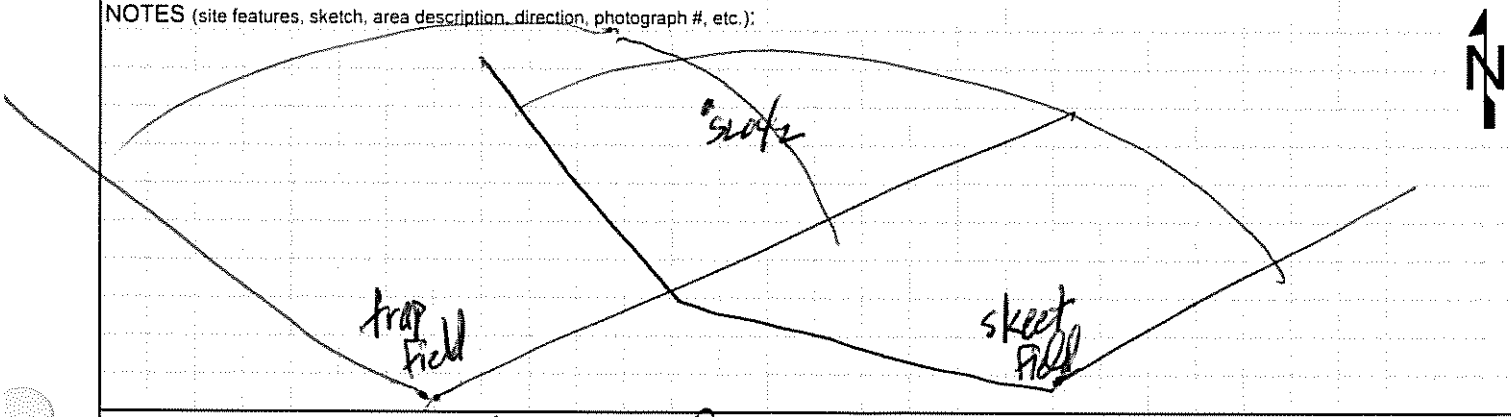
Sample ID: ECCLSL004/2 ECCLSL9005 | Sample Date / Time: 6.7.16 1545 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay (10YR 3/1) 70-85% little organic, with silt and sand, moist, soft, low plasticity	NA	some clay pigeon debris
1				collect field dup ECCLSL9005
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: trap and skeet field fallout zones

GEOLOGIST SIGNATURE/DATE: [signature] 6.7.16

QA/QC SIGNATURE/DATE: [signature] 6.10.16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-04/3
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.7.16 COMPLETED: 1605
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

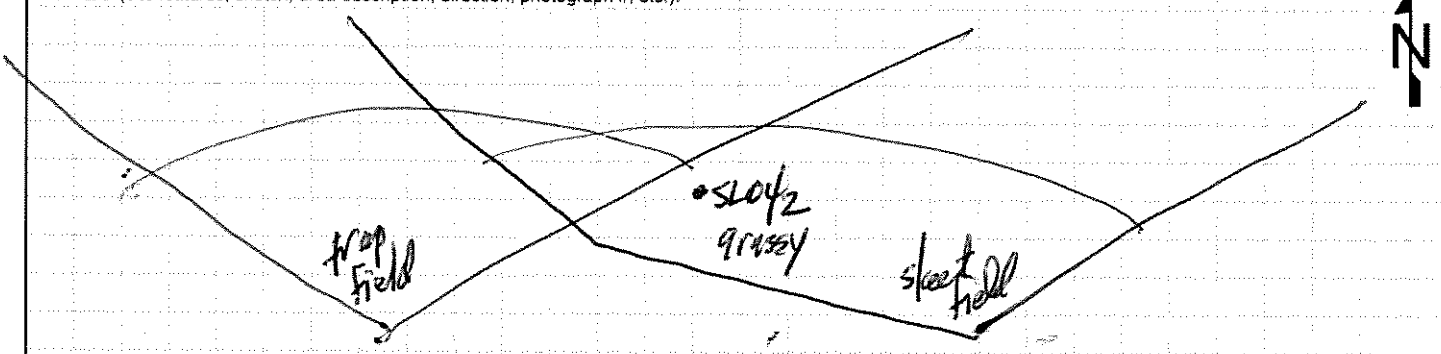
Sample ID: ECCLSL004/3 | Sample Date / Time: 6.7.16 1605 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay (10YR 3/1) organic, with silt and sand, moist, soft, low plasticity	NA	
		TD-0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Trap and sheet field fallout

GEOLOGIST SIGNATURE/DATE: Paul Lowdenbach 6.7.16

QA/QC SIGNATURE/DATE: [illegible] 6.10.16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-044
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6.7.16 COMPLETED: ~~1620~~ 1620
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	~~NA~~ 0.5
DEPTH TO WATER	NA

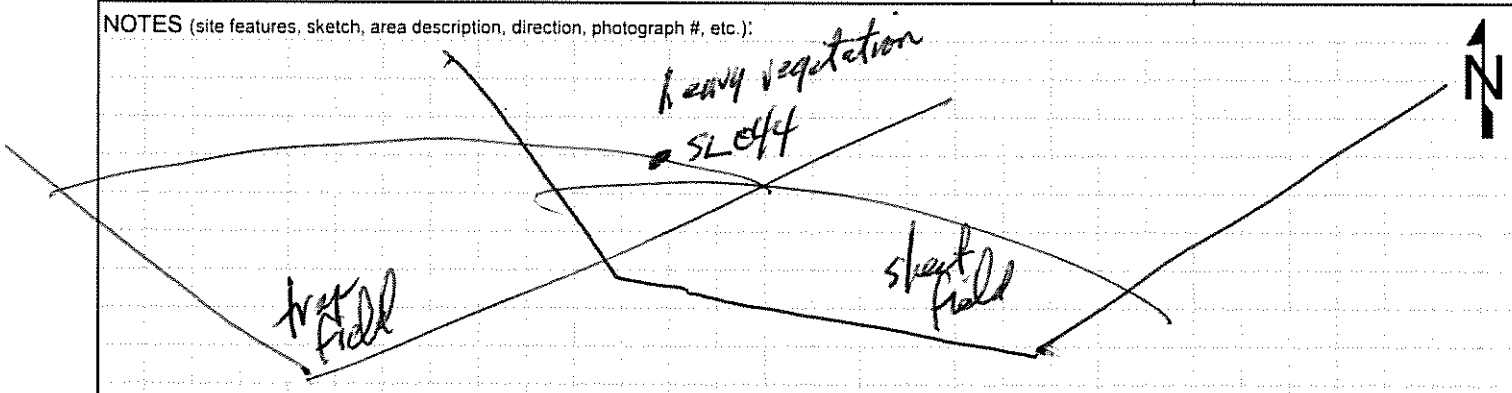
Sample ID: ECCLSL0044	Sample Date / Time: 6.7.16 ~~1620~~ 1620	Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		(10YR 3/1) Dark brown clayey, silty, sand, moist, organic, soft non-plastic TD -0.5	NA	clay pigeon debris
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: trap and skeet field fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16	QA/QC SIGNATURE/DATE: [signature] 6.10.16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-0405
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1640
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

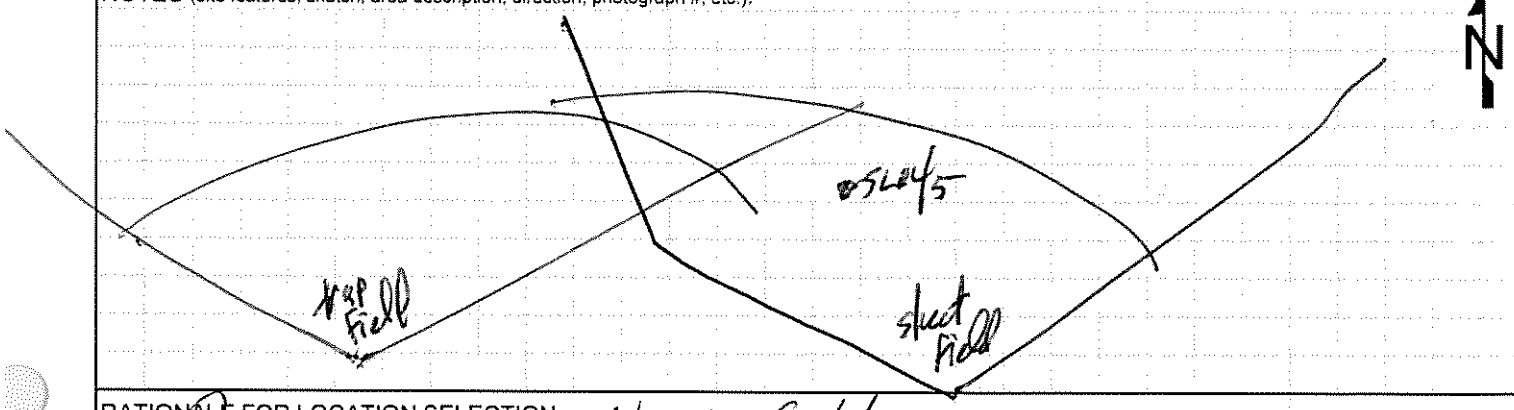
Sample ID: ECCLSL0405	Sample Date / Time: 6-7-16 1640	Sample Depth: 0.5

CHEMICAL ANALYSES (circle) VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay (10YR 3/1) with sand and silt, moist, organic, soft, plastic TD - 0.5	NA	
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: sheet field

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
6-10-16	6-10-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-046
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR ~~TFSF~~ SKSF TFMF
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-8-16 COMPLETED: 1440
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5 ft
DEPTH TO WATER	NA

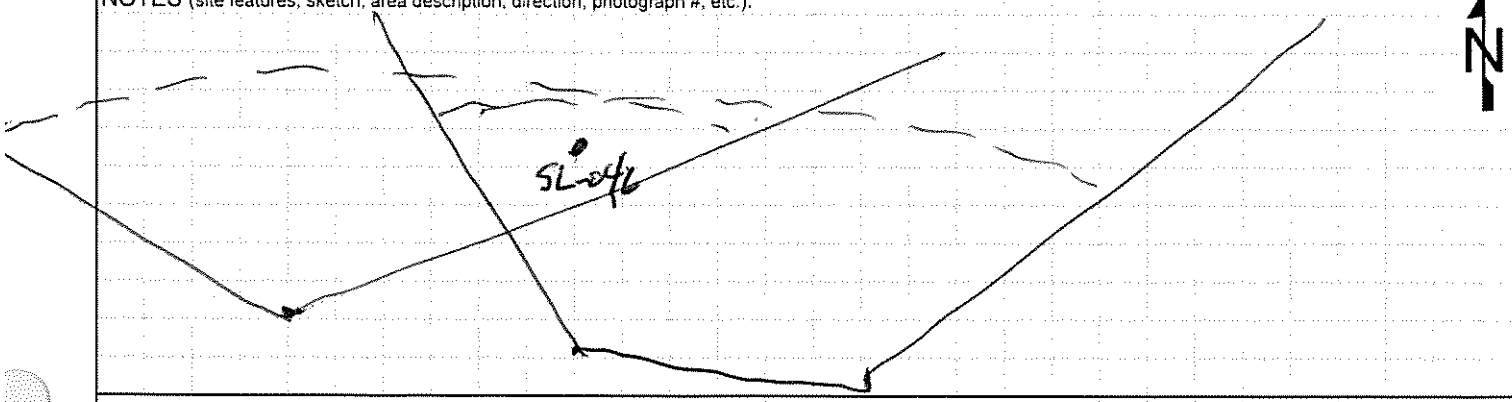
Sample ID: ECCLSL0046	Sample Date / Time: 6-8-16 1640	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown (10YR 3/3), moist, very soft, low plasticity, organic material	NA	
1		TD=0.5 SH - shotgun wads / frags CP - clay pigeon debris TR - trap field SK - skeet field DA - discharge area SF - std shot fallout zone MF - max shot fallout zone AP - also part of SF		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: ~~TFSF~~, SKSF, TFMF

GEOLOGIST SIGNATURE/DATE: Paul Underwood 6-8-16	QA/QC SIGNATURE/DATE: D. Mayer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-047
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR ~~TFSF~~ SKSF TFMF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.8.16 COMPLETED: 1650
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5 ft
DEPTH TO WATER	NA

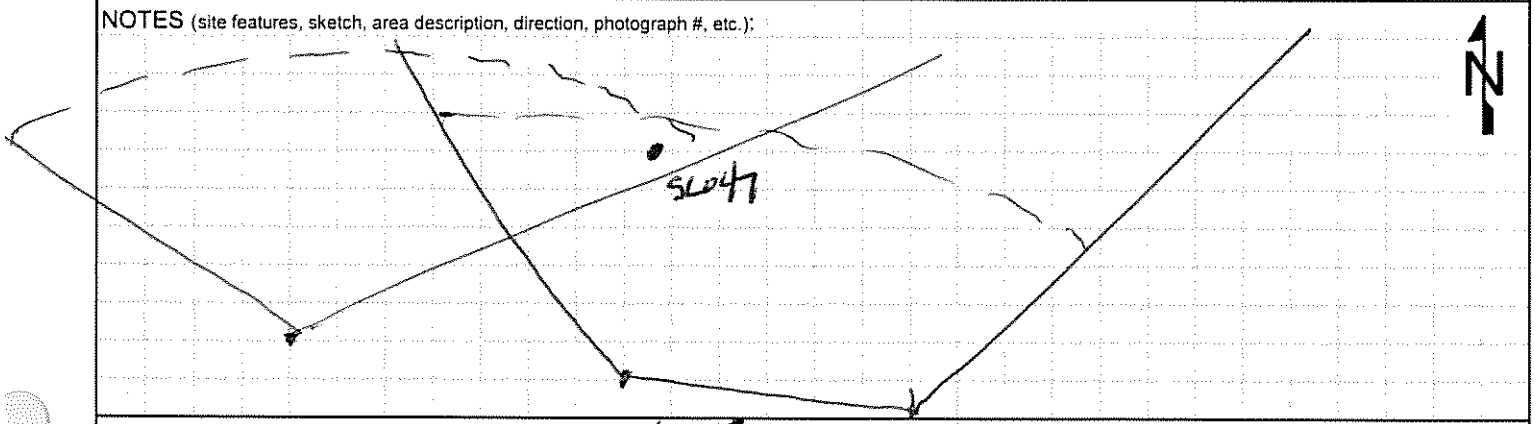
Sample ID: ECCLSL0047 | Sample Date / Time: 6.8.16 1650 | Sample Depth: 0 – 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FE, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown (10YR 3/3), moist, very soft, low plasticity, organic material	NA	low vegetation area
1		TD = 0.5 SH – CP – TF – trap field SK – skeet field DA – SF – std shot fallout zone MF – max shot fallout zone		
2		AP –		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: ~~TFSF~~, SKSF TFMF, low vegetation area

GEOLOGIST SIGNATURE/DATE: [signature] 6-8-16

QA/QC SIGNATURE/DATE: A. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-048
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.8.16 COMPLETED: 1700
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5 ft
DEPTH TO WATER	NA

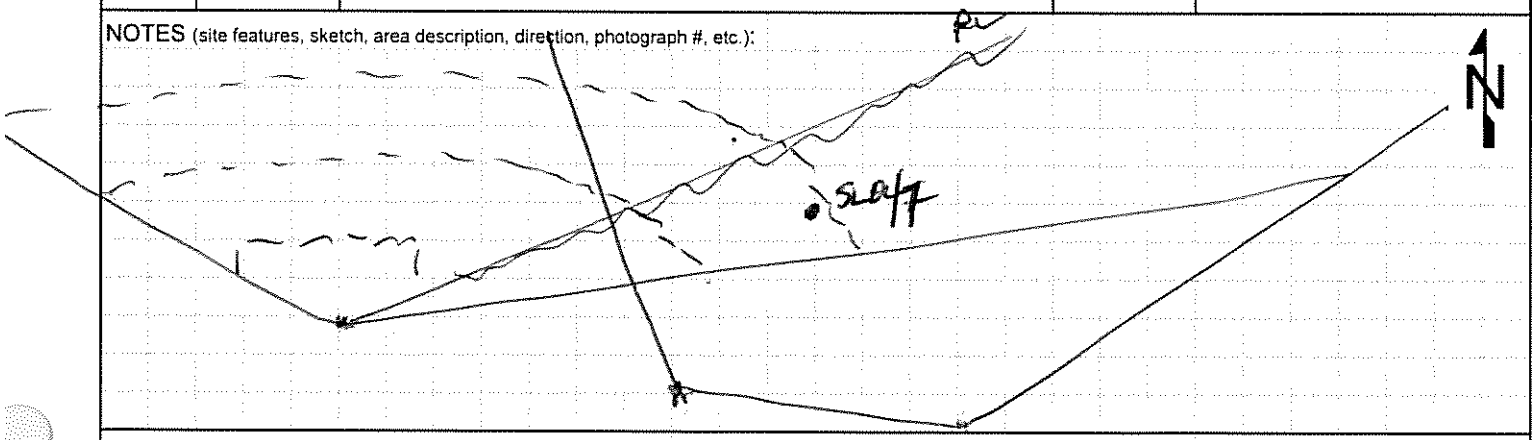
Sample ID: ECCLSL0048 | Sample Date / Time: 6.8.16 1700 | Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark yellowish brown (10YR 3/4), very soft, moist, low plasticity, organic	NA	
1		TD = 0.5 TF - trap field SK - skeet field SF - std fallout area MF - max fallout area		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TPMF, SKSF

GEOLOGIST SIGNATURE/DATE: Paul Kuhlmann 6-8-16

QA/QC SIGNATURE/DATE: L. Meyer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-049
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1155
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

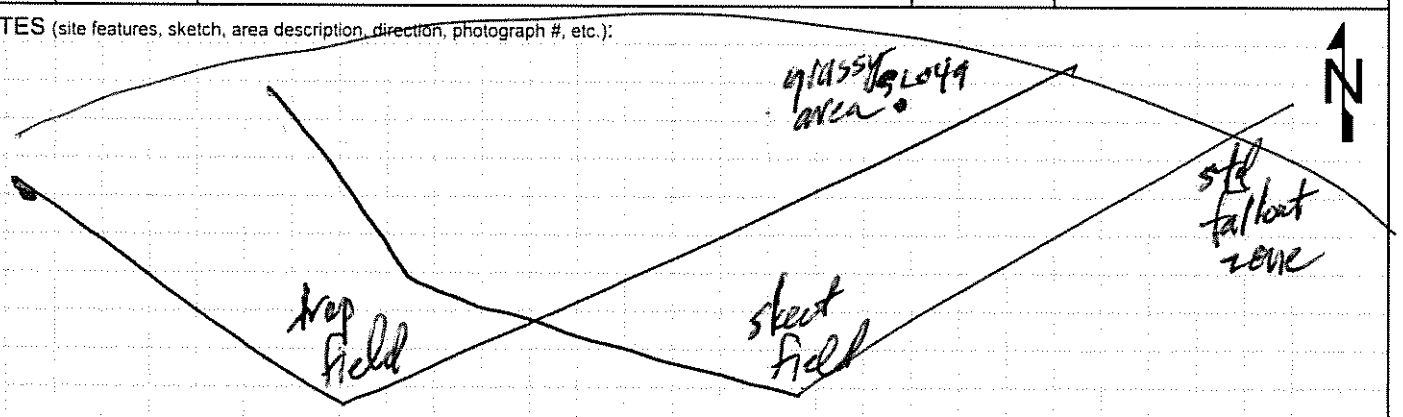
Sample ID: ECCLSL0049 | Sample Date / Time: 6-7-16 1155 | Sample Depth: 0-5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1 and 10YR 4/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay, with sand, organic, soft, moist, tan clay at bottom TD-0.5	NA	
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: tray field / sheet field fallout zone

GEOLOGIST SIGNATURE/DATE: 6-7-16

QA/QC SIGNATURE/DATE:

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-050
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1125
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

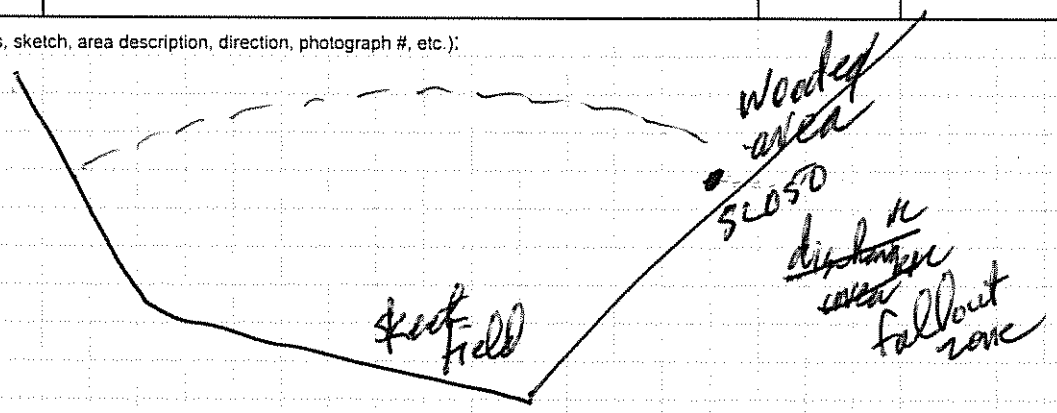
Sample ID: ECCLSL0050 | Sample Date / Time: 6-7-16 1125 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay, moist, little silt, organic material, low plasticity, soft TD-0.5	NA	clay pigeon pieces on surface
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet field fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-10-16

QA/QC SIGNATURE/DATE: [signature] 6/10/16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-051
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1140
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

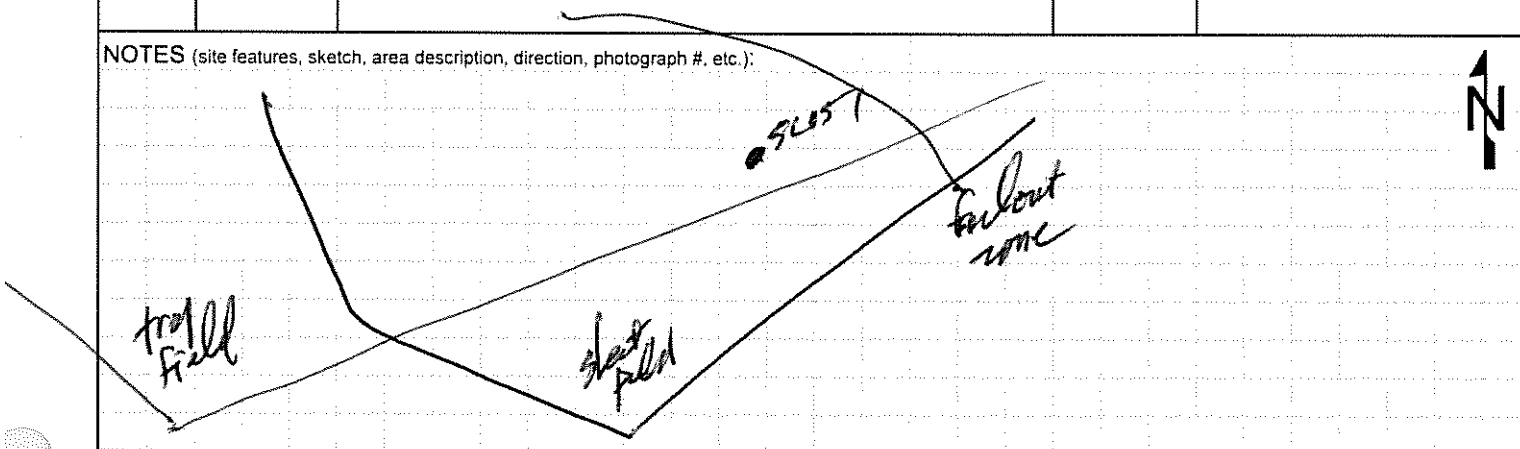
Sample ID: ECCLSL0051	Sample Date / Time: 6-7-16 1140	Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Brown clay, dry, organic soft, low plasticity	NA	clay pegions pieces
		TD - 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: steep field fallout zone

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-7-16	[signature] 6/10/16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-052
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR SKAP
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-9-16 COMPLETED: 1025
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

Sample ID: ECCLSL0052 MS/MSD

Sample Date / Time: 6-9-16 1025

Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

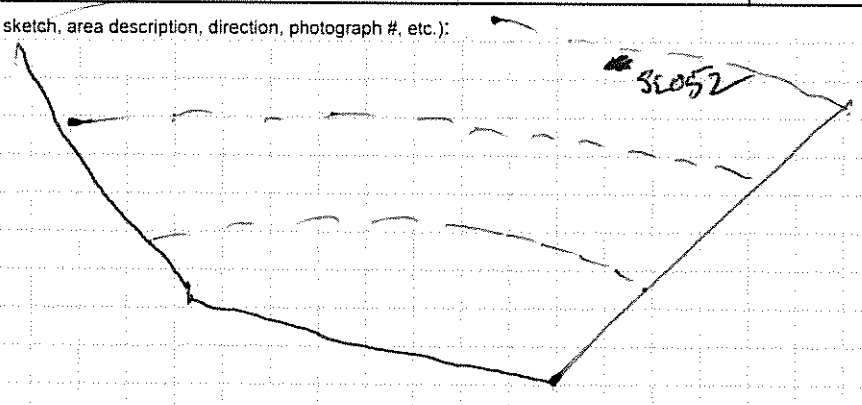
PID MAKE/MODEL: NA

PID SERIAL#: NA

Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, dark brown (10YR 2/2), moist, very soft, low plasticity, organic material	NA	Moved to NW, in depression near property line, construction on other side
1		TD = 0.5 SK - skeet field AP - also part of standard fallout zone		PLUS MS/MSD
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKAP, depression near property line

GEOLOGIST SIGNATURE/DATE: [signature] 6-9-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-Ø53
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1100
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	Ø.5
DEPTH TO WATER	N/A

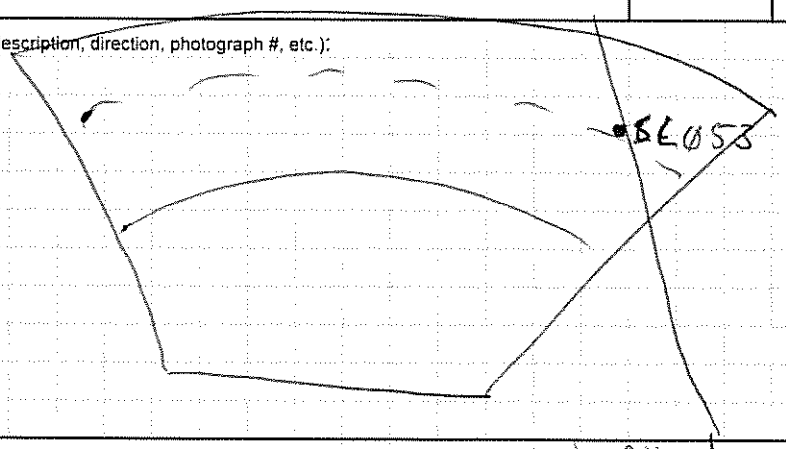
Sample ID: ECCLSLØØ53	Sample Date / Time: 6/9/16 1100	Sample Depth: Ø - Ø.5

CHEMICAL ANALYSES (circle) VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT AND CLAY, VERY DARK BROWN, (10YR 2/2), SOFT, DAMP, ORGANIC MATTER	N/A	
1		TD - Ø.5 TF - Trap field SK - Skeet field ST - std fallow zone MF - Max fallow zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: skeet field, standard shot fallout zone, field

GEOLOGIST SIGNATURE/DATE	Michael Reilly 6/9/16
QA/QC SIGNATURE/DATE	D. Major 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-054
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	CM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1035
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

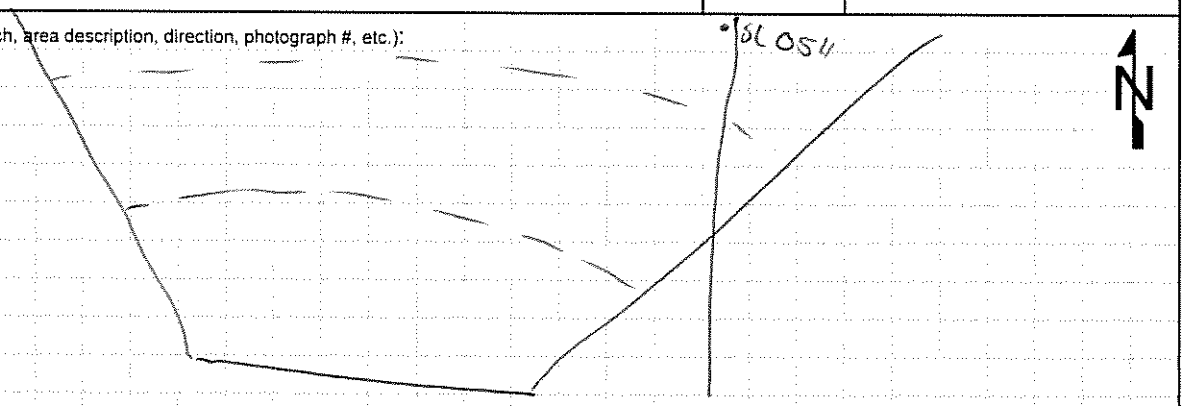
Sample ID: ECCL SL054 | Sample Date / Time: 6/9/16 1035 | Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: N/A | PID SERIAL#: N/A | Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, VERY DARK BROWN (10YR 2/2), SOFT, DAMP, NON PLASTIC, ROOTS AND ORGANIC MATTER	N/A	Vegetation, dirt pile, along parcel border
1		TD - 0.5 TF - Trap field SK - Skeet field ST - ~~[illegible]~~ Std fallow zone MF - Max fallow zone MCB 6/9/16		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKMF, vegetation, dirt pile, along parcel border

GEOLOGIST SIGNATURE/DATE: Michael Reilly 6/9/16

QA/QC SIGNATURE/DATE: D. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL – SL-055
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL SKAP
NAME OF DRILLER	JTL
DRILL DATE/TIME	STARTED: 6-9-16 COMPLETED: 0940
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

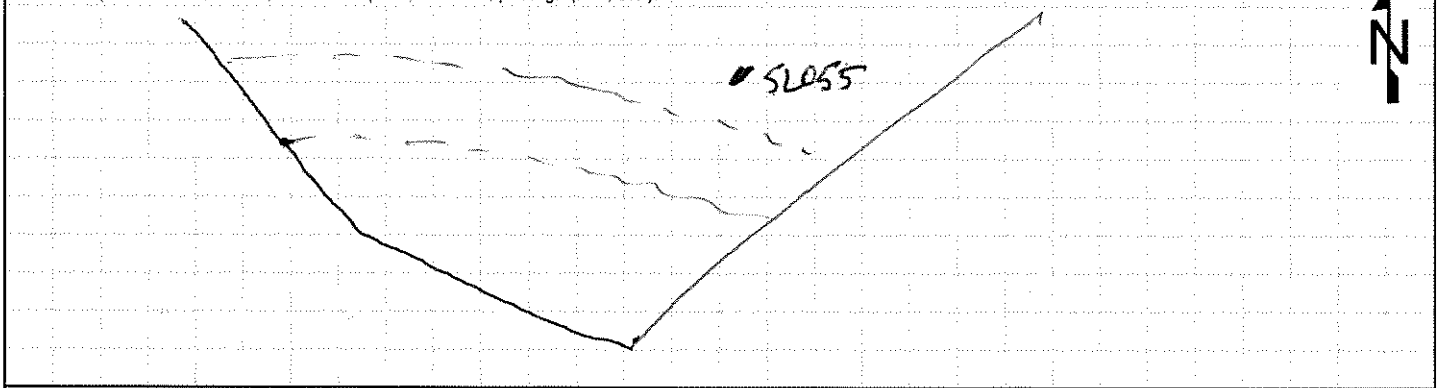
Sample ID: ECCL SL0055	Sample Date / Time: 6-9-16 0940	Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown (10YR 2/2), moist, very soft, low plasticity, organic material	NA	~~Soft~~ depressed area w/vegetation
1		TD=0.5 SK – skeet field AP – also part of standard fallout zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKAP, depressed area w/vegetation

GEOLOGIST SIGNATURE/DATE: [signature] 6-9-16	QA/QC SIGNATURE/DATE: [signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-056
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL-FR-SKAP
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-9-16 COMPLETED: 1115
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

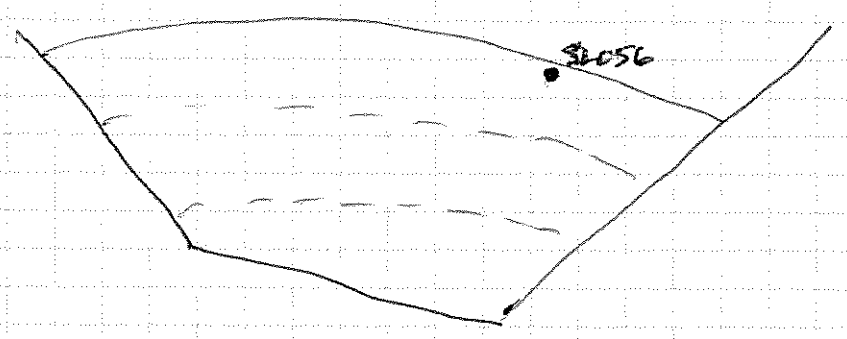
Sample ID: ECCLSL0056 | Sample Date / Time: 6.9.16 1115 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR/2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown, 10YR 2/2, moist, very soft, low plasticity, organic material	NA	highly vegetated w/ ferns, briars
1		TD = 0.5 SK – sheet field AP – also part of standard fallout zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: SKAP, ferns, briars

GEOLOGIST SIGNATURE/DATE: Paul Tomlinson 6-9-16

QA/QC SIGNATURE/DATE: J. Mar 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-Ø57
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1240
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	Ø.5
DEPTH TO WATER	N/A

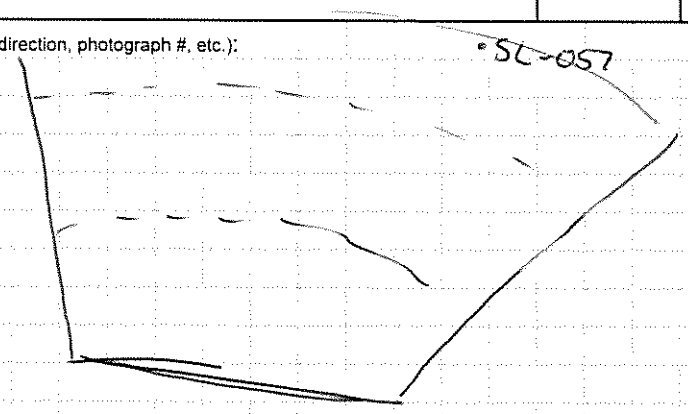
Sample ID: ECCLSLØØ57	Sample Date / Time: 6/9/16 1240	Sample Depth: Ø - Ø.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: N/A	PID SERIAL#: N/A	Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, BLACK (10YR 2/1) SOFT DAMP, NON PLASTIC, ROOTS AND ORLANIC ~~[illegible]~~ MR 6/9/16 MATERIAL	N/A	Heavily vegitated
1		TD - Ø.5 TF - Trap Field SK - Skeet field SF - Std fallow zone MF - Max fallow zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SK SF, heavily vegitative, along border

GEOLOGIST SIGNATURE/DATE: [signature] 6/9/16	QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-058
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR SKAP
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.9.16 COMPLETED: 1135
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

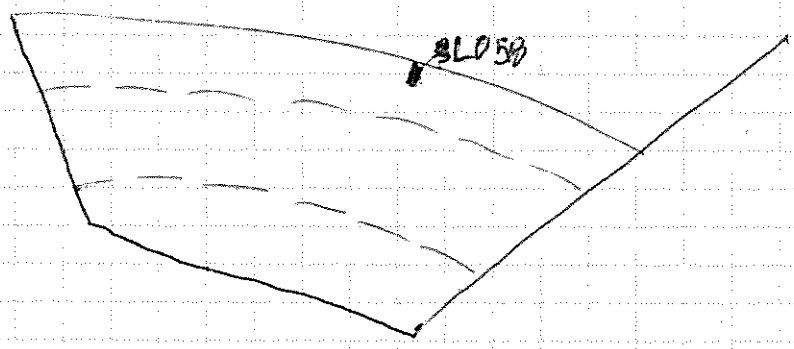
Sample ID: ECCLSL0058 | Sample Date / Time: 6.9.16 1135 | Sample Depth: 0.-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FA, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, dark brown 10YR (2/2) moist, very soft, low plasticity, organic material	NA	heavy vegetated area
1		TD = 0.5 SK - sheet field AP - also part of site fallout area		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: SKAP, heavily vegetated area

GEOLOGIST SIGNATURE/DATE: [signature] 6.9.16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-Ø59
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1250
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	Ø.5
DEPTH TO WATER	N/A

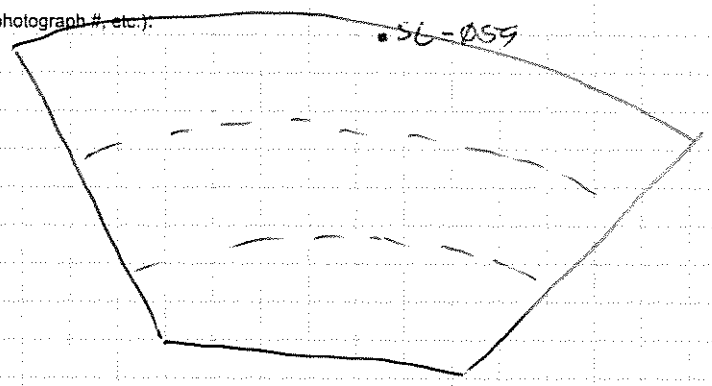
Sample ID: ECCLSLØØ59 | Sample Date / Time: 6/9/16 1250 | Sample Depth: Ø-Ø.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: N/A | PID SERIAL#: N/A | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, DARK BROWN 10YR 3/3, SOFT, DAMP, NON PLASTIC, ROOTS	N/A	Highly Vegitated
1		TF - Trap field SK - Skeet field SF - Std fallow zone MF - Max fallow zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: SKSF, highly vegitated

GEOLOGIST SIGNATURE/DATE: [signature] 6/9/16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-0060
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFAP SKAP
NAME OF DRILLER	MR
DRILL DATE/TIME	STARTED: 6-9-16 COMPLETED: 1330
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

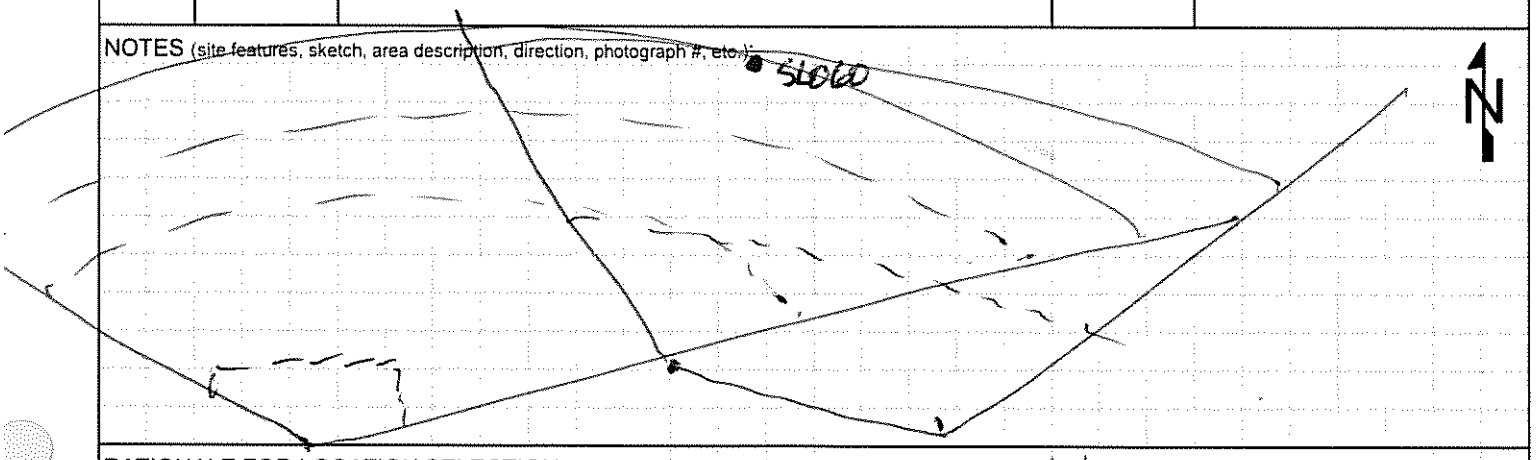
Sample ID: ECCLSL0060	Sample Date / Time: 6-9-16 1330	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, with sand, dark brown (10YR 2/2), moist, very soft, low plasticity, organic material	NA	vegetated area
1		TD - 0.5 TF - target field SK - skeet Field AP - also part of std fallout zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFAP SKAP, vegetated area

GEOLOGIST SIGNATURE/DATE: [signature] 6-9-16	QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-Ø61
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFAP SKAP
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1340
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand ~~Auger~~ Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	Ø.5
DEPTH TO WATER	N/A

Sample ID: ECCLSØØ61	Sample Date / Time: 6/9/16 1340	Sample Depth: Ø-Ø.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

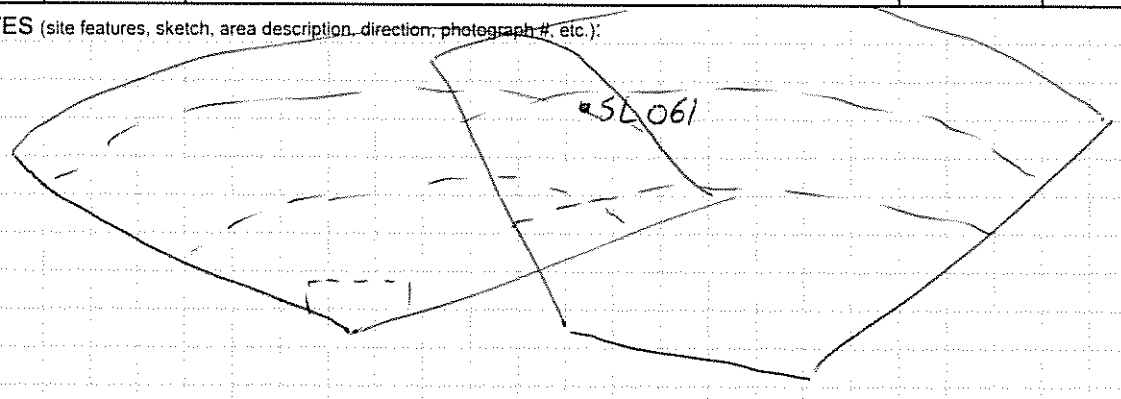
PID MAKE/MODEL: NA

PID SERIAL#: NA

Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	~~MR 6/9/16~~ CLAY ~~AND~~ AND SILT, DARK BROWN 10YR 3/3, SOFT, DAMP, NON-PLASTIC, ROOTS AND ORGANIC MATTER	N/A	Low vegetation
1		TD - Ø.5 TF - Target field SK - Skeet field AP - Std fallow zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: TFAP SKAP, low vegetation

GEOLOGIST SIGNATURE/DATE	Michael Reilly 6/9/16
QA/QC SIGNATURE/DATE	L. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-Ø62
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFAP SKAP
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1405
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	Ø.5
DEPTH TO WATER	NA

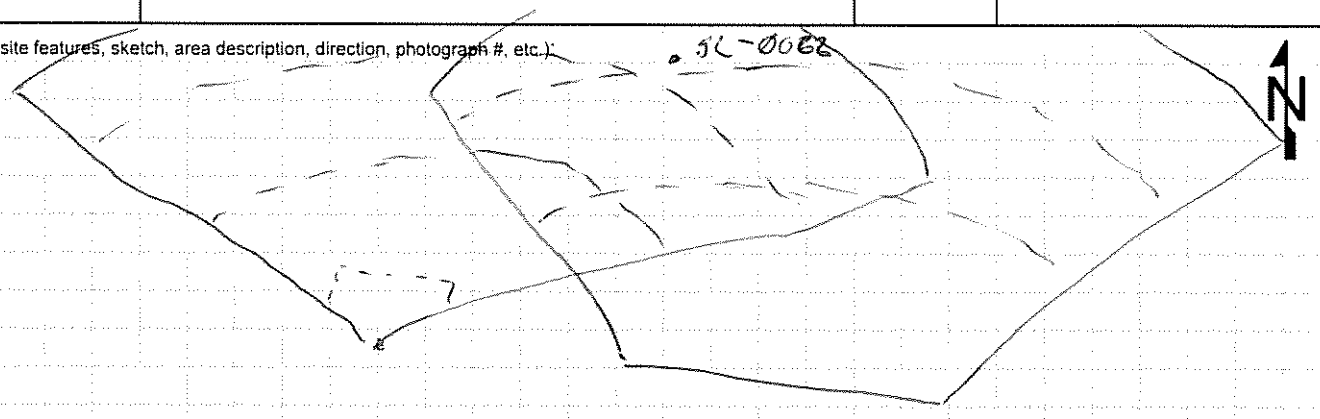
Sample ID: ECCLSLØØ62	Sample Date / Time: 6/9/16 1405	Sample Depth: Ø-Ø.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 10YR 3/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT AND CLAY, VERY DARK GRAYISH BROWN (10YR 3/2), SOFT, DAMP, NON-PLASTIC, ROOTS	NA	Vegetation
1		TD - Ø.5 TF - Trap field SK - Skeet field MF - Max Fallow zone AP - Standard Fall out zone (Also part)		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFAP SKAP, vegetation

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6/9/16	R. Moer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-063
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	PL
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1425
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

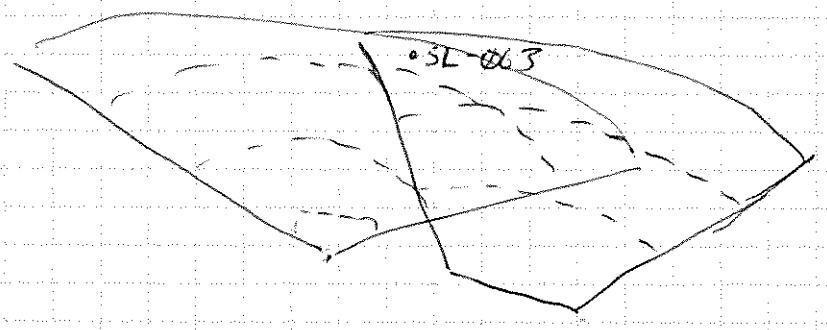
Sample ID: ECCLSL0063	Sample Date / Time: 6/9/16 1425	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT AND CLAY, VERY DARK BROWN, (10YR 2/2), SOFT, DAMP, NON-PLASTIC ROOTS	NA	Heavily vegitated
1		TD - 0.5 Sk - Skeet Field (Also ART) AP - Standard Fallout zone TF - Trap Range		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKAP SF, TRAP, heavily vegetative

GEOLOGIST SIGNATURE/DATE	Mike Rilly 6/9/16
QA/QC SIGNATURE/DATE	2. Mayer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-064
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL - FR - SKAP - TFAP
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-9-16 COMPLETED: 1435
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	~~NA~~ 0.5
DEPTH TO WATER	NA

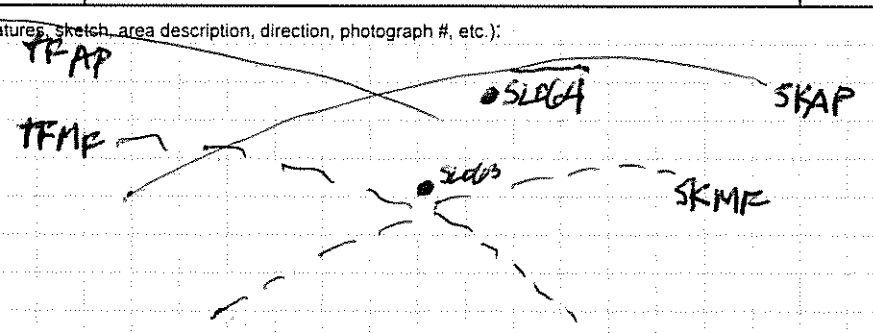
Sample ID: ECCLSL0064 ECCLSL 9008 | Sample Date / Time: 6-9-16 1435 | Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt with sand, dark brown (10YR 2/2), moist, very soft, low plasticity, organic	N/A	Field duplicate ECCLSL 9008
1		TD = 0.5'		
		TF - target field		
		SK - skeet field		
		AP - also part of standard shot fallout		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKAP TFAP, Brush / Tall grass

GEOLOGIST SIGNATURE/DATE: Paul Franklin 6-9-16

QA/QC SIGNATURE/DATE: L. Mager 6-29-16

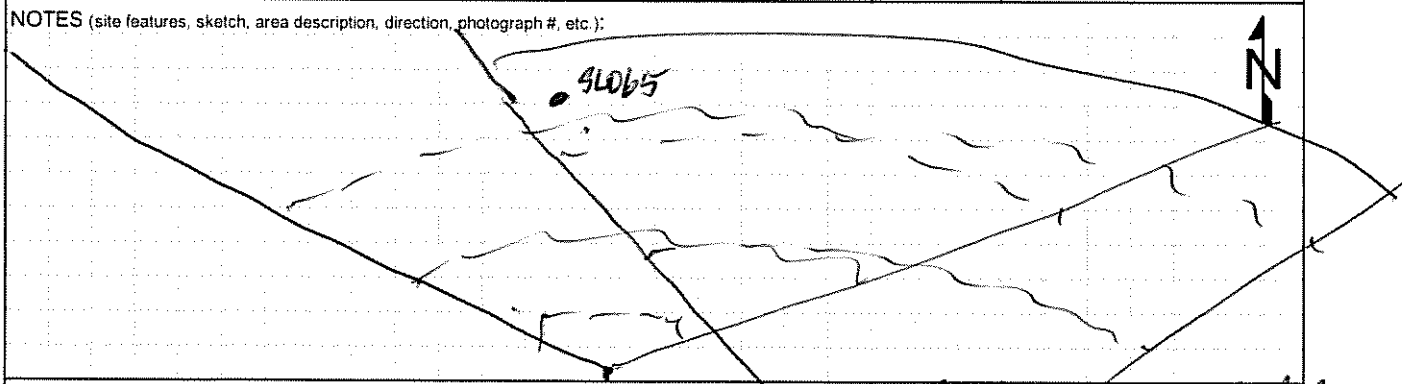
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL - SL - 065
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TFMP SKAP
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-13-16 COMPLETED: 0820
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA
Sample ID:	ECCL SL0065
Sample Date / Time:	6-13-16 0820
Sample Depth:	0-0.5'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
0	OL	CLAY and silt, very dark brown (10YR 2/2) firm, non-plastic, organic material, roots	NA	grassy area
0.5		TD = 0.5'		
1				
1.5		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field also part of std fallout; skeet field also part of std fallout

GEOLOGIST SIGNATURE/DATE	Paul Landon 6-13-16
QA/QC SIGNATURE/DATE	L. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-066
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TFMF SKAP
NAME OF DRILLER	JTR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 0830
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

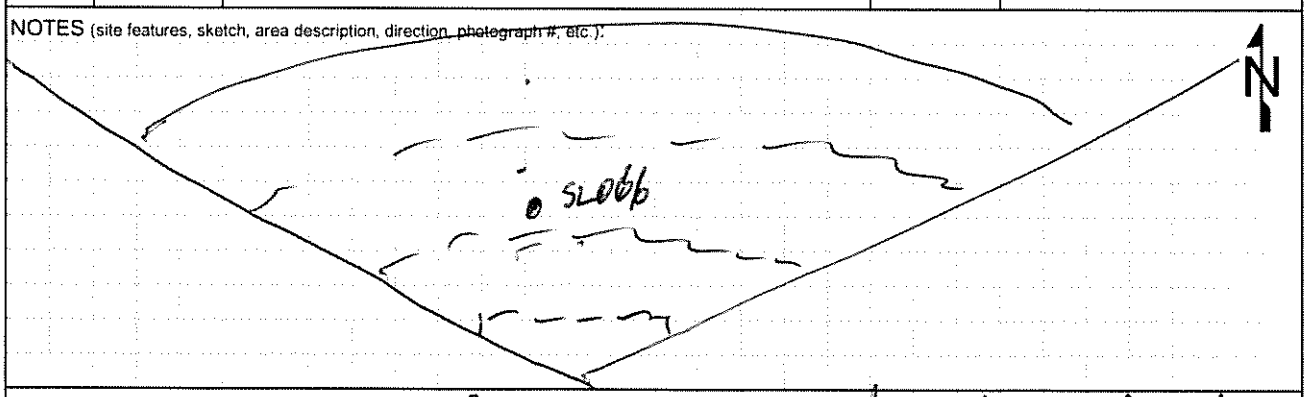
Sample ID: ECCL 0066	Sample Date / Time: 6.13.16 0830	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL #: NA | Colors from Munsell Soil Color Chart, Rev. 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
0.5	CL	CLAY and silt, very soft, moist, dark yellowish brown (10YR 3/4), organic material, roots	NA	sketch/tray wooded area
1		TD=0.5'		
1.5		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Target field max fallout zone, sketch field also part of stp fallout zone

GEOLOGIST SIGNATURE/DATE	Tod Lewandowski 6.13.16
QA/QC SIGNATURE/DATE	D. Moyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-067
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TFMF SKAP
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 0840
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger (circled), Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-0.5
DEPTH TO WATER	NA

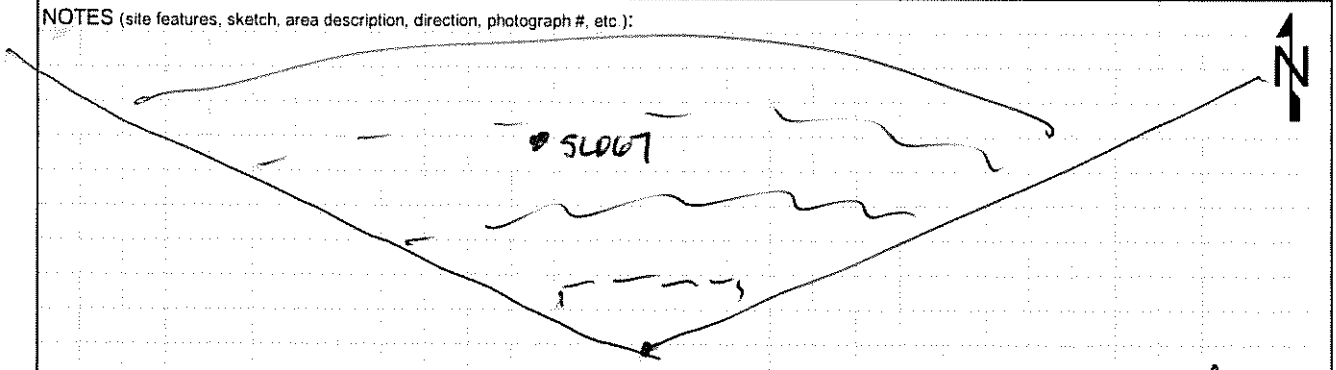
Sample ID: ECCLSL0067	Sample Date / Time: 6.13.16 0840	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs (circled), PCBs, Herbicides, Pesticides, Explosives, Metals FR (circled), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL #: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
0	CL	CLAY and silt, dry, firm, dark brown (10YR 3/3), organic material, roots	NA	trap/skeet area in the woods
0.5		TD=0.5		
1				
1.5		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: target field max fallout zone; skeet field also part of site fallout zone

GEOLOGIST SIGNATURE/DATE	Paul Goodman 6.13.16
QA/QC SIGNATURE/DATE	L. Maor 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-068
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.8.16 COMPLETED: 1715
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

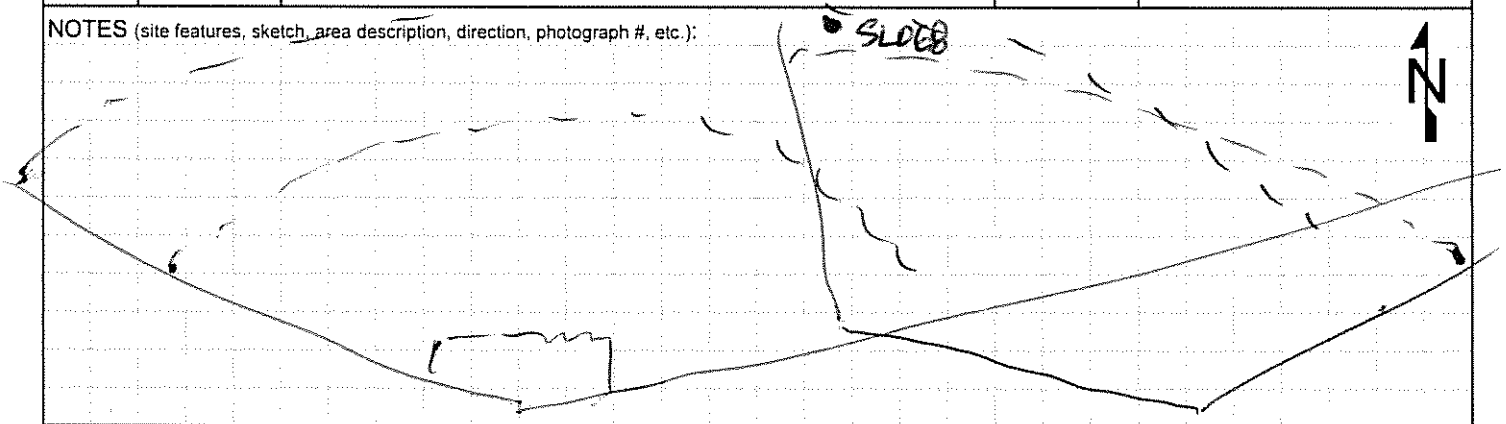
Sample ID: ECCLSL068	Sample Date / Time: 6.8.16 1715	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals Fe, Asbestos, Lead Paint

PID MAKE/MODEL	PID SERIAL#:	Colors from Munsell Soil Color Chart, Rev
NA	NA	10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown (10YR 3/3), moist, very soft, low plasticity, organic material	NA	highly vegetated
1		TD - 0.5 TF - trap field SK - skeet field MF - max fallout zone		collected MS/MSD
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, high vegetation

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-8-16	L. Moyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-069
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	~~LMR~~ JR
DRILL DATE/TIME	STARTED: 6.8.16 COMPLETED: 1725
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

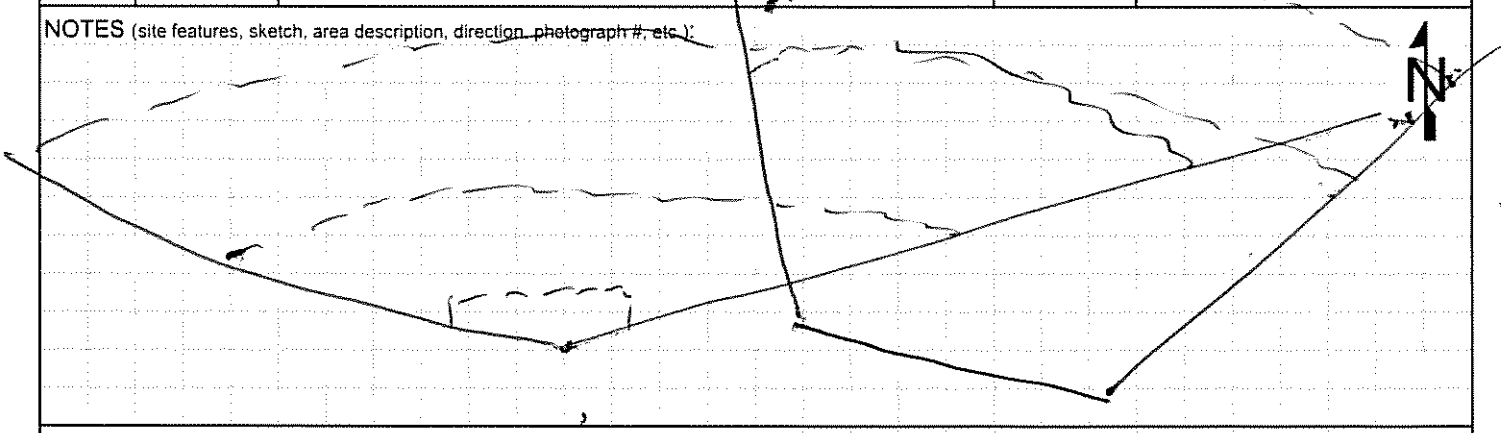
Sample ID: ECCLSL069 ECCLSL9006 | Sample Date / Time: 6.8.16 1725 | Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown (10YR 3/3), moist, very soft, low plasticity, organic material	NA	collect field duplicate. ECCLSL9006
1		TD = 0.5 TF - trap field SK - skeet field SF - std fallout zone MF - max fallout zone		
2		Boring terminated and ~~backfilled~~ with bentonite chips.		

NOTES (site features, sketch, area description, direction, ~~photograph #, etc.~~):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, Brush field

GEOLOGIST SIGNATURE/DATE: [signature] 6-8-16

QA/QC SIGNATURE/DATE: Z. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-070
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 0755
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

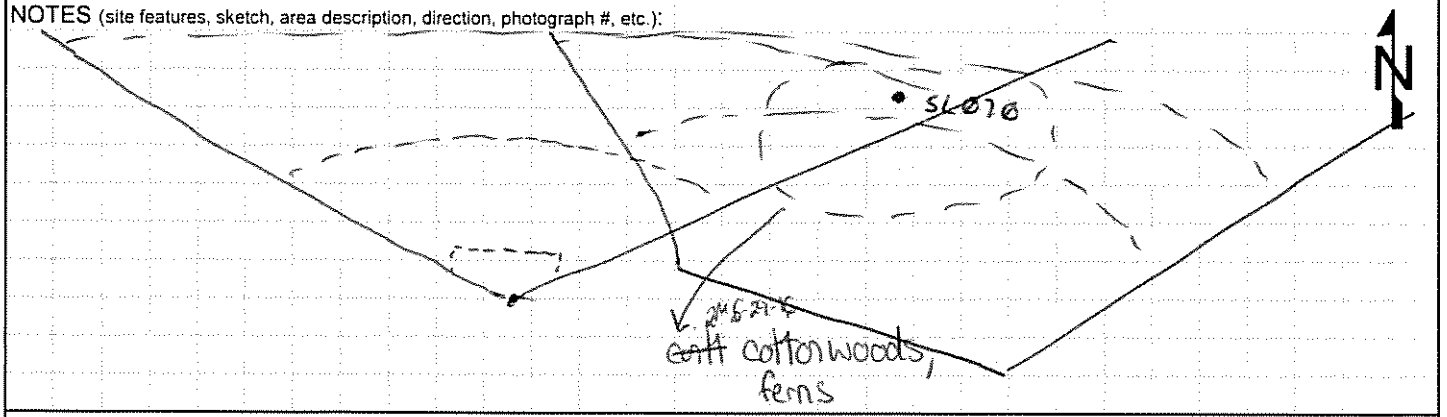
Sample ID: ECCL SL0070	Sample Date / Time: 6/9/16 0755	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT W/ SOME ROOTS AND ORGANIC MATERIAL, FINE, VERY DARK BROWN (10YR 2/2), VERY SOFT, DAMP, LOW PLASTIC	N/A	heavily vegetated
1		TD = 0.5 TF - Trap field SK - Skeet field SF - Std fallout zone MF - max fallout zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, highly vegetative

GEOLOGIST SIGNATURE/DATE	Michael Reilly 6/9/16
QA/QC SIGNATURE/DATE	A. Major 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-071
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-7-16 COMPLETED: 1450
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

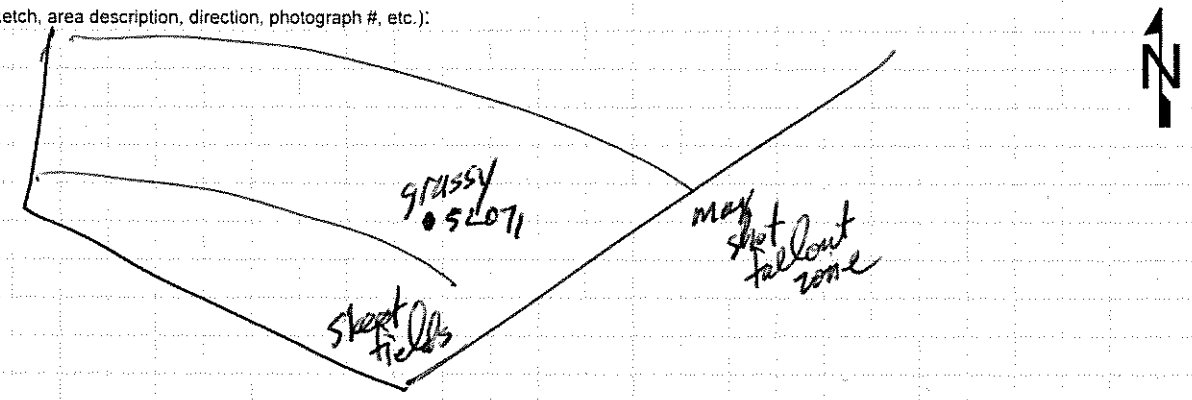
Sample ID: ECCLSL0071 | Sample Date / Time: 6-7-16 1450 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
		Dark brown clay with silt and sand, moist, soft, low plasticity	NA	
		TD - 0.5		
1				
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Shot Field Fallout zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-7-16

QA/QC SIGNATURE/DATE: [signature] 6-10-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-Ø72
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1520
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	Ø.5
DEPTH TO WATER	NA

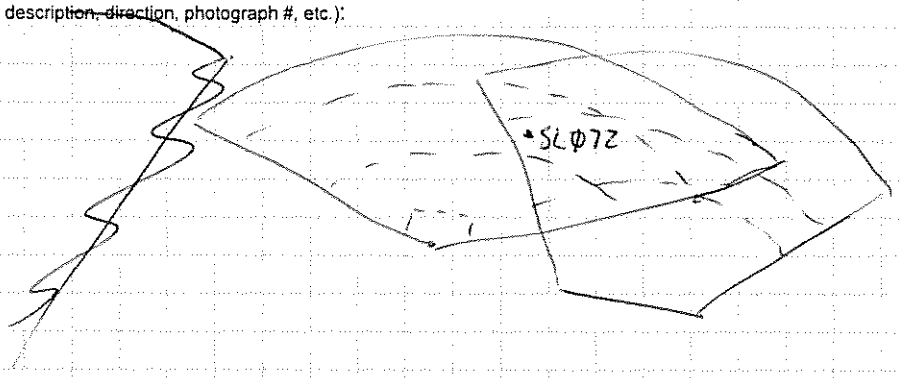
Sample ID: ECCLSLØØ72 | Sample Date / Time: 6/9/16 1520 | Sample Depth: Ø–Ø.5

CHEMICAL ANALYSES (circle): VOC, (SVOCs), PCBs, Herbicides, Pesticides, Explosives, (Metals FR), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev: 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY AND SILT, VERY DARK BROWN (10YR 3/3), SOFT, DAMP, NON PLASTIC, ROOTS	NA	Highly vegetated
1		TD – Ø.5 TF – Trap field SK – Skeet field ST – Std shot zone MF = MAX shot zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFAP SKAP, high vegetation

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6/9/16	[signature] 6-29-16

leidos	CLIENT: NASA	LOCATION NUMBER/STATION ID: ECCL-SL-073
BORING LOG	LOCATION: NASA Plum Brook Station Sandusky, Ohio	SHEET 1 OF 1

PROJECT: Multi-site Site Characterization (**ECCL FR**)	BOREHOLE SITE: ECCL-FR TFMF SKMF
NAME OF DRILLER: JR	DRILL DATE/TIME: STARTED: 6/9/16 COMPLETED: 0850
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle): 3" Hand Auger, Scoop/Spoon	TOTAL DEPTH OF BOREHOLE: 0.5
	DEPTH TO WATER: N/A

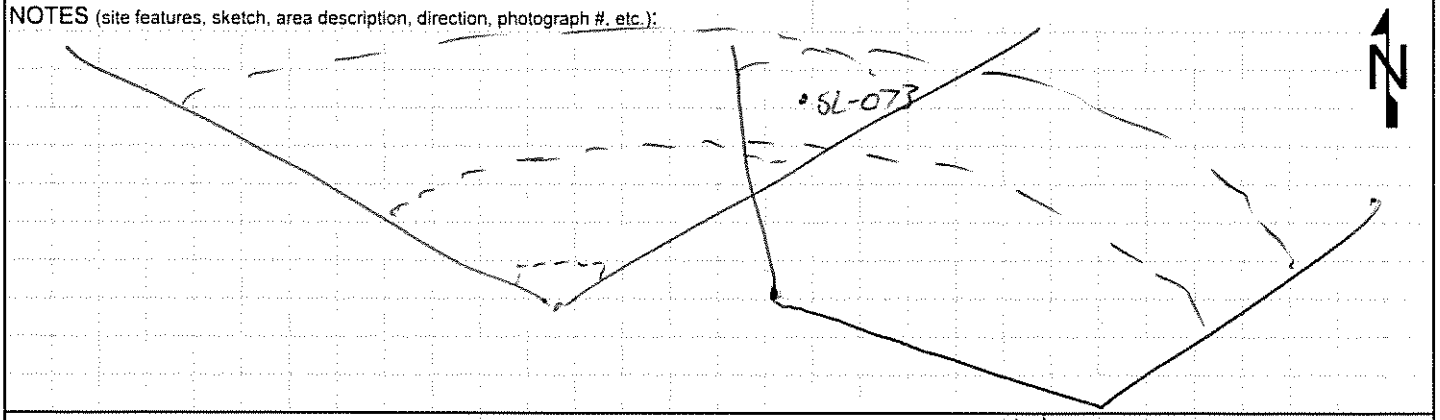
Sample ID: ECCLSL0073	Sample Date / Time: 6/9/16 0850	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: N/A	PID SERIAL#: N/A	Colors from Munsell Soil Color Chart, Rev: 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY w/ SOME SILT, DARK BROWN (10YR3/3) VERY SOFT, DAMP, LOW PLASTIC, ROOTS AND ORGANIC MATTER	N/A	Vegetated area
1		TD - 0.5 TF - Trap field SK - Skeet field SF - Std fallow zone MF - Max fallow zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, vegetative area

GEOLOGIST SIGNATURE/DATE: [signature] 6/9/16	QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos	CLIENT: NASA	LOCATION NUMBER/STATION ID: ECCL-SL-074
BORING LOG	LOCATION: NASA Plum Brook Station Sandusky, Ohio	SHEET 1 OF 1

PROJECT: Multi-site Site Characterization (**ECCL FR**)	BOREHOLE SITE: ECCL FR TFMF SKMF
NAME OF DRILLER: JR	DRILL DATE/TIME: STARTED: 6/9/16 COMPLETED: 0810
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle): 3" Hand Auger, Scoop/Spoon	TOTAL DEPTH OF BOREHOLE: 0.5
	DEPTH TO WATER: N/A

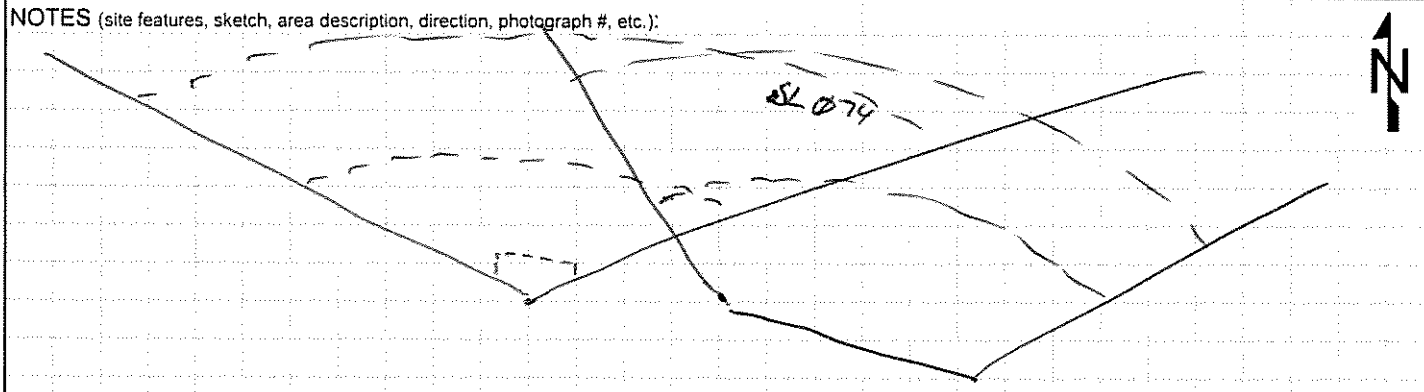
Sample ID: ECCLSL0074	Sample Date / Time: 6/9/16 0810	Sample Depth: 0-0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals Fe, Asbestos, Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT WITH SOME SAND, FINE, VERY DARK BROWN (10YR 2/2), VERY SOFT, DAMP, LOW PLASTIC, ROOTS AND ORGANIC MATERIAL	N/A	Highly Vegitated
1		TD - 0.5 TF - Trap field SK - Skeet field SF - Std fallow zone MF - max fallow zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, highly vegitated

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6/9/16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-075
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 0800
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

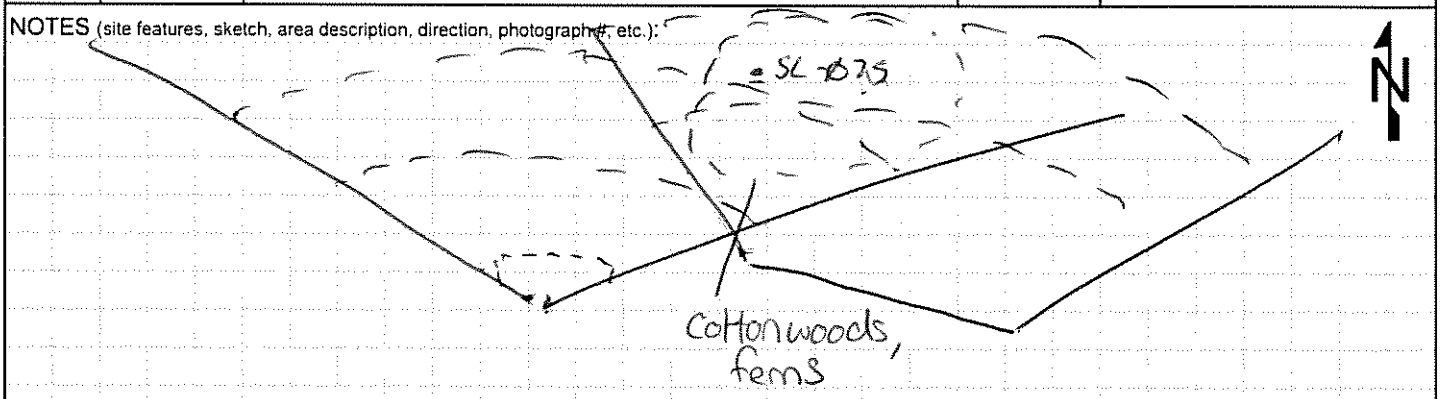
Sample ID: ECCLSL0075	Sample Date / Time: 6/9/16 0800	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle) VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 10YR3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT, FINE, (10YR3/3) DARK BROWN, VERY SOFT, DAMP, LOW PLASTIC, ROOTS AND ORGANIC MATERIAL	N/A	Heavily vegitated
1		TD = 0.5 TF - TRAP Field SK - Skeet Field SF - Std Fallow Zone MF - Max Fallow Zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph#, etc.):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, heavily vegetated,

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6/9/16	R. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL - SL - Ø76
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: Ø900
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger (circled), Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	Ø.5
DEPTH TO WATER	N/A

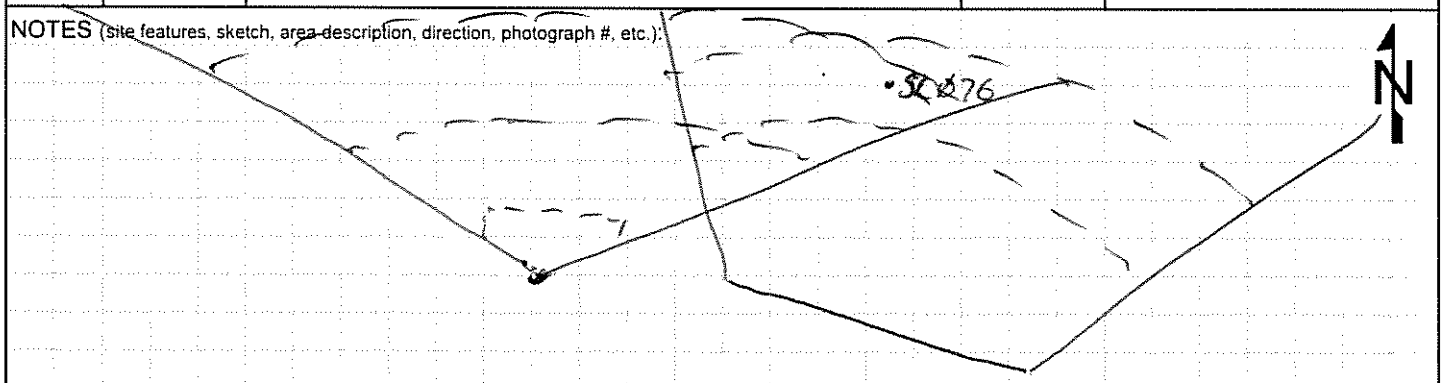
Sample ID: ECCLSLØØ76	Sample Date / Time: 6/9/16 Ø9ØØ	Sample Depth: Ø - Ø.5

CHEMICAL ANALYSES (circle): VOC, SVOCs (circled), PCBs, Herbicides, Pesticides, Explosives, Metals FR (circled), Asbestos, Lead Paint

PID MAKE/MODEL: N/A PID SERIAL#: N/A Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT W/ SOME CLAY, VERY DARK BROWN (10YR 2/2) SOFT, DAMP, LOW PLASTIC, ROOTS AND ORGANIC MATTER	N/A	Highly vegetated, Depression
1		TD - Ø.5 TF - Trap field SK - Skeet field SF - Std fallow zone MF - Max fallow zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, depression, highly vegetated

GEOLOGIST SIGNATURE/DATE	Mind Bailey 6/9/16
QA/QC SIGNATURE/DATE	L. Moser 6-29-16

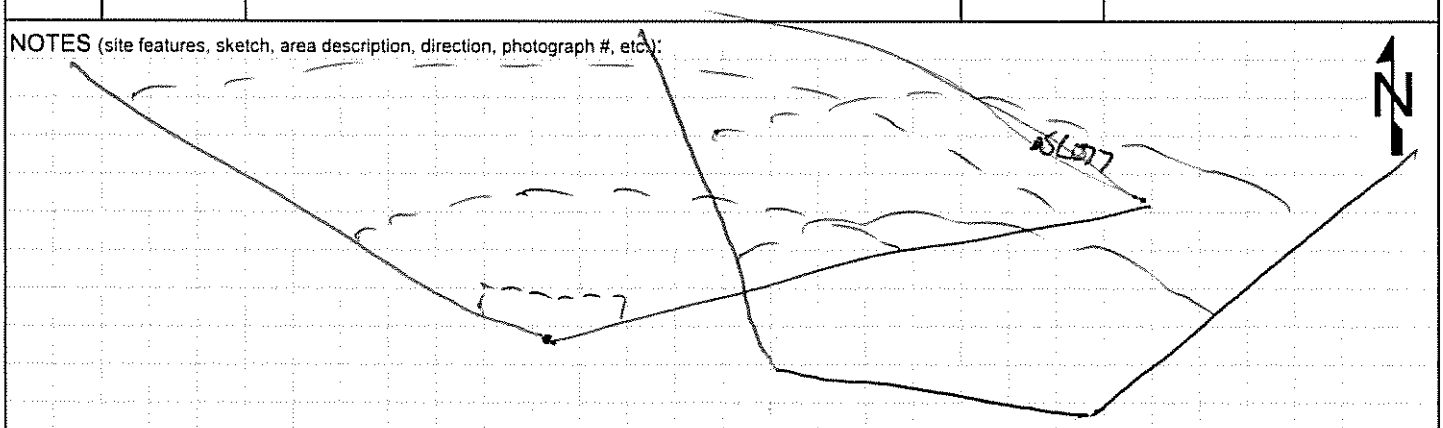
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-~~0077~~ 077 ~~MP 6/9/16~~
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1015
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A
Sample ID:	ECCLSL~~00~~77 MS/MSD
Sample Date / Time:	6/9/16 1015
Sample Depth:	0 - 0.5
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	N/A
PID SERIAL#:	N/A
Colors from Munsell Soil Color Chart, Rev	10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY W/ SOME SILT, ~~TOR~~ ~~MP 6/9/16~~ BLACK (10YR 2/1), SOFT, DAMP, LOW PLASTIC, ROOTS	N/A	LOW VEGETATION Ferns
1		TD - 0.5 TF - Trap field SK - Skeet field SF - Std fallow zone MF - Max fallow zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, low vegetation, ferns

GEOLOGIST SIGNATURE/DATE	Michael Phillips 6/9/16
QA/QC SIGNATURE/DATE	A. Moor 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-078
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL SK MF
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.9.16 COMPLETED: 1000
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

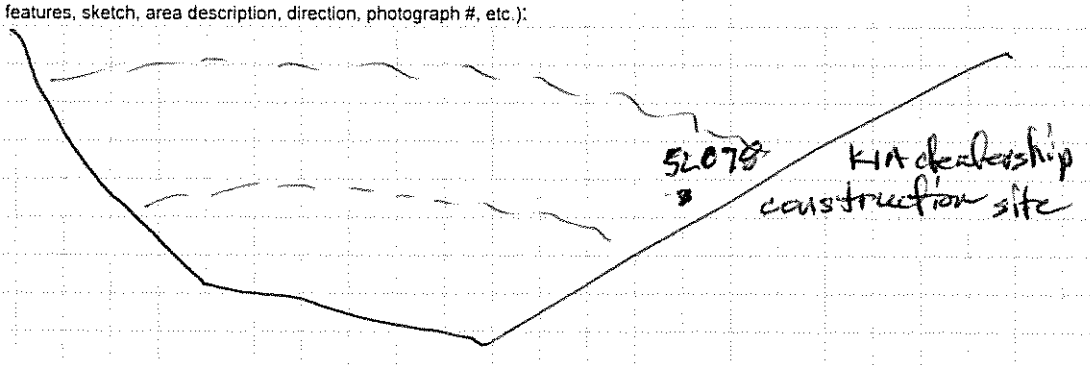
Sample ID: ECCLSL0078	Sample Date / Time: 6.9.16 1000	Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev. 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown, 10YR (2/2), moist, very soft, low plasticity, organic material	NA	moved near silt fence bordering const. site, sparse vegetation
1		TD = 0.5 SK - skeet field MF - max fallout zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKMF, sparse vegetation

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6.9.16	R. Moyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-079
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR SKMF
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.9.16 COMPLETED: 0945
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	NA

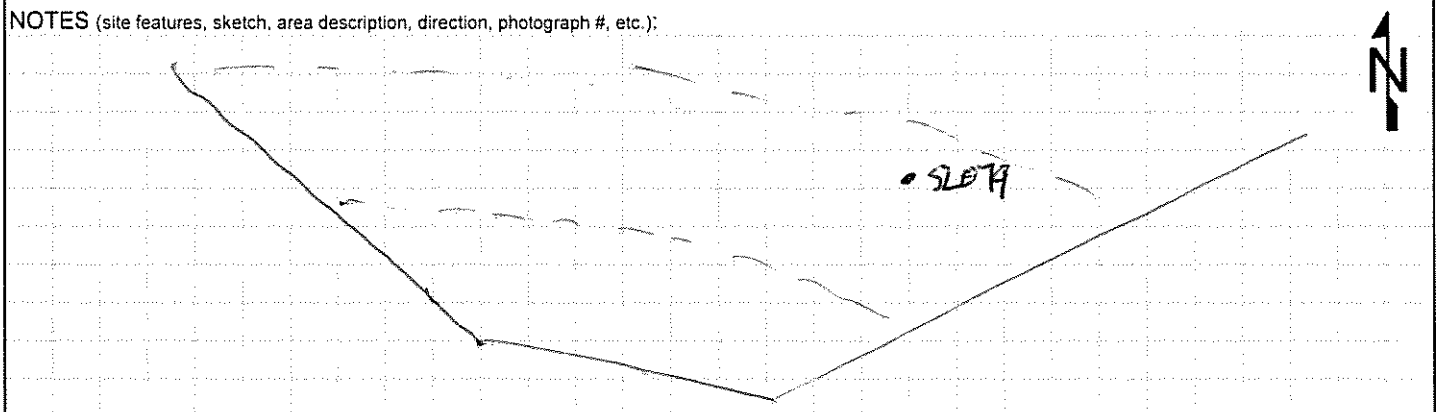
Sample ID: ECCLSL0079 ECCLSL9007 | Sample Date / Time: 6.9.16 0945 | Sample Depth: 0.5

CHEMICAL ANALYSES (circle): VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, and silt, some sand, dark brown 10YR(2/2), moist, very soft, low plasticity, organic material	NA	highly vegetated area collect field dupe ECCLSL9007
1		TD=0.5 SK - skeet field MF - max fallout zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SKMF, highly vegitative

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-9-16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-080
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1140
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A

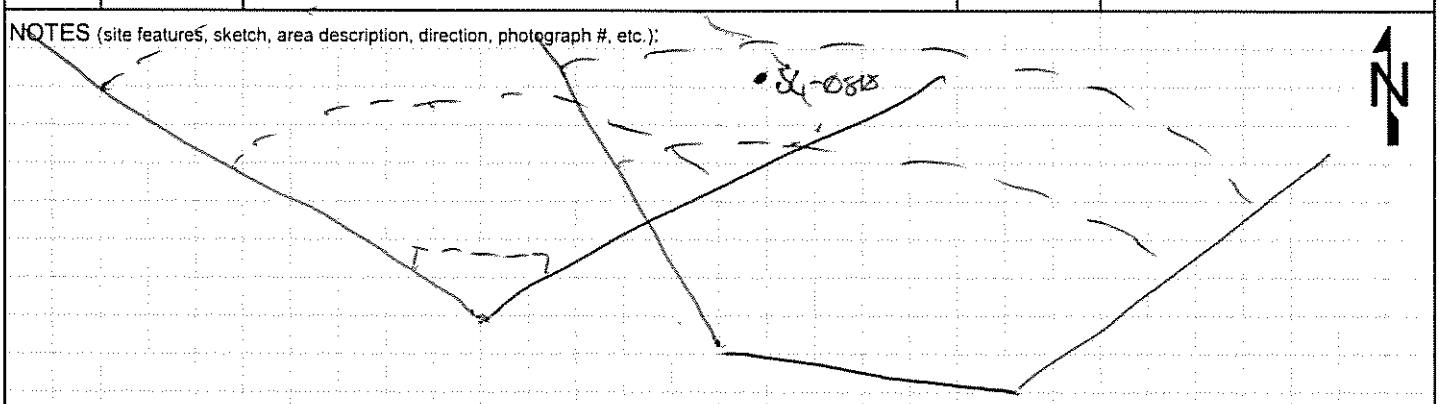
Sample ID: ECCLSL0080	Sample Date / Time: 6/9/16 1140	Sample Depth: 0 - 0.5

CHEMICAL ANALYSES (circle) VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: N/A	PID SERIAL#: N/A	Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY W/ SOME SILT, VERY DARK BROWN, SOFT, DAMP, LOW PLASTIC, ROOTS; (10YR 2/2)	N/A	Vegetated area
1		TF - Trap Field SK - Skeet Field ST - Std Fallow zone MF - Max Fallow zone		
2		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TF MF SK MF, vegetative area

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
Mike Kelly 6/9/16	L. Meyer 6-29-16

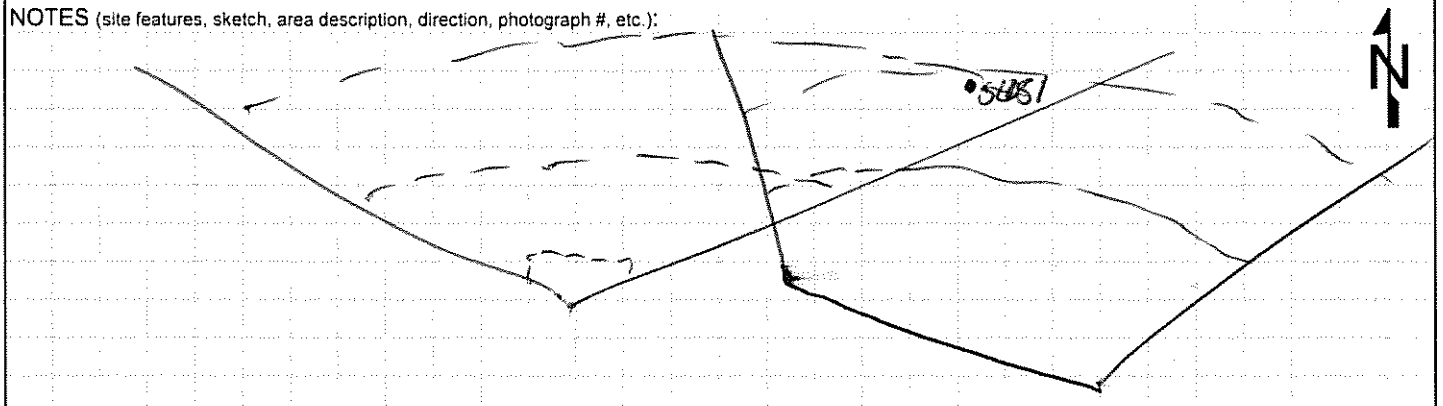
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-081
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR TFMF SKMF
NAME OF DRILLER	~~JR~~ MR 6/9/16 LMM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 0820
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0.5
DEPTH TO WATER	N/A
Sample ID:	ECCLSL0081
Sample Date / Time:	6/9/16 0820
Sample Depth:	0 - 0.5
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	N/A
PID SERIAL#:	N/A
Colors from Munsell Soil Color Chart, Rev	10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT, FINE, DARK BROWN DIRT (10YR 3/3), VERY SOFT, DAMP, LOW PLASTIC. ROOTS AND ORGANIC MATTER.	N/A	Highly Vegitative
1		TD - 0.5 TF - Trap field SK - Skeet field SF - ST fallout zone MF - max fallout zone		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: TFMF, SKMF, highly vegitative

GEOLOGIST SIGNATURE/DATE	6/9/16
QA/QC SIGNATURE/DATE	R. Moyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-082
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL RR south discharge area
NAME OF DRILLER	PL / JP
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1040
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

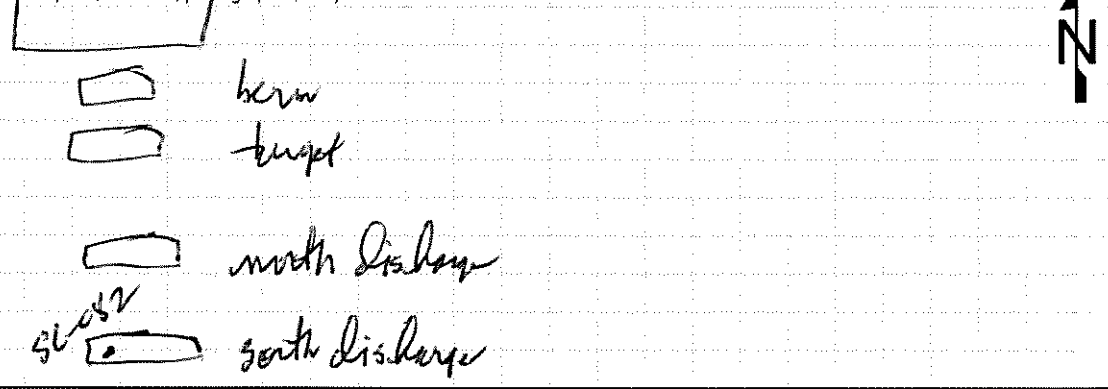
Sample ID: ECCLSL0082	Sample Date / Time: 6-14-16 1040	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY fill with silt and shale frag to 1", dark yellowish brown (10YR 3/4), soft (soil) to very hard (shale), dry.	NA	Sparse veg shale frag on surface
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range south discharge zone, sparse vegetation

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-14-16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-083
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL RR south discharge zone
NAME OF DRILLER	PL/JL
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 1050
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

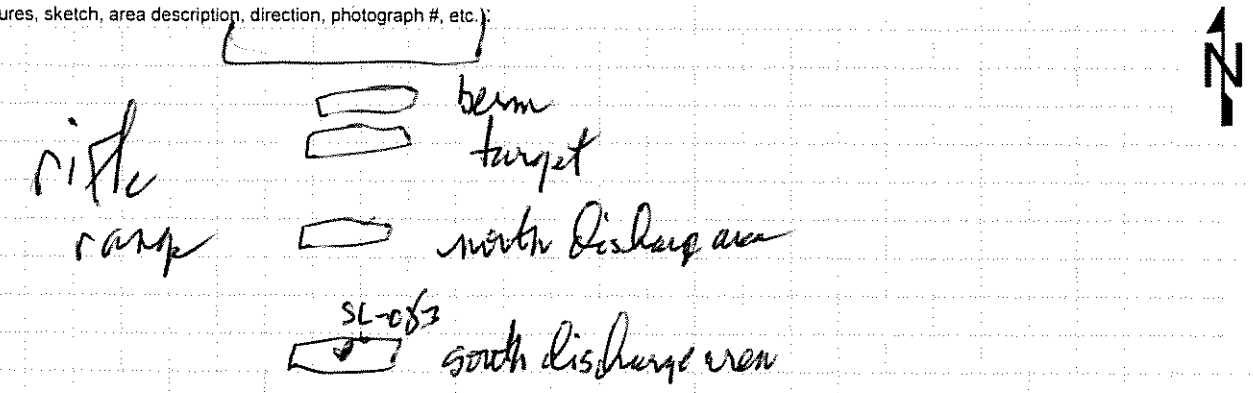
Sample ID: ECCLSL0083 | Sample Date / Time: 6/14/16 1050 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY fill with silt and shale frag to 1", dark yellowish brown (10YR 3/4), soft (soil) to very hard (shale), dry	NA	sparse veg shale frag on surface
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range south discharge area, sparse vegetation

GEOLOGIST SIGNATURE/DATE: [signature] 6.14.16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-084
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL 2A south Discharge area
NAME OF DRILLER	PL/JK
DRILL DATE/TIME STARTED:	6-14-16
COMPLETED:	1100
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

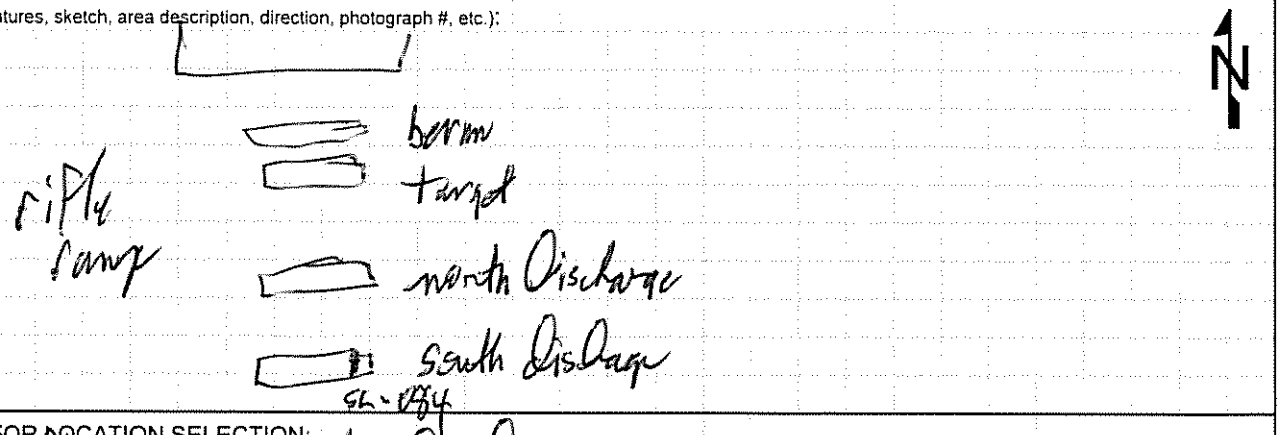
Sample ID: ECCLSL0084	Sample Date / Time: 6.14.16 1100	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals TR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fill with silt and shale frag to 1", dark yellowish brown (10YR 3/4), soft (soil) to very hard (shale)	NA	sparse veg shale frag on surface
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: riffle ramp south Discharge area, sparse vegetation

GEOLOGIST SIGNATURE/DATE	Paul Lindemann 6-14-16
QA/QC SIGNATURE/DATE	J. Mayer 6.29.16

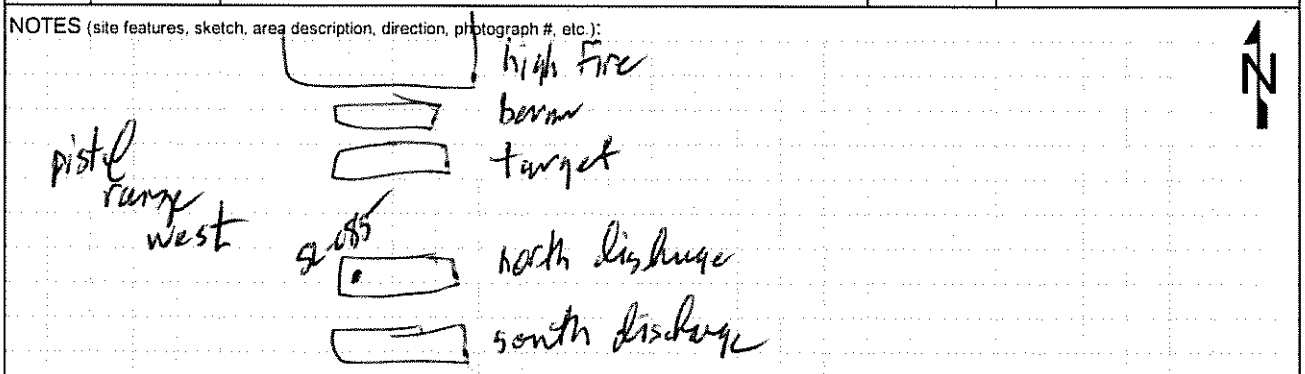
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-085
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW north discharge area
NAME OF DRILLER	LM/JR
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 0910
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0085
Sample Date / Time:	6.14.16 0910
Sample Depth:	0-1'
CHEMICAL ANALYSES (circle)	VOC; SVOCs; PCBs; Herbicides; Pesticides; Explosives; Metals FA; Asbestos; Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY with silt and shale frag to 4", dark yellowish brown (10YR 3/4), moist, soft, organic material with roots	NA	spotty vegetation shale frag on surface
2				
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west north discharge area

GEOLOGIST SIGNATURE/DATE	L. [illegible] 6.14.16
QA/QC SIGNATURE/DATE	A. Meyer 6.29.16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-086
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRW north discharge area
NAME OF DRILLER	LM / JR
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 0920
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

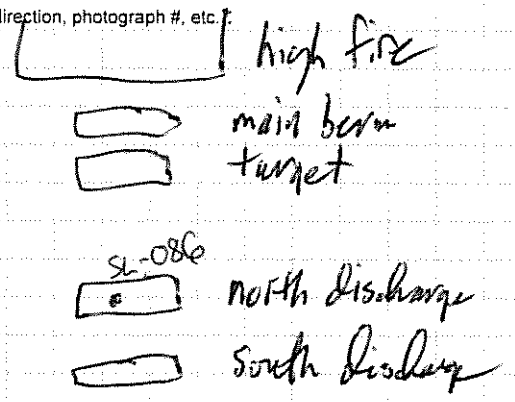
Sample ID: ECCLSL0086	Sample Date / Time: 6.14.16 0920	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, with silt and shale frag to ~1", dark yellowish brown (10YR 3/4), moist, soft, organic material, with roots	NA	spotty veg. shale frag on surface
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.)



N

RATIONALE FOR LOCATION SELECTION: Pistol range west north discharge area, spotty vegetation

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-14-16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-087
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRW north discharge area
NAME OF DRILLER	LM/JR
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 0930
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

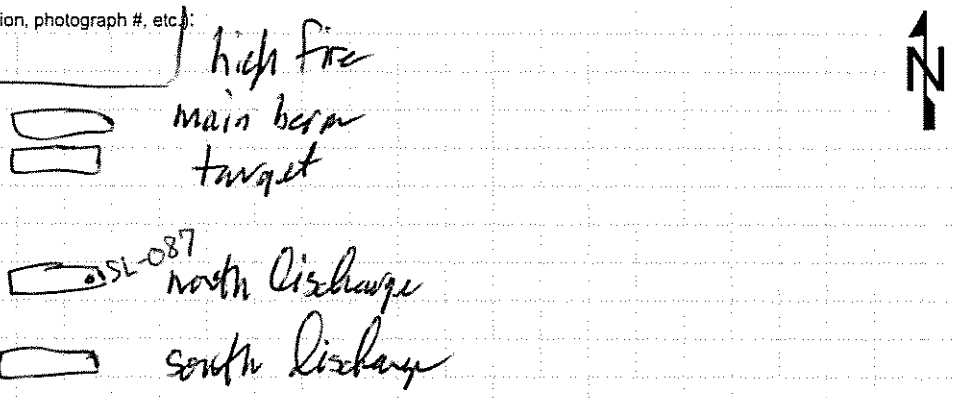
Sample ID: ECCLSL0087 ECCLSL9012 | Sample Date / Time: 6.14.16 0930 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, with silt and shale frag to ~1", dark yellowish brown (10YR 3/4), moist, soft organic material w/ roots	NA	spotty veg. shale frag on surface
2		TD=1'		collect field duplicate ECCLSL9012
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west north discharge area, spotty vegetation

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: J. Moyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-088
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR TARGET west side
NAME OF DRILLER	JR/CM
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1615
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

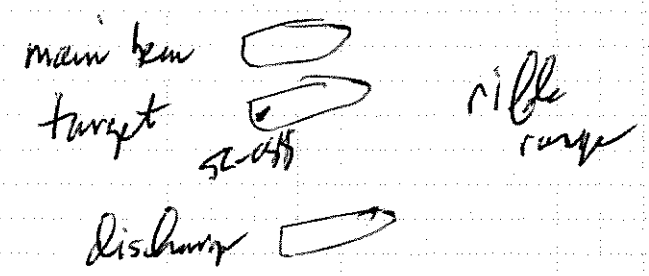
Sample ID: ECCLSL0088 | Sample Date / Time: 6.13.16 1615 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, AND SILT WITH shale pieces to 2", dry, dark brown (10YR 3/3), non-plastic, organics @ top of interval	NA	
2		TD = 1'		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: rifle range, target, west side

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: A. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-0089
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR Target center
NAME OF DRILLER	R. Long
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1600
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

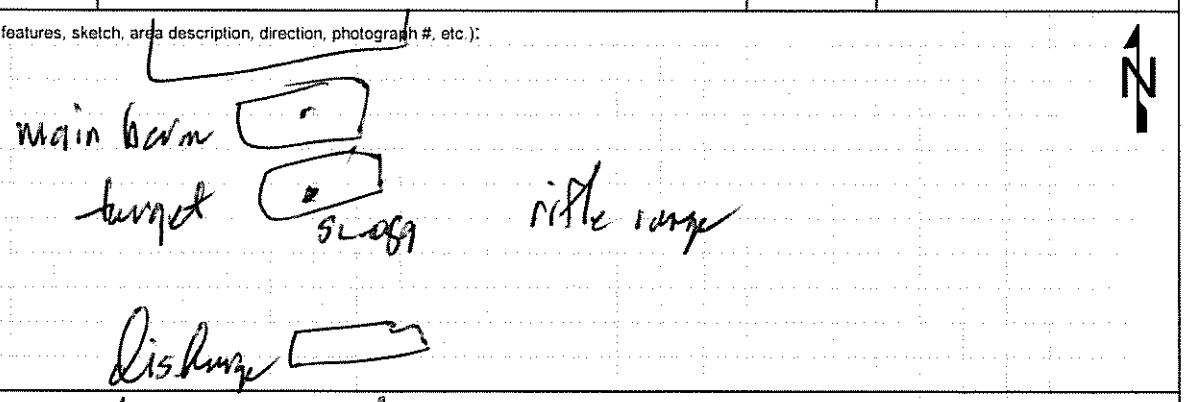
Sample ID: ECCLSL0089 ECCLSL9010 | Sample Date / Time: 6.13.16 1600 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, and silt, with shale pieces to 2", dry, soft (soil), very hard (shale), non plastic organics top inferred dark brown (10YR 3/3)	NA	collect field duplicate ECCLSL9010
2				
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range, target area center

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: R. Meyer 6-29-16

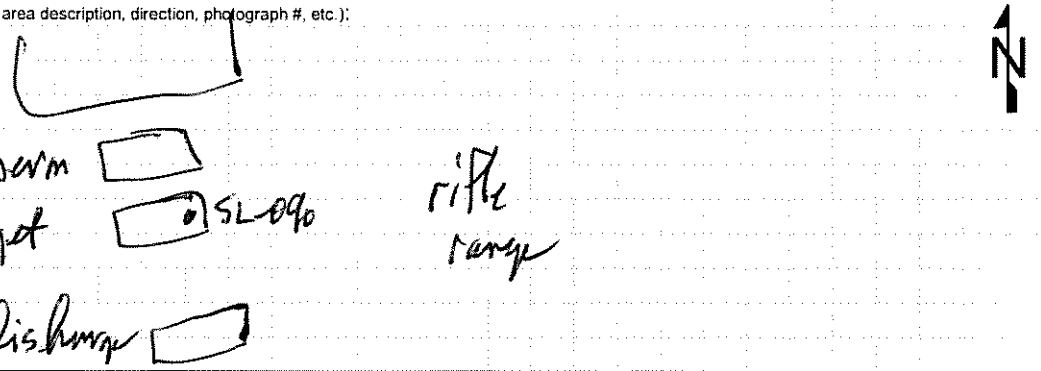
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-090
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR Target Range tie
NAME OF DRILLER	RC/LG
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1545
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0090
Sample Date / Time:	6.13.16 1545
Sample Depth:	0-1'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FM Asbestos Lead Paint
PID MAKE/MODEL	NA
PID SERIAL/#	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, dark brown; (10YR 3/3), dry, non-plastic organic material, stable pieces to 2"	NA	
2		TD=1'		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range, target, railroad tie

GEOLOGIST SIGNATURE/DATE	[signature] 6-13-16
QA/QC SIGNATURE/DATE	D. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-091
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR West side top
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1525
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

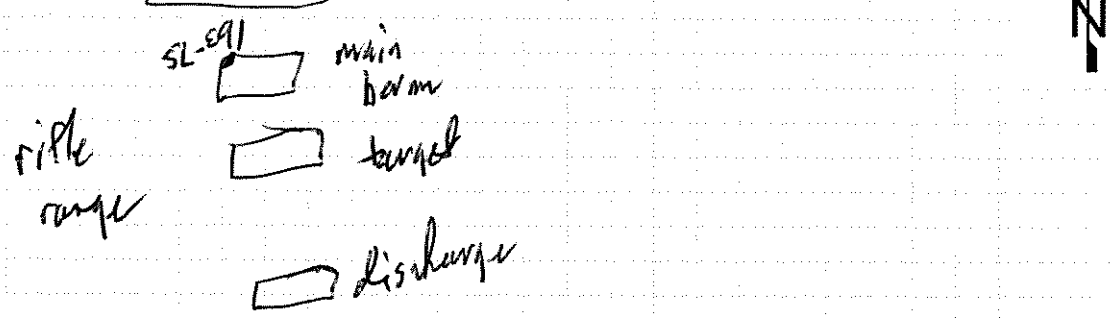
Sample ID: ECCLSL0091 | Sample Date / Time: 6.13.16 1525 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY FILL, and silt with shale pieces to ~2", brown (10YR 4/3), dry, non-plastic, organic material and roots @ top of interval	NA	SL-091 ~ 20' above ground level
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Rifle range, main berm, west side top

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-092
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MB west side middle
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1530
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5' (refusal)
DEPTH TO WATER	NA

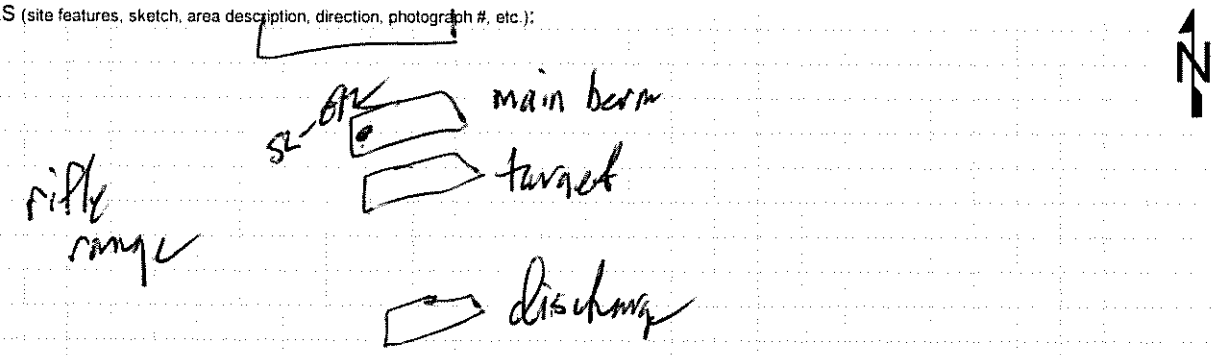
Sample ID: ECCL SL0092 | Sample Date / Time: 6.13.16 1530 | Sample Depth: 0-2.5' (refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY FILL WITH SILT, shale pieces to ~2", brown (10YR 4/3), dry, non-plastic, organic material at top of interval	NA	SL-092 ~15' above ground level
2				auger refusal at 2.5'
		TD = 2.5' (auger refusal)		
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range, main berm, west side middle

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: L. Meyer 6-29-16

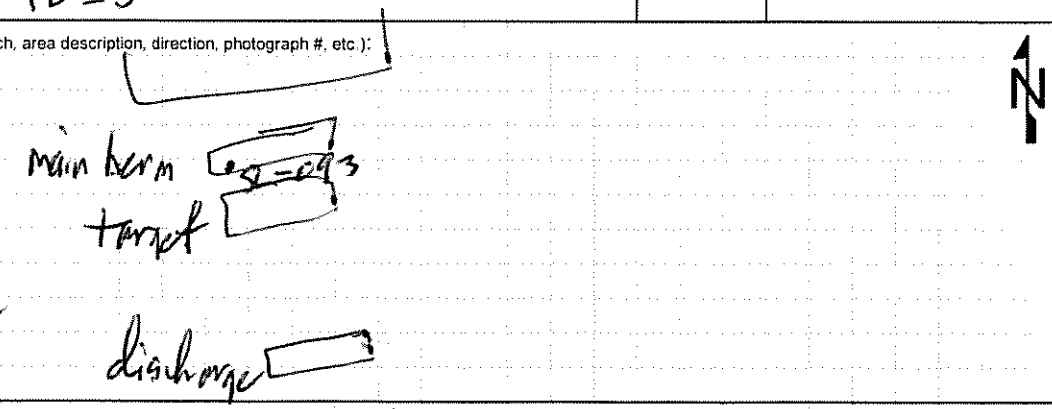
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-093
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MB left bottom
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1510
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon ~~ECCL-SL-093~~ PL
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0093
Sample Date / Time:	6.13.16 1510
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals PB Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev.	10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY FILL, AND SILT, with shale pieces to 2", dry brown (10YR 4/3), non-plastic, organic material and roots @ top of interval	NA	SL-093 ~ 7' above ground level
2				
3				
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range, main berm, left side (west) bottom

GEOLOGIST SIGNATURE/DATE: Jean Herkelmann 6-13-16

QA/QC SIGNATURE/DATE: 2 Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-094
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MB center dep
NAME OF DRILLER	PL
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1430
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5'
DEPTH TO WATER	NA

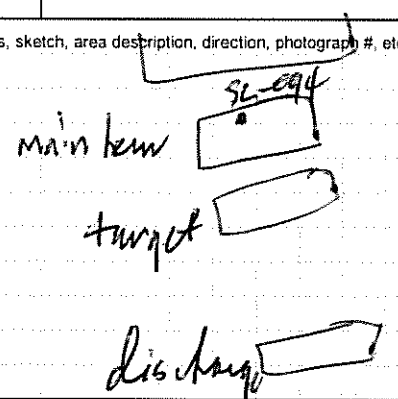
Sample ID: ECCLSL094 | Sample Date / Time: 6.13.16 1430 | Sample Depth: 0-2.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PL, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY FILL, AND SILT W/SHALE PIECES TO 3", brown (10YR4/3), dry, non-plastic, ~~organic material~~	NA	SL-094 ~ 20' above ground level
2				auger refusal @ 2.5'
3		TD= 2.5' (auger refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: rifle range main berm top center

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-095
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MB middle ~~stop~~ center
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1445
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

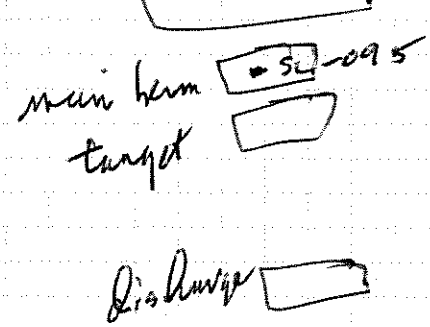
Sample ID: ECCLSL0095 | Sample Date / Time: 6.13.16 1445 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL #: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY FILL, AND SILT FILL w/ shale pieces to 2", dry, non-plastic, organic material in top interval	NA	SL-095 ~15' above ground level
2				
3		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: Firing range, main berm, middle center

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

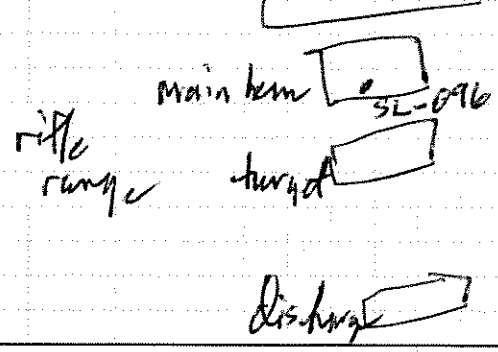
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-096
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL-SL RR MB bottom center
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1455
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3
DEPTH TO WATER	NA
Sample ID:	ECCLSL0096
Sample Date / Time:	6.13.16 1455
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1 2 3	CL	CLAY FILL, and silt, with shale pieces to ~ 2", dry, brown (10YR 4/3), non-plastic, organic material and roots and top of interval	NA	SL-096 ~7' above ground level
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: rifle range, main bem, bottom under

GEOLOGIST SIGNATURE/DATE	[signature] 6-13-16
QA/QC SIGNATURE/DATE	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-097
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MB
NAME OF DRILLER	JR/LM
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1345
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

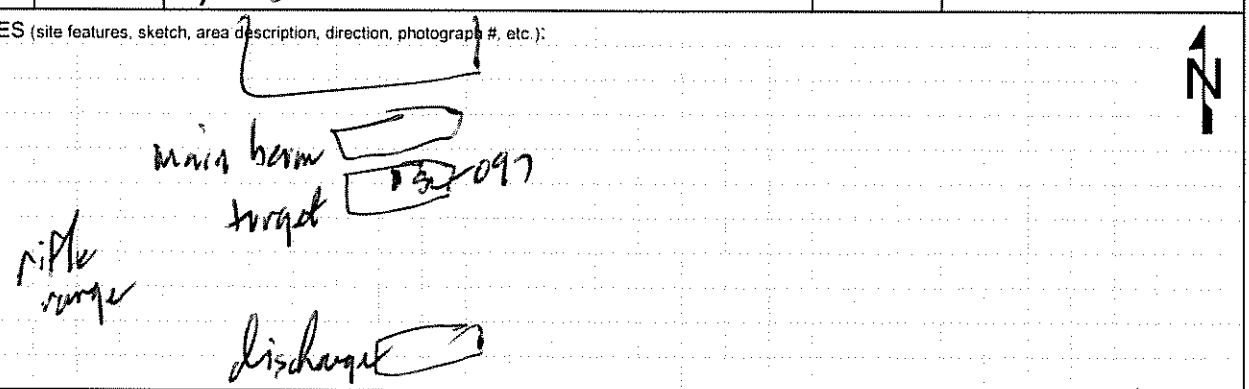
Sample ID: ECCLSL0097 | Sample Date / Time: 6.13.16 1345 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 2000: 10YR 4/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY FILL, AND SILT, BROWN (10YR 4/3), with shale pieces to 2" dry, soft (soil), very hard (shale), non plastic, little organic material in top interval	NA	SL-097 ~ 20' above ground level
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range main berm center

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

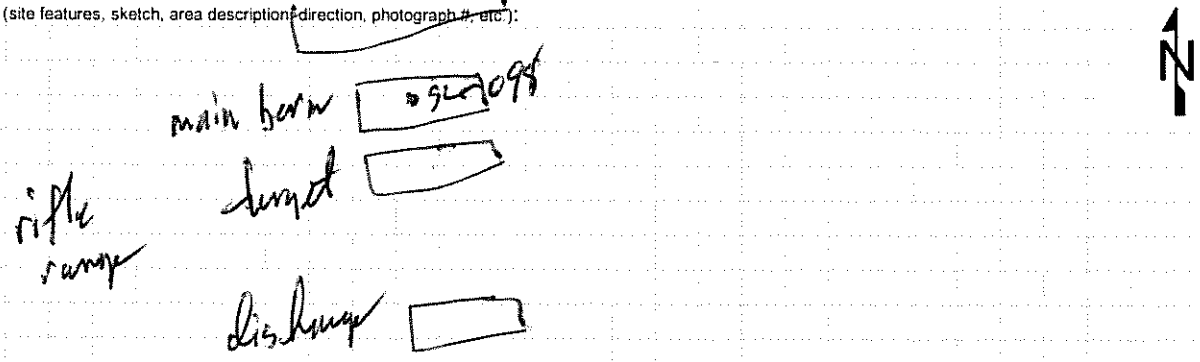
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-098
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MB
NAME OF DRILLER	JR/LM
DRILL DATE/TIME	STARTED: 6-13-16 COMPLETED: 1320
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0098
Sample Date / Time:	6-13-16 1320
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FM, Asbestos, Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL #:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Fill CLAY, and silt, brown (10YR 4/3), dry, non-plastic, shale pieces to <1/2 inch, pea gravel observed from 2-3	NA	SL-cap ~ 15' above gravel level
2				pea gravel observed at 2-3'
3				
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Drill large main berm center

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL_SL_099
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL_RR_MB
NAME OF DRILLER	JR/LW
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1305
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

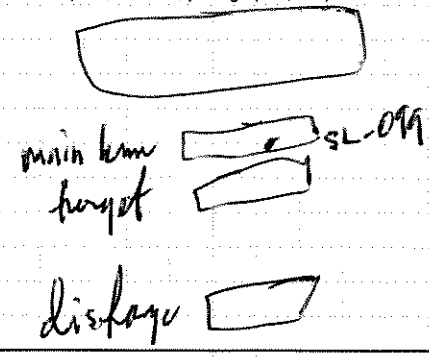
Sample ID: ECCLSL0099 | Sample Date / Time: 6.13.16 1305 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	fill CLAY, AND SILT, shale chunks to 3", brown (10YR 4/3), dry, non plastic soil, (pea gravel observed at 1')	NA	pea gravel observed 1-3' SL-099 ~ 7' above ground level
2				
3		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: rifle range main berm center

GEOLOGIST SIGNATURE/DATE: [signature] 6-13.16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL - SL - 100
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MAIN BERM
NAME OF DRILLER	JP/CM
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1250
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-31
DEPTH TO WATER	NA

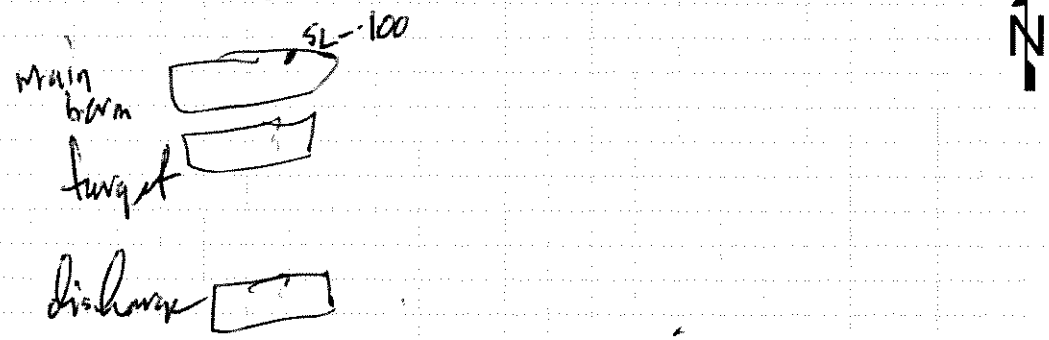
Sample ID: ECCL SL0100 | Sample Date / Time: 6.13.16 1250 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1 2 3	CL	fill CLAY and SILT, brown (10YR 4/3), ~~soft~~ with shale pieces to 3", dry, soft (soil), very hard (shale), non plastic, little organics at top	NA	collect MS/MSD SL-100 ~ 20' above ground surface
		Boring terminated and backfilled with bentonite chips. TD = 31		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: [illegible] range main berm east side

GEOLOGIST SIGNATURE/DATE: [illegible] 6.13.16

QA/QC SIGNATURE/DATE: R. Meyer 6-29-16

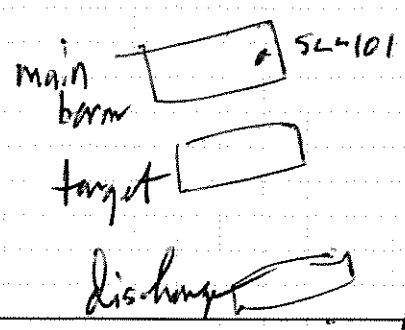
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-0101
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MB
NAME OF DRILLER	JR/LM
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1230
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0101
Sample Date / Time:	6.13.16 1230
Sample Depth:	0-2.5'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals Asbestos Lead Paint
PID MAKE/MODEL	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1 2	CL	fill CLAY, AND SILT, shale chunks to 3", dry, brown (10YR 4/3), soft (soil), very hard (shale), non-plastic	NA	SL-101 ~ 15' above ground level
3		TD = 2.5 (auger refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: rifle range main berm east side

GEOLOGIST SIGNATURE/DATE: [signature] 6-13.16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-102
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR MAIN BERM
NAME OF DRILLER	JR/LM
DRILL DATE/TIME	STARTED: 6-13-16 COMPLETED: 1200
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

Sample ID: ECCLSL0102 ECCLSL9009

Sample Date / Time: 6.13.16 1200

Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

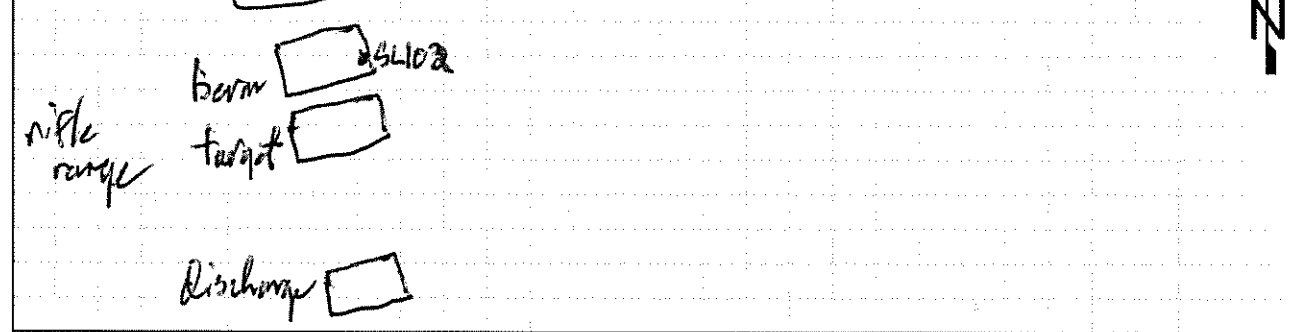
PID MAKE/MODEL: NA

PID SERIAL#: NA

Colors from Munsell Soil Color Chart, Rev 10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1 2 3	CL	Fill CLAY and silt with shale pieces to 2", dark yellowish brown (10YR 4/4), dry, soil soft, shale very hard, organic material at top	NA	rifle bullet casing observed (.38 caliber) .22 SL-102 ~ 7' above ground level collect field duplicate ECCLSL9009
		Boring terminated and backfilled with bentonite chips. TD=3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range main berm east side

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-103
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL RR HF
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1020
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

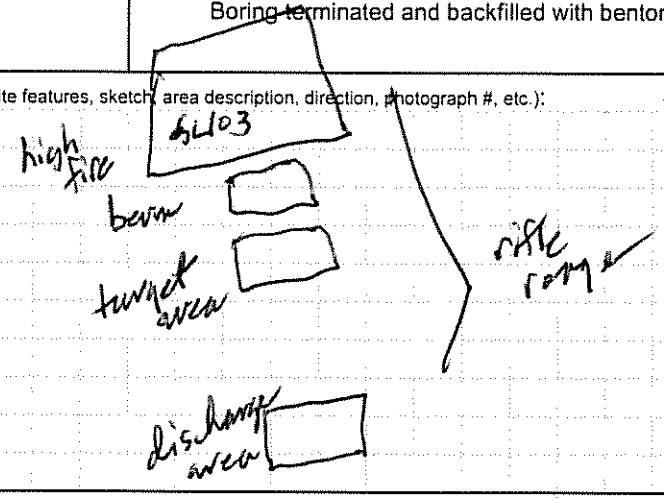
Sample ID: ~~ECCLSL103~~ ECCLSL0103	Sample Date / Time: 6.13.16 1020	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1, 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY and silt, moist, soft, organic w/roots, black 10YR/2/1	NA	shale pieces throughout
	CL	CLAY, soft, plastic, moist, dark yellowish brown 4/4 10YR		
1	CL	CLAY, soft, plastic, moist, 10YR 5/8 yellowish brown		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: rifle range high fire zone, ~~between~~ 2MG29-16 behind berm/concrete blocks

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6.13.16	S. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-104
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL RP HF
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1035
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

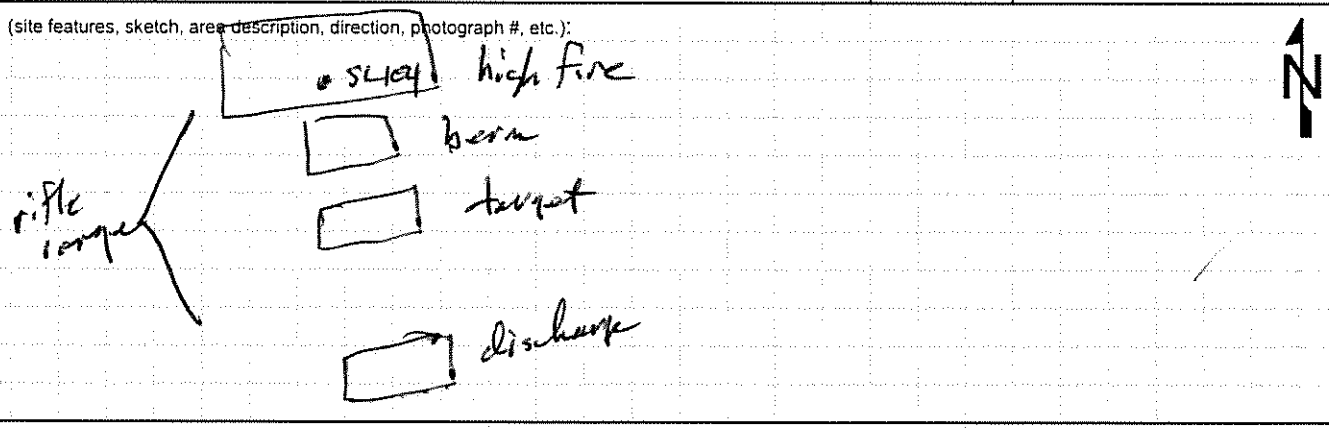
Sample ID: ECCLSL0104	Sample Date / Time: 6.13.16 1035	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 2009 10YR 3/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, dry, dark yellowish brown (10YR 3/6) soft, organic roots many shell pieces to about 1 inch	NA	
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range high fire zone between berm and pond / behind concrete blocks

GEOLOGIST SIGNATURE/DATE: [signature] 6-13-16	QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-105
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL RR HF
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1050
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

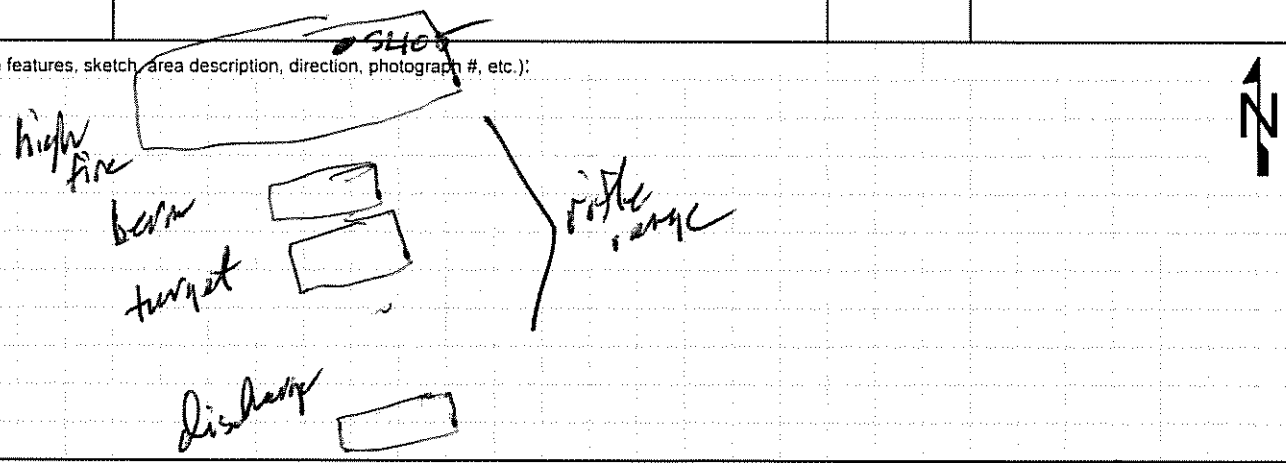
Sample ID: ECCLSL0105 | Sample Date / Time: 6.13.16 1050 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY with silt and shale pieces to 4"; dark yellowish brown, organic material w/roots, dry, soft (10YR 3/6)	NA	
1		TD=1'		
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range high fire b/w ditch, berm, and pond

GEOLOGIST SIGNATURE/DATE: [signature] 6.13.16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-106
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PR LB
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1445
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5'
DEPTH TO WATER	NA

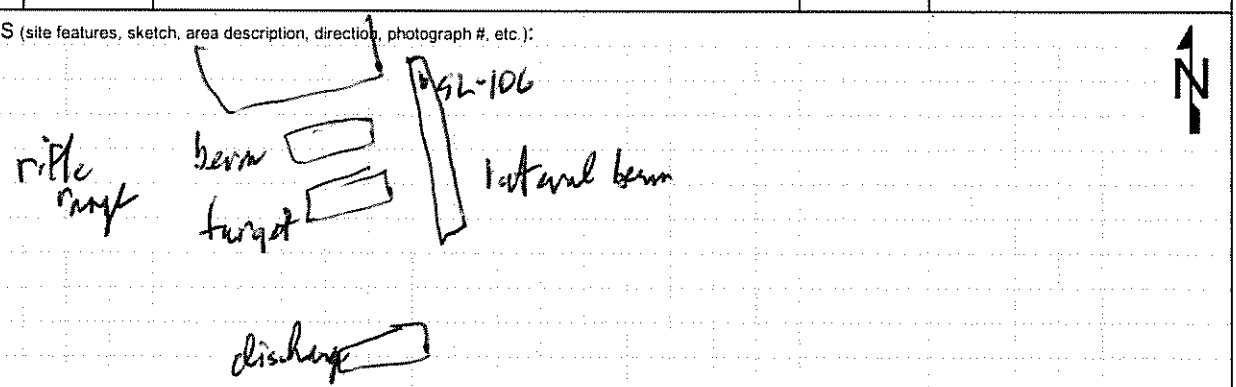
Sample ID: ECCLSL0106 | Sample Date / Time: 6.13.16 1445 | Sample Depth: 0-2.5'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt w/ shale pieces to ~3", dark yellowish brown (10YR 4/4), dry, soil soft, shale hard, organic material at top	NA	SL-106 Approx 8' Above grand level
2				auger refusal @ 2.5'
3		TD=2.5 (auger refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range lateral berm east side

GEOLOGIST SIGNATURE/DATE: [signature] 6.13.16

QA/QC SIGNATURE/DATE: L. Meyer 6-24-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-107
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	RB LB
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1135
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

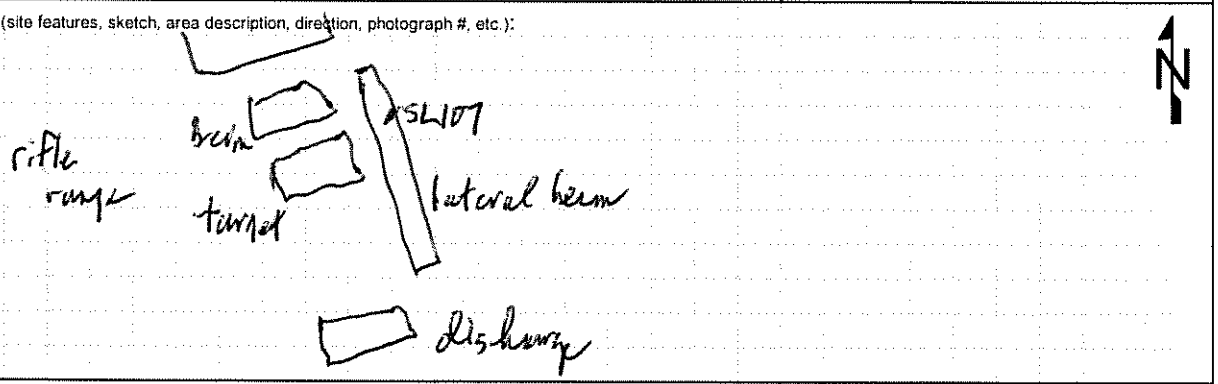
Sample ID: ECCLSL0107	Sample Date / Time: 6.13.16 1135	Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	fill CLAY and silt with shale pieces to 3", dark yellowish brown (10YR 4/4), dry, soil soft, shale very hard, organic material at top	NA	contact ~~Field duplicate~~ ~~ECCL SL-9004~~ 2M 6-29-16 SL-107 Approx 3' Above ground level
		Boring terminated and backfilled with bentonite chips. TD=3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range lateral berm east side

GEOLOGIST SIGNATURE/DATE	Paul Coulson 6.13.16
QA/QC SIGNATURE/DATE	L. Meyer 6-29-16

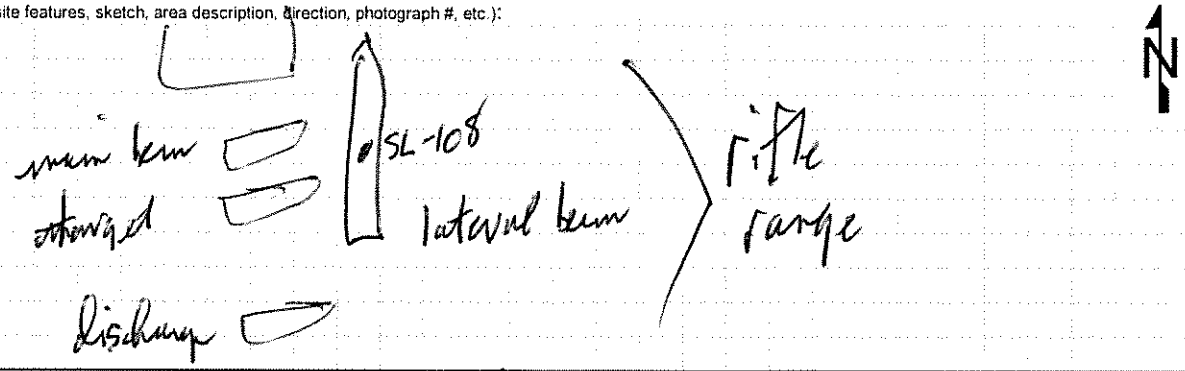
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-108
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR lateral berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-13-16 COMPLETED: 1700
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0108
Sample Date / Time:	6-13-16 1700
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY FILL, AND SILT, with shale pieces to 2", dark yellowish brown (10YR 4/4) dry, non-plastic, organic material top interval, soft (soil) to very hard (shale)	NA	SL-108 ~ 6' above pond surface
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range, lateral berm, SL 6-29-16

GEOLOGIST SIGNATURE/DATE	[signature] 6-13-16
QA/QC SIGNATURE/DATE	[signature] 6-29-16

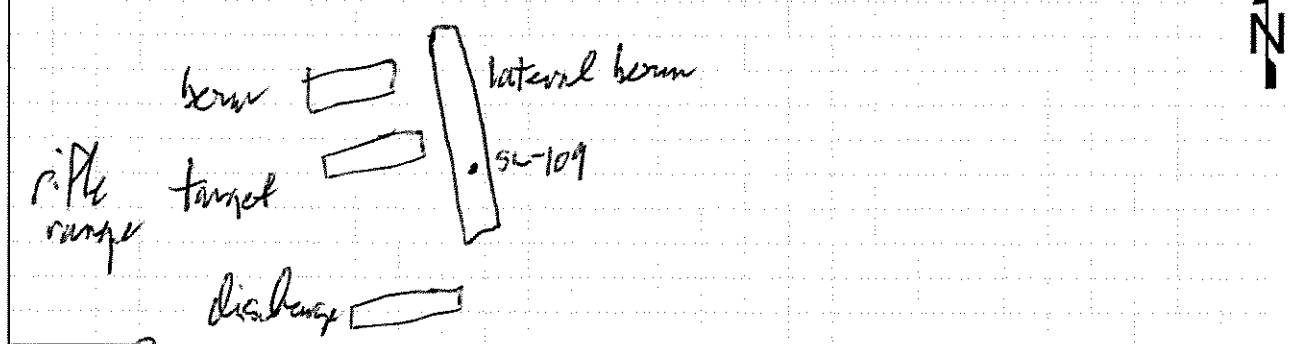
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-109
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR lateral berm
NAME OF DRILLER	JD
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 0800
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0109
Sample Date / Time:	6-14-16 0800
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY FILL and silt with shale pieces to ~2", dark yellowish brown (10YR 3/2), soft (soil) to very hard (shale), dry, organic material at top of interval, non-plastic	NA	SL-109 ~3' above ground surface
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range lateral berm

GEOLOGIST SIGNATURE/DATE	Paul Vondamie 6-14-16
QA/QC SIGNATURE/DATE	L. Mayer 6-29-16

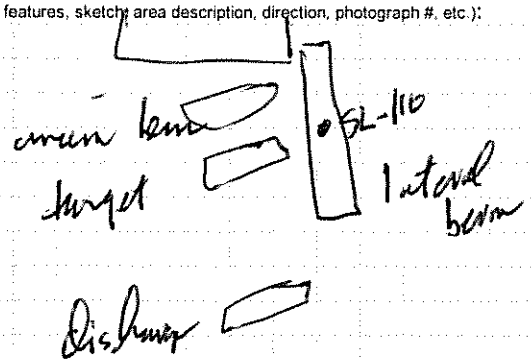
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL - SL - 110
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR lateral berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6:13:16 COMPLETED: 1635
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5' (auger refusal)
DEPTH TO WATER	NA
Sample ID:	ECCLSL0110
Sample Date / Time:	6:13:16 1635
Sample Depth:	0-2.5' (auger refusal)
CHEMICAL ANALYSES (circle)	VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY FILL and silt with shale pieces to 3", little pea gravel, dark yellowish brown (10YR 3/4), dry, non-plastic, organic material at top of interval	NA	SL-110 ~5' above ground surface
2				auger refusal @ 2.5
		TD=2.5' (auger refusal)		
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: rifle range, lateral berm

GEOLOGIST SIGNATURE/DATE	Paul Lorkowski 6-13-16
QA/QC SIGNATURE/DATE	D. Mayer 6-29-16

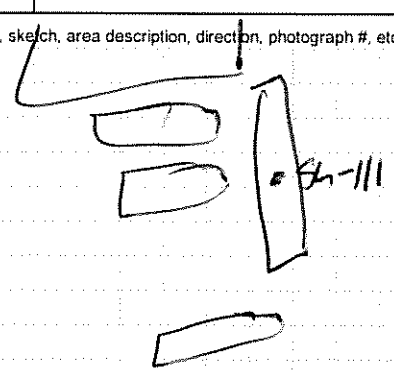
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-111
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR lateral berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1645
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5' (auger refusal)
DEPTH TO WATER	NA
Sample ID:	ECCLSL0111
Sample Date / Time:	6.13.16 1645
Sample Depth:	0-2.5'
CHEMICAL ANALYSES (circle)	VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY FILL and silt, with shale pieces to ~3", dark yellowish brown (10YR 3/4), clay, non-plastic, stiff (soil) to very hard (shale), original material top of interval	NA	SL-111 ~ 3' above ground surface
2				auger refusal @ 2.5'
3		TD=2.5' (auger refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Bike range lateral berm

GEOLOGIST SIGNATURE/DATE: [signature] 6.13.16

QA/QC SIGNATURE/DATE: D. Moyer 6-29-16

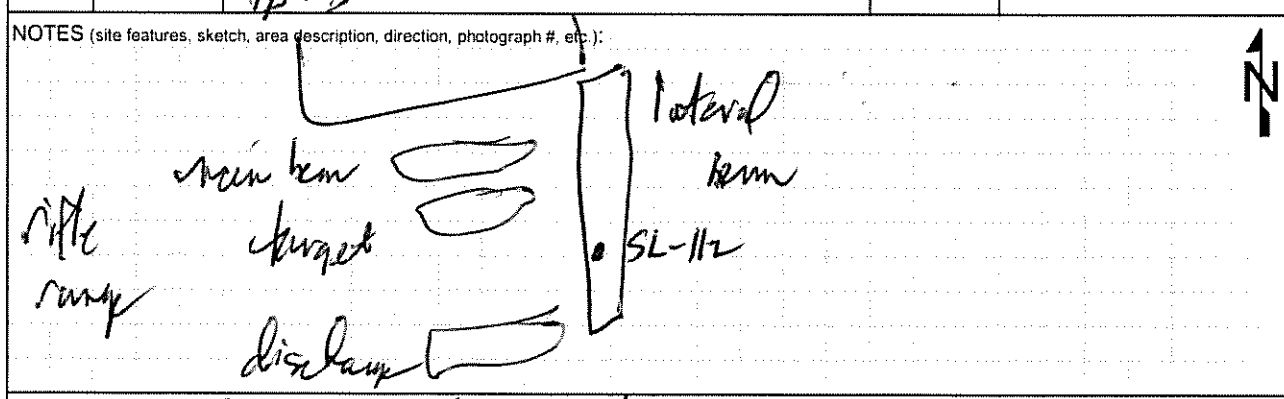
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-112
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL-RR-lateral berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.13.16 COMPLETED: 1710
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0112
Sample Date / Time:	6.13.16 1710
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals-FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1 2 3	CL	CLAY FILL, and silt with shale pieces to ~2", dark yellowish brown (10YR 4/4), dry, non-plastic, soft (soil) to very hard (shale), organic material top of interval	NA	SL-112 ~ 4' above ground surface
		Boring terminated and backfilled with bentonite chips. TD=3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range lateral berm

GEOLOGIST SIGNATURE/DATE	6.13.16
QA/QC SIGNATURE/DATE	J. Mayer 6-29-16

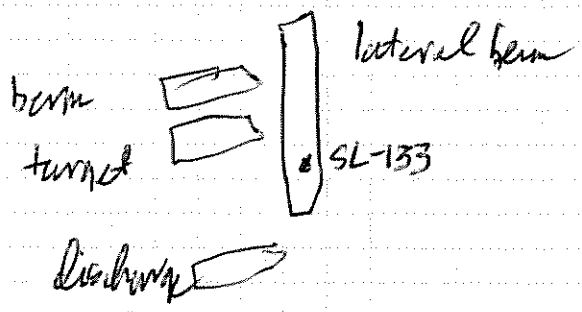
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-113
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR lateral berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 0815
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5' (auger refusal)
DEPTH TO WATER	NA
Sample ID:	ECCLSL0113
Sample Date / Time:	6.14.16 0815
Sample Depth:	0-2.5' (auger refusal)
CHEMICAL ANALYSES (circle)	VOC; SVOCs; PCBs; Herbicides; Pesticides; Explosives; Metals FP; Asbestos; Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2		CLAY FILL, and silt, with shale pieces to ~1", moist, dark brown (10YR 3/3), soft (soil) to very hard (shale), organic material and roots		SL-113 ~ 3' above ground surface
3		TD = 2.5' (auger refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: D.P. Lateral berm

GEOLOGIST SIGNATURE/DATE: 6-15-16

QA/QC SIGNATURE/DATE: 6.29-16

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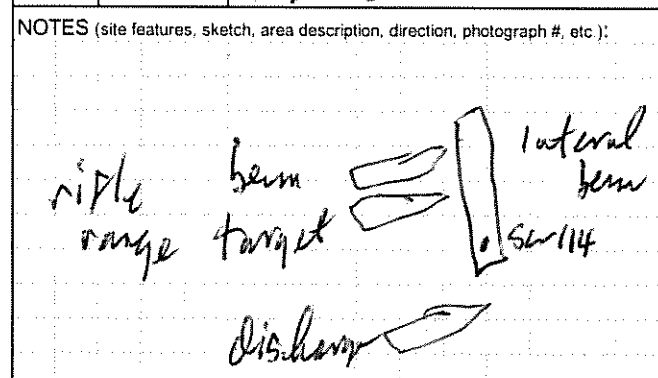
BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-114
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL RR lateral berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 0825
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0114 ECCL SL 9011
Sample Date / Time:	6.14.16 0825
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY fill, and silt, dark yellowish brown (10YR 4/4) w/shale pieces to 2", organic material and roots, dry, soft (soil) to very hard (shale)	NA	SL-114 ~2' above ground surface
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: rifle range lateral berm

GEOLOGIST SIGNATURE/DATE	6-14-16
QA/QC SIGNATURE/DATE	6-29-16

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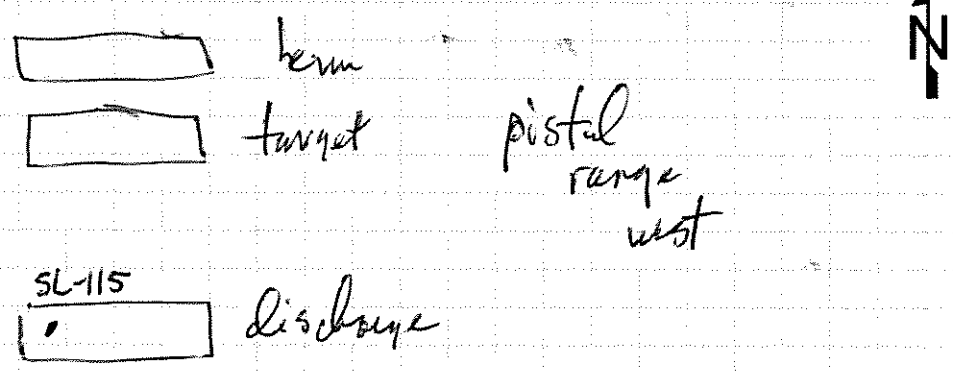
BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-115
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRW discharge area
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1420
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0115
Sample Date / Time:	6.14.16 1420
Sample Depth:	0-1'
CHEMICAL ANALYSES (circle)	VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint
PID MAKE/MODEL	NA
PID SERIAL #:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 2/2, 5/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, black (10YR 2/2), moist, soft, low plasticity	NA	~4" of gravel piled on surface, log beams under gravel
	SW	SAND, yellowish brown (10YR 5/4), soft, moist, fine		
1	CL	CLAY, black (10YR 2/2), moist, firm, medium plasticity		
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west discharge area visible shooting area, ground covered with casings

GEOLOGIST SIGNATURE/DATE	[signature] 6-14-16
QA/QC SIGNATURE/DATE	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-116
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRW discharge
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1430
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

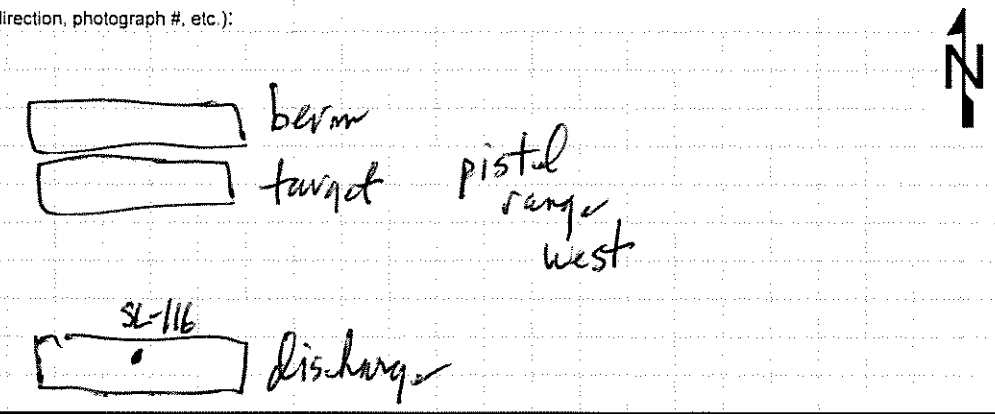
Sample ID: ECCLSL0116 | Sample Date / Time: 6-14-16 1430 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/2 5Y

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	CLAY, black (10YR 2/2), moist, soft, low plasticity	NA	~4" of gravel/cinders piled on surface, log begins below gravel
	SW	SAND, yellowish brown (10YR 5/4), fine, soft, moist		
1	CL	CLAY, black (10YR 2/2), moist, firm, medium plasticity		
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west discharge area, visible shooting area, ground covered w/casings

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-117
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL-PRW discharge area
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1445
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

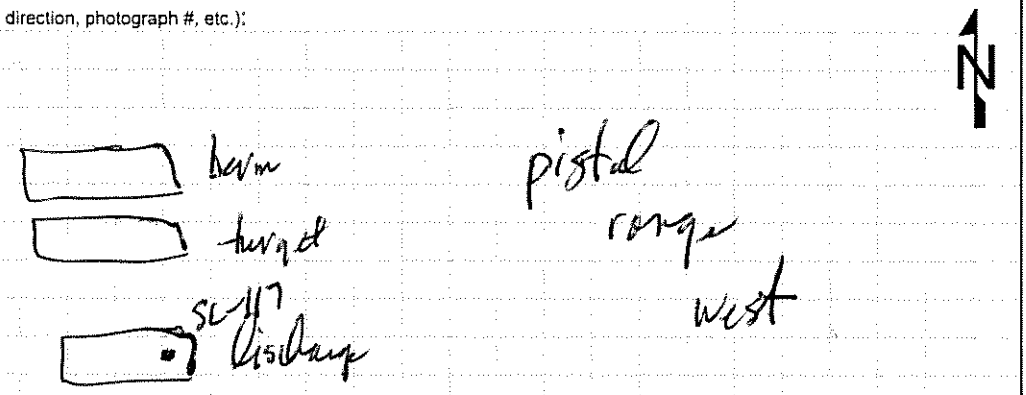
Sample ID: ECCLSL0117 | Sample Date / Time: 6.14.16 1445 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, Black (10YR 2/2), moist, soft, low plasticity, organic material and roots	NA	~4" gravel/cuttings piled on surface log begins below gravel
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west discharge area inside shooting area ground covered in casing

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-11B
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW target area
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1655
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

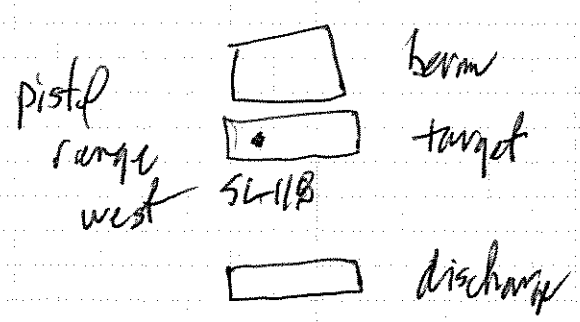
Sample ID: ECCLSL01B | Sample Date / Time: 6-14-16 1655 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt w/ shale pieces, dirt, bullets, casings, shotgun wads, organic material and roots, dark grayish brown (10YR 3/2)	NA	
2		TD=1'		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west, target area

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: R. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-119
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW Target area
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1515
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

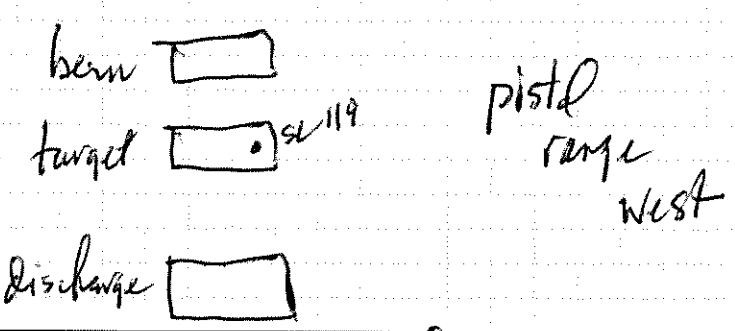
Sample ID: ECCLSL0119 | Sample Date / Time: 6-14-16 1515 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 2000: 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt w/ shale pieces <1' and various misc metal debris, dry, ~~soft~~ firm, organic material and roots, very dark grayish brown (10YR 3/2)	NA	shotgun casings, bottle caps, misc debris
2		TD = 1'		
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol range west target area, ~~shotgun casings~~ 6-29-16

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: R. Moyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-120
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW target area
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1645
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

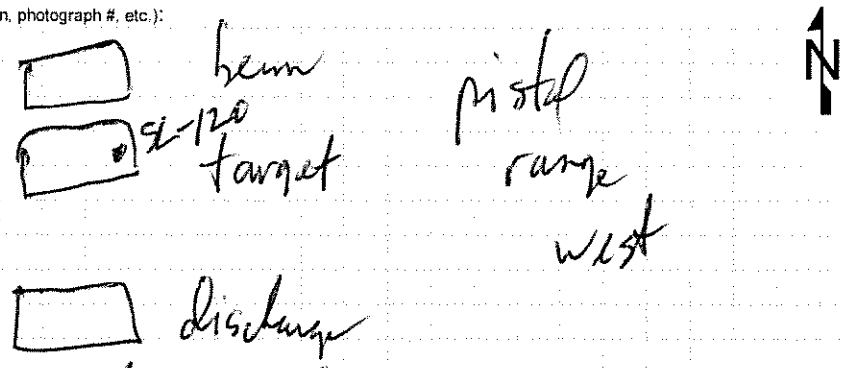
Sample ID: ECCLSL-0120	Sample Date / Time: 6-14-16 1645	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt w/ shale pieces, dump, bullets, casings, shotgun wads, organic material and roots, dark grayish brown (10YR 3/2)	NA	
2				
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west target area

GEOLOGIST SIGNATURE/DATE	Kent Lewis 6-14-16
QA/QC SIGNATURE/DATE	A. Myers 6-29-16

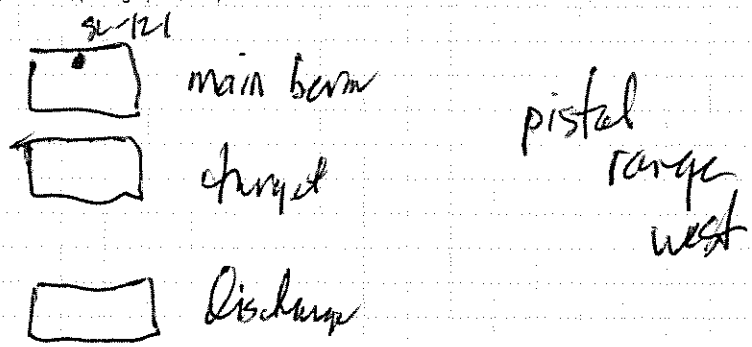
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-121
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: ~~1445~~ 1545
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0121
Sample Date / Time:	6-14-16 ~~1445~~ 1545
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals Fe Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, dark brown (10YR 2/2), dry, low plasticity, firm, shale gravel to 1", numerous bullets and bags.	NA	SL-121 ~ 15' above ground surface
2				
3				
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: A. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-122
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1600
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

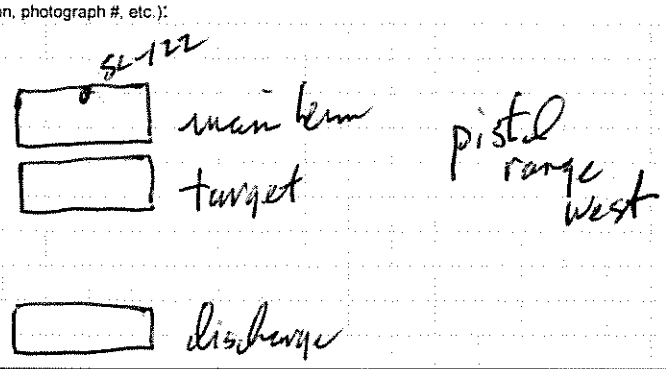
Sample ID: ECCLSL0122 | Sample Date / Time: 6-14-16 1600 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Fill CLAY and silt, dark yellowish brown (10YR 3/4), soft, moist, shale frags, bullet casings	NA	SL-122 is ~ 9' above ground surface
2				
3				
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

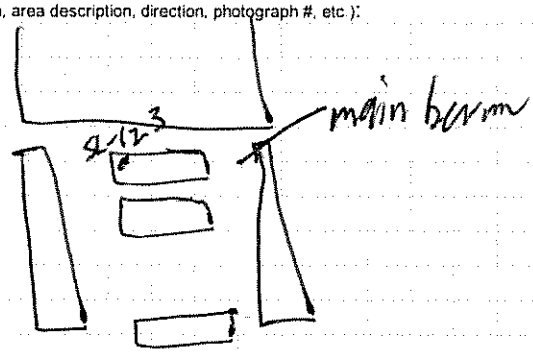
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-123
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1400
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA
Sample ID:	ECCLSL0123
Sample Date / Time:	6-14-16 1400
Sample Depth:	0-2' (auger refusal)
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, dark brown (10YR 2/2), clay, low plasticity, firm	NA	SL-123 ~ 8' above ground surface
2				auger refusal @ 2'
3		TD = 2' (auger refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west main berm

GEOLOGIST SIGNATURE/DATE	Paul Lindhorst 6-14-16
QA/QC SIGNATURE/DATE	L. Moser 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL — SL-124
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1525
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA

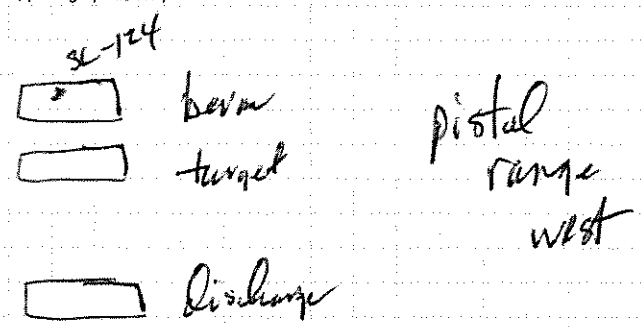
Sample ID: ECCLSL0124 ECCLSL9014 | Sample Date / Time: 6-14-16 1525 | Sample Depth: 0-2' (auger refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, dark brown (10YR 2/2), dry, low plasticity, firm	NA	SL-124 ~ 7' above ground surface
2				auger refusal @ 2'
3		TD = 2' (auger refusal)		collect field duplicate ECCLSL9014
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol range west, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

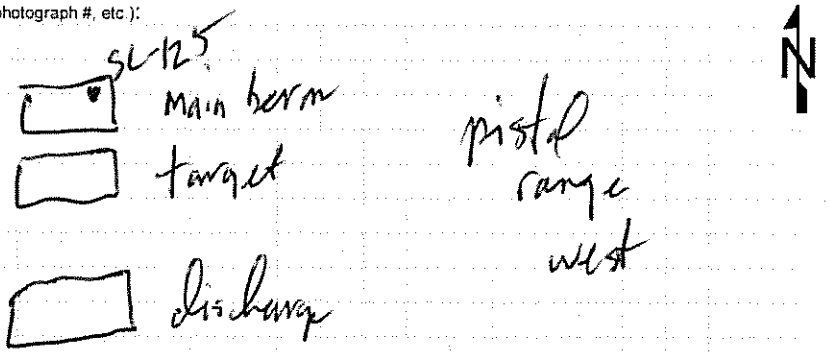
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL SL-125
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: ~~1410~~ 1610
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3' 2M 6-29-16
DEPTH TO WATER	NA
Sample ID:	ECCLSL0125
Sample Date / Time:	6-14-16 ~~1410~~ 1610 2M 6-29-16
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals Fe, Asbestos, Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL #:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, ? fill and silt, little sand, dark yellowish brown (10YR 4/6), soft, moist, low plasticity, shale frag to ~1"	NA	SL-125 ~ 9' above ground surface
2				
3				
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west main berm

GEOLOGIST SIGNATURE/DATE	[signature] 6-14-16
QA/QC SIGNATURE/DATE	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-126
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	TR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1405
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

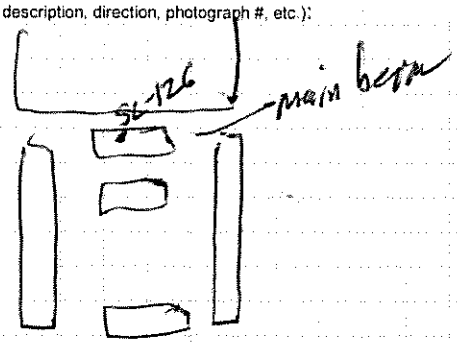
Sample ID: ECCLSC0126 | Sample Date / Time: 6-14-16 1405 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY and silty, dark brown (10YR 2/2), dry, low plasticity, firm	NA	shotgun ~~pellets~~ wads on surface and sample; SL-126 ~ 4' above ground surface
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



pistol range west

N

RATIONALE FOR LOCATION SELECTION: pistol range west main berm, shot wads on surface

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: R. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-127
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1635
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA

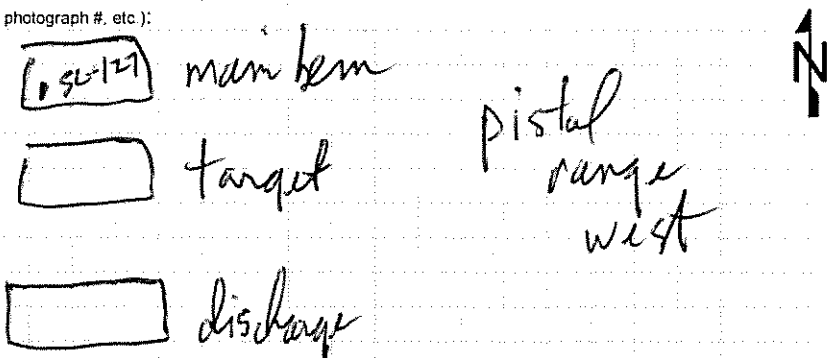
Sample ID: ECCLSL0127 | Sample Date / Time: 6-14-16 1635 | Sample Depth: 0-2' (auger refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY fill and silt, dark yellowish brown (10YR 4/6), shale frag, bullet casings	NA	SL-127 ~ 4' above ground surface auger refusal @ 2'
2		TD=2' (auger refusal)		
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol Range west, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-128
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1550
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA

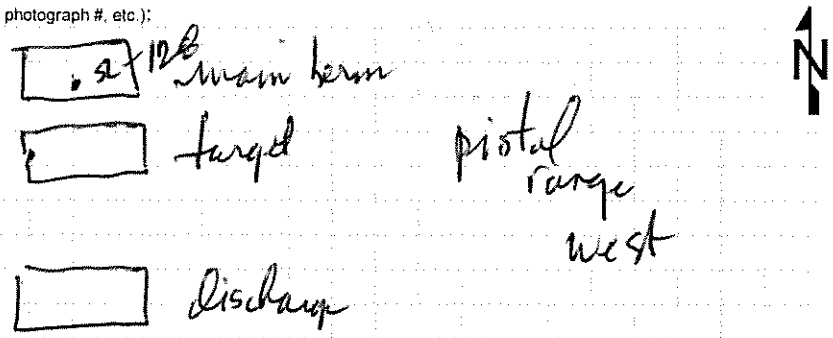
Sample ID: ECCLSL0128 | Sample Date / Time: 6.14.16 1550 | Sample Depth: 0-2' (auger refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, dark brown (10YR 2/2) with shale frag and bullets, dry, firm, low plasticity	NA	SL-128 ~4' above ground surface
2				auger refusal @ 2'
3		TD = 2' (auger refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: L. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-129
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW main berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1625
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	N/A

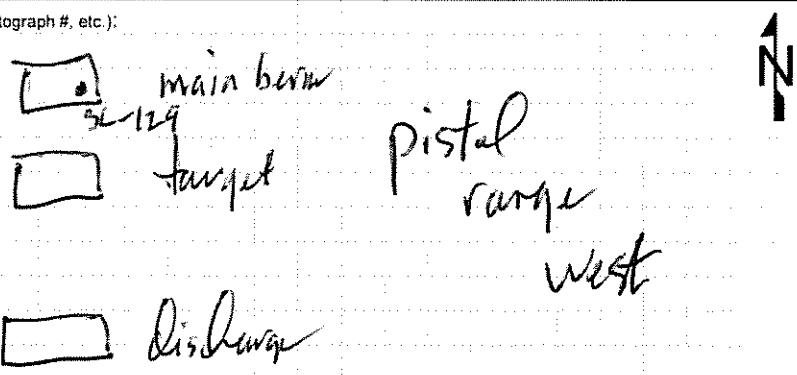
Sample ID: ECCLSL0129 | Sample Date / Time: 6-14-16 1625 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PM, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	fill CLAY and silt, dark yellowish brown (10YR 4/6), ~~soft~~ moist, shale frag, bullet casings	NA	SL-125 ~ 4' above ground surface
2				
3		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-130
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRW high fire
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 0850
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

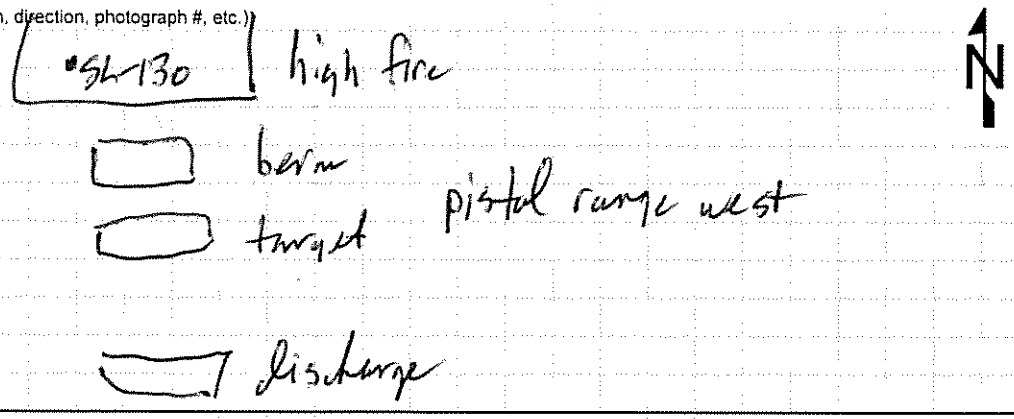
Sample ID: ECCLSL0130 | Sample Date / Time: 6.14.16 0850 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals Pb, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, and silt, dark yellowish brown (10YR 3/4), soft, moist, organic material and roots	NA	
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.)



RATIONALE FOR LOCATION SELECTION: pistol range west high fire zone

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-131
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL BR PRW high fire
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 0840
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	6" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

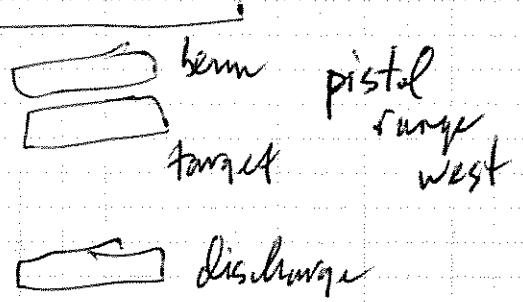
Sample ID: ECCLSL0131 | Sample Date / Time: 6.14.16 0840 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, and silt, black (10YR 2/1), moist, organic, soft, low plasticity	NA	
2		TD=1'		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.): high fire



N

RATIONALE FOR LOCATION SELECTION: pistol range high fire

GEOLOGIST SIGNATURE/DATE: [illegible] 6.14.16

QA/QC SIGNATURE/DATE: [illegible] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-132
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRIV – high fire zone
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 0900
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

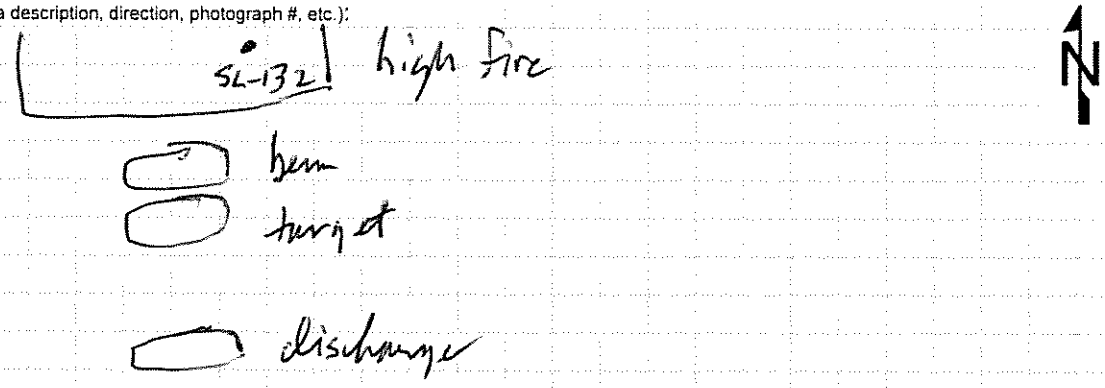
Sample ID: ECCL	Sample Date / Time: 6.14.16 0900	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals (TL), Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, brown (10YR 4/3), w/ shale pieces to ~1", organic material with roots, soft, dry, low plasticity	NA	
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west high fire zone

GEOLOGIST SIGNATURE/DATE	[signature] 6-14-16
QA/QC SIGNATURE/DATE	L. Moyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-133
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL - PRW lateral berm west
NAME OF DRILLER	LH
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1330
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

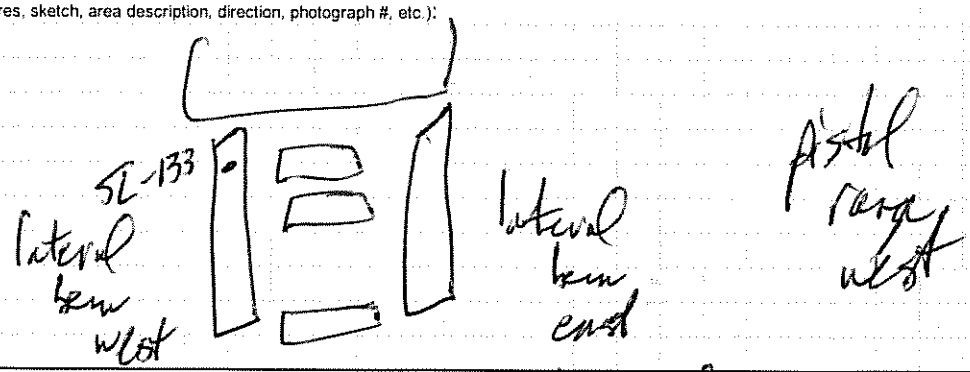
Sample ID: ECCLSL0133 | Sample Date / Time: 6.14.16 1330 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL #: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	Clay and silt with shale pieces (<1"), dark yellowish brown (10YR 3/4), dry, low plasticity, organic material and roots, soft (soil) to very hard (shale)	NA	SL-133 ~6' above ground surface
		Boring terminated and backfilled with bentonite chips. TD=3		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west lateral berm west

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: R. Moyer 6-29-16

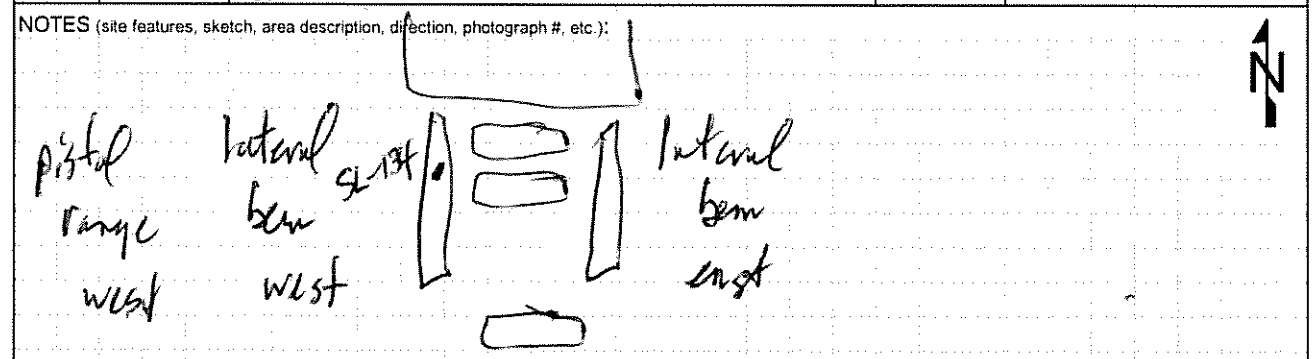
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-134
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL - PRW lateral berm west
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1325
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0134 ECCLSL9013
Sample Date / Time:	6-14-16 1325
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals Pb Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY and Silt with shale pieces to 1", dark yellowish brown (10YR 3/6), dry, low plasticity, organic material and roots, soft (soil) to very hard (shale)	NA	collect field duplicate ECCLSL9013; SL-134 ~ 4' above ground surface
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west lateral berm west

GEOLOGIST SIGNATURE/DATE	[illegible] 6-14-16
QA/QC SIGNATURE/DATE	J. Mayer 6-29-16

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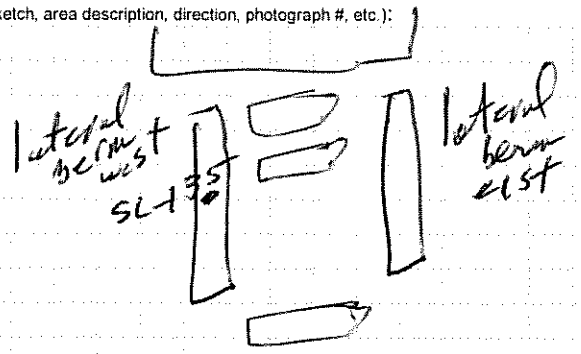
BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-135
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL-Pew lateral berm west
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 1315
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA
Sample ID:	ECCLSL0135
Sample Date / Time:	6.14.16 1315
Sample Depth:	0-3'
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 3/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt with shale pieces to 2", dark yellowish brown (10YR 3/6), dry, low plasticity, organic material and roots, soft (soil) to very hard (shale)	NA	SL-135 a 3' above ground surface
3		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: pistol range west, lateral berm west

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-136
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW lateral berm west
NAME OF DRILLER	LM/JR
DRILL DATE/TIME	STARTED: 6.14.16 COMPLETED: 1130
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA

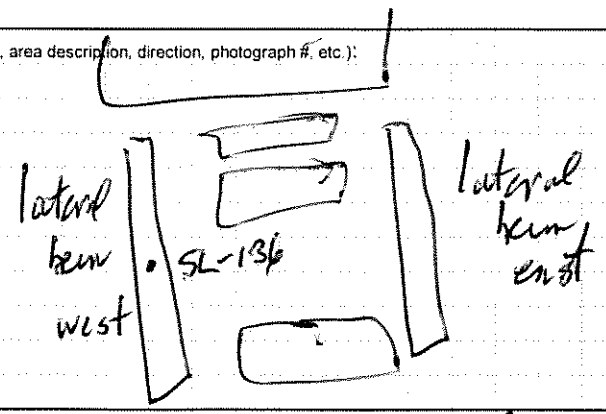
Sample ID: ECCLSL0136	Sample Date / Time: 6.14.16 1130	Sample Depth: 0-2' (auger refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL #: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY fill and silt, with shale pieces to 1" dark yellowish brown (10YR 4/6) ~~silt shale~~ dry, soft (silt) to very hard (shale), organic material and roots	NA	SL-136 is approx 7' above ground surface (auger refusal at 2')
2		TD = 2' (auger refusal)		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Distal range west lateral berm west

GEOLOGIST SIGNATURE/DATE	Paul Lamberin 6-14-16
QA/QC SIGNATURE/DATE	2 Moyer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-137
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW lateral berm west
NAME OF DRILLER	JR/LG
DRILL DATE/TIME	STARTED: 6-14-16 COMPLETED: 1200
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

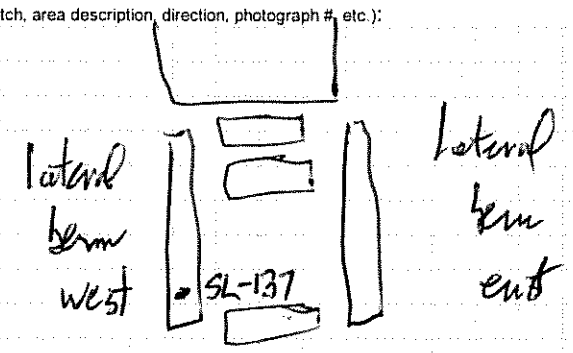
Sample ID: ECCLSL0137	Sample Date / Time: 6.14.16 1200	Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay and silt with shale pieces to ~1", dark yellowish brown (10YR 3/4), dry, low plasticity, organic material and roots, dry (soil) to very hard (shale)	NA	SL-137 is ~4' above ground surface
2				
3				
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol range west lateral berm west

GEOLOGIST SIGNATURE/DATE: [signature] 6.14.16	QA/QC SIGNATURE/DATE: [signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-138
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW lateral berm east
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6.15.16 COMPLETED: 0800
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

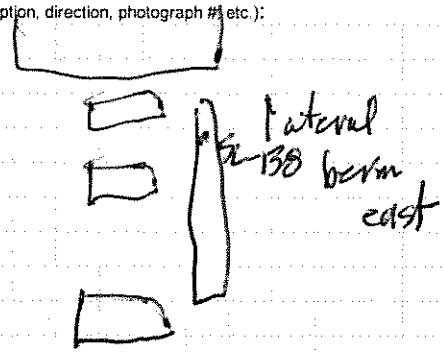
Sample ID: ECCLSL0138 | Sample Date / Time: 6.15.16 0800 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1, 2, 3	CL	CLAY fill and silt with shale pieces to 1", Dark yellowish brown (10YR 4/6), dry, soft (soil) to very hard (shale), organic material and roots	NA	
		Boring terminated and backfilled with bentonite chips. TD=3		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: Pistol range west lateral berm east

GEOLOGIST SIGNATURE/DATE: [signature] 6.15.16

QA/QC SIGNATURE/DATE: R. Moyer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-139
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRW lateral berm east
NAME OF DRILLER	LA
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 0810
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA

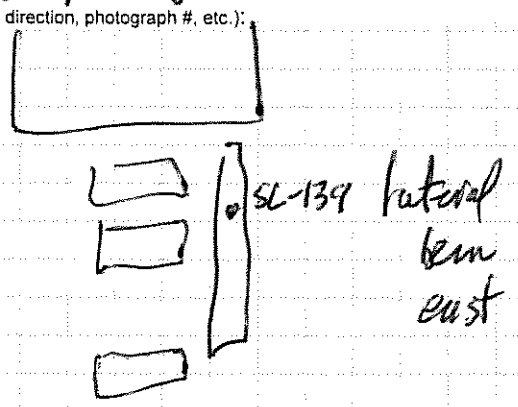
Sample ID: ECCLSL0139 | Sample Date / Time: 6-15-16 0810 | Sample Depth: 0-2 (auger refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals TN, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/6 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fill and silt with shale pieces to 1", Dark yellowish brown (10YR 4/6), dry, stiff (soil) to very hard (shale) org material and roots	NA	SL-139 Approx 5' Above ground info
2		Boring terminated and backfilled with bentonite chips. TD=2' (auger refused)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: Pistol range west, lateral berm east

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: J. Mayer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SC-140
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRW lateral berm east
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.15.16 COMPLETED: 0825
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2.5' (auger refusal)
DEPTH TO WATER	NA

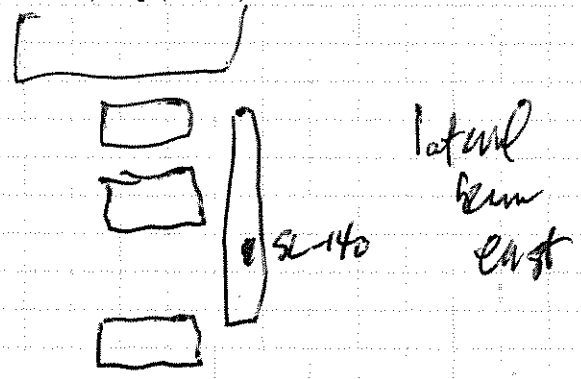
Sample ID: ECCLSC0140 MS/MSD	Sample Date / Time: 6.15.16 0825	Sample Depth: 0-2.5' (auger refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals (FR), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5	CL	CLAY fill and silt with shale pieces to 1" Dark yellowish brown (10YR 4/6), dry, soft (soil) to very hard (shale) organic material	NA	SC-140 is 3' above ground
		TD = 2.5'		
2/3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Distal range west, lateral berm east

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6.15.16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-141
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL- ~~PRW~~ lateral berm east
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-14-16 PRW COMPLETED: 1650
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

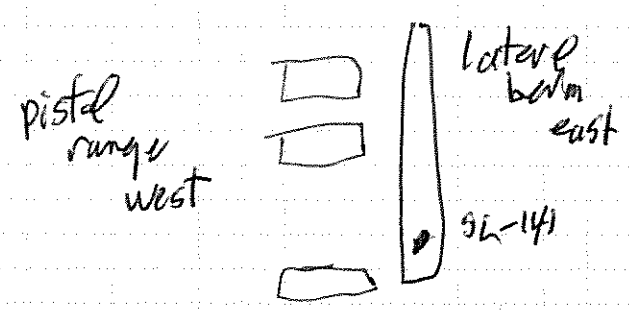
Sample ID: ECCLSL0141 ECCLSL9015 | Sample Date / Time: 6-14-16 1650 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY fill, and silt w/ shale pieces, dark yellowish brown (10YR 3/4), dry, soft (soil) to very hard (shale)	NA	SL-141 ~ 1' up berm
2				
3				
		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range west lateral berm east

GEOLOGIST SIGNATURE/DATE: [signature] 6-14-16

QA/QC SIGNATURE/DATE: D. Mayer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-142
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL pistol range east discharge
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1355
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

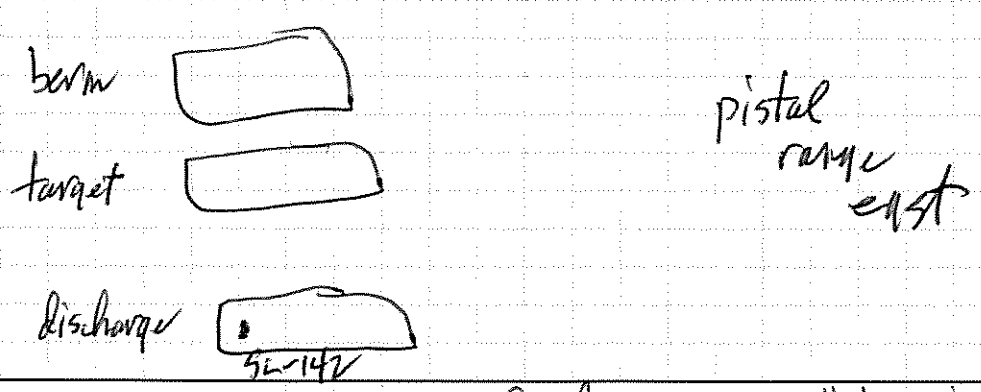
Sample ID: ECCLSL0142 | Sample Date / Time: 6.15.16 1355 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	~~GC~~ SW	Sand fill, well sorted, fine, dark yellowish brown (10YR 3/4), NA moist		inch of bullet casings and pea gravel on top
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol range east discharge area, bullet casings

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: L. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-143
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE discharge area
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1415
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

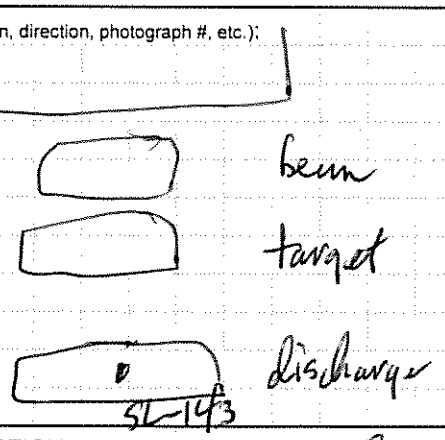
Sample ID: ECCLSL0143 | Sample Date / Time: 6.15.16 1415 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	pt CL SW	Sand fill, well sorted, fine, dark yellowish brown (10YR 3/4), moist	NA	telephone pole and old shooting board, casings at surface
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east discharge area casings on ground

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-30-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-144
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE discharge area
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1435
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

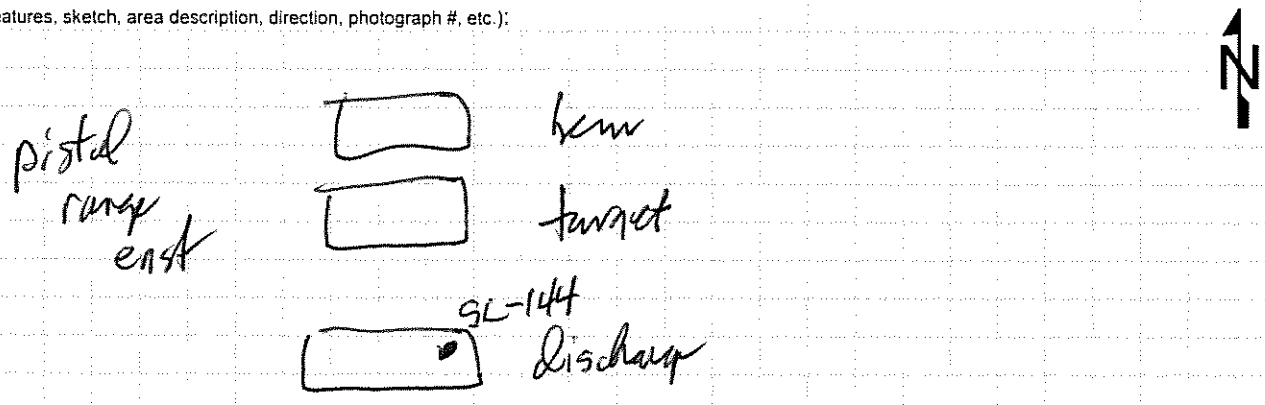
Sample ID: ECCLSL0144 | Sample Date / Time: 6-15-16 1435 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	SW	Sand Fill, well sorted, fine, dark yellowish brown (10YR 3/4), moist	NA	
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, discharge area, casings on ground

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-30-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-14/5
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PBE target area
NAME OF DRILLER	Loy
DRILL DATE/TIME	STARTED: 6.15.16 COMPLETED: 0910
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

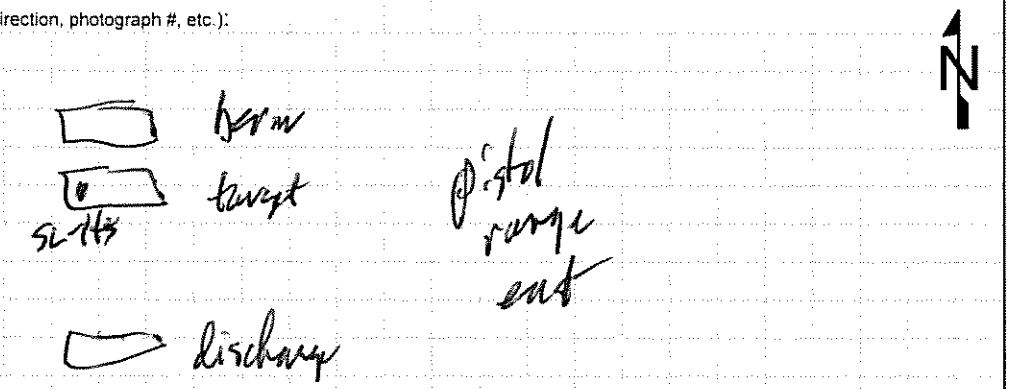
Sample ID: ECCL SL014/5	Sample Date / Time: 6.15.16 0910	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FM, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay and silt, black (10YR2/2), organic, fibrous, dry, low plasticity	NA	casings, bullets on surface per guard
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east target area casings, bullets on surface

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[illegible] 6-15-16	[illegible] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-146
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PPE Target area
NAME OF DRILLER	Lin
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 0930
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

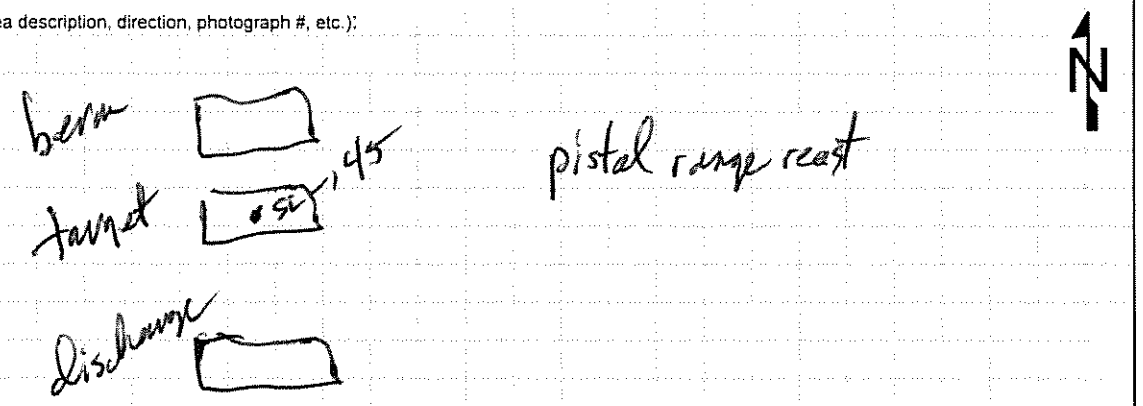
Sample ID: ECCLSL0146 | Sample Date / Time: 6.15.16 0930 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay and silt, Black (10YR 2/2), organic, firm, dry, low plasticity	NA	casing, pea gravel and wads observed
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, target area

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-147
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE target area
NAME OF DRILLER	VR
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 0945
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

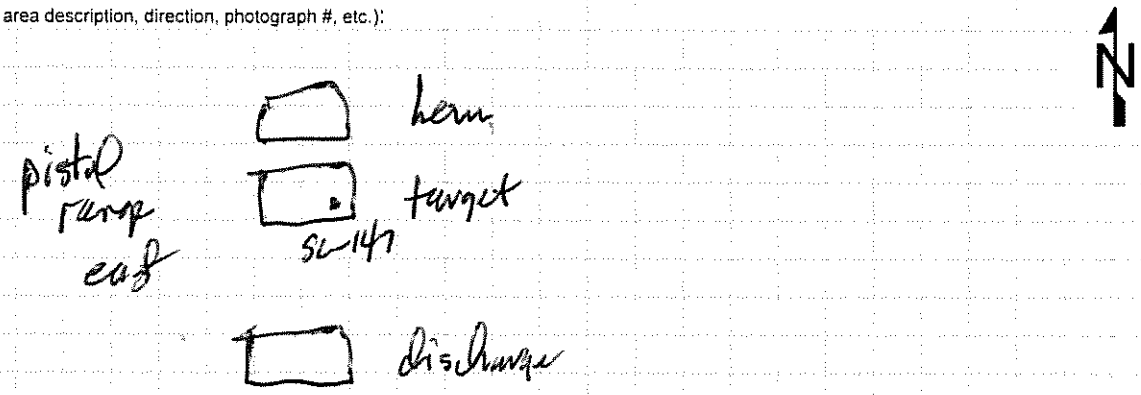
Sample ID: ECCLSL 0147 | Sample Date / Time: 6-15-16 0945 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/2 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, black (10YR 2/2). organic, firm, dry, low plasticity	NA	
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east target area

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: J. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-148
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm
NAME OF DRILLER	RS
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1620
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1' (refusal/auger pattern)
DEPTH TO WATER	NA

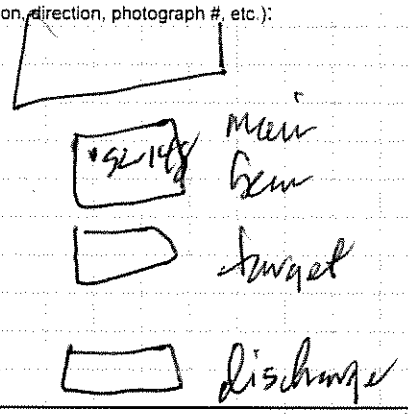
Sample ID: ECCLSL0148	Sample Date / Time: 6-15-16 1620	Sample Depth: 0-1' (refusal/auger)

CHEMICAL ANALYSES (circle): VOC / SVOCs / PCBs / Herbicides / Pesticides / Explosives / Metals FR / Asbestos / Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fill and silt w/ shale pieces, dry, firm, dark yellowish brown (10YR 3/4) low plasticity	NA	SL-148 Approx. 15' Above ground; auger refusal @ 1' after pattern
2		TD=1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east main berm top

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-15-16	[signature] 6-30-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-149
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm top
NAME OF DRILLER	PL
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1610
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1' (refusal)
DEPTH TO WATER	NA

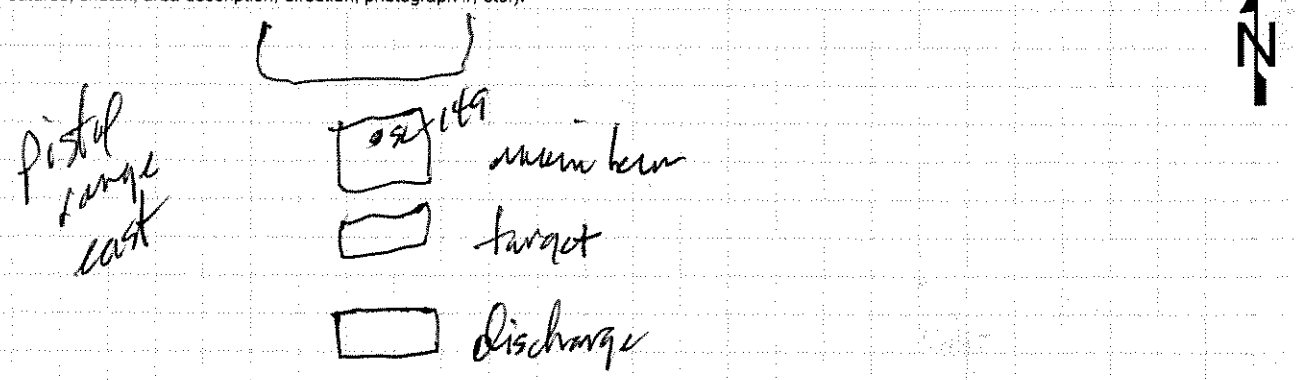
Sample ID: ECCLSL0149 | Sample Date / Time: 6.15.16 1610 | Sample Depth: 0-1' (refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fill and silt w/ shale pieces, dry, firm, dark yellowish brown (10YR 3/4), low plasticity	N/A	SL-149 Approx. 15' Above ground; auger refusal @ 1'
2		TD = 1' (refusal)		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east main berm top

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-30-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-150
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6.15.16 COMPLETED: 1545
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2 (refusal)
DEPTH TO WATER	NA

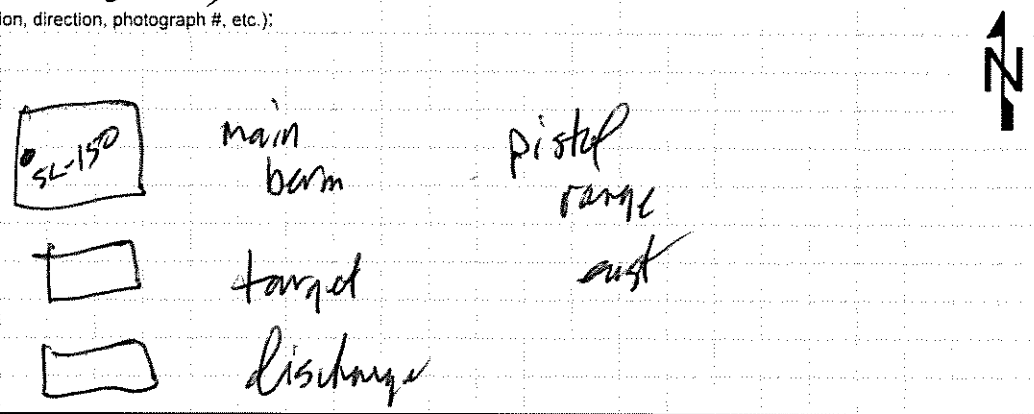
Sample ID: ECCLSL0150	Sample Date / Time: 6.15.16 1545	Sample Depth: 0-2' (refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals Fe, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR(3/4)

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1		Clay fill and silt with shale pieces, dark yellowish brown (10YR 3/4), organic material, dry, firm, low plasticity		bulbs observed; SL-150 ~ 15' up berm
2				auger refusal at 2'
		Boring terminated and backfilled with bentonite chips. TD = 2' (refusal)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, main berm

GEOLOGIST SIGNATURE/DATE	6-15-16
QA/QC SIGNATURE/DATE	2-Moyer 6-30-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-151
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1540
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0 – 2' (refusal)
DEPTH TO WATER	NA

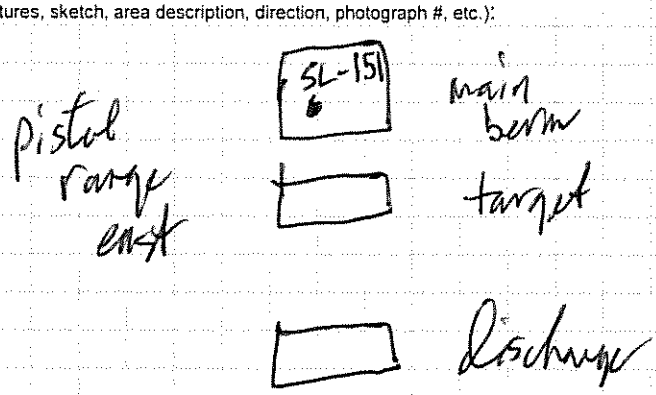
Sample ID: ECCLSL0151 | Sample Date / Time: 6-15-16 1540 | Sample Depth: 0 – 2' (refusal)

CHEMICAL ANALYSES (circle): VOC, (SVOCs), PCBs, Herbicides, Pesticides, Explosives, (Metals FR), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay loam and silty with shale pieces, dark yellowish brown (10YR 3/4), organic material, dry, firm, low plasticity	NA	bullets observed SL-151 ~ 8' upbern
2				auger refusal at 2'
		Boring terminated and backfilled with bentonite chips. TD=2' (refusal)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: R. Mace 6-30-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-152
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1515
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	(3" Hand Auger) Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (refusal)
DEPTH TO WATER	NA

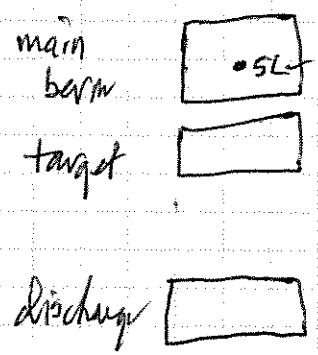
Sample ID: ECCLSL0152 | Sample Date / Time: 6.15.16 1515 | Sample Depth: 0-2' (refusal)

CHEMICAL ANALYSES (circle): VOC (SVOCs) PCBs Herbicides Pesticides Explosives (Metals FR) Asbestos Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR-3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fill and silt w/ shale pieces, dark yellowish brown (10YR3/4) organic material, dry, firm, low plasticity	NA	bullets observed SL-152 ~ 8' up berm
2				auger refusal @ 2'
		Boring terminated and backfilled with bentonite chips. TD = 2' (refusal)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol range east, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-30-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-153
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm
NAME OF DRILLER	YR
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1520
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (refusal)
DEPTH TO WATER	N/A

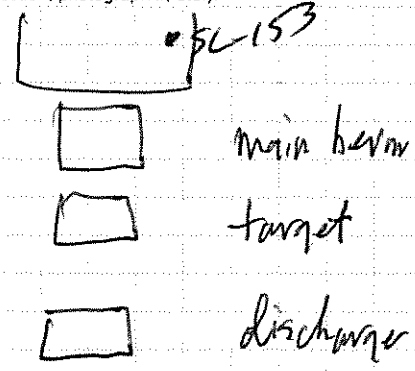
Sample ID: ECCLSL0153 | Sample Date / Time: 6.15.16 1520 | Sample Depth: 0-2' (refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fine and silt with shale pieces, dark yellowish brown (10YR 3/4) organic material, dry, firm, low plasticity	NA	bullets observed; SL-153 ~8' up berm
2				auger refusal @ 2'
		Boring terminated and backfilled with bentonite chips. TD=2' (refusal)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: Distal range east, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: J. Mayer 6.30.16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-154
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1445
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

Sample ID: ECCLSL0154 ECCLSL9017 | Sample Date / Time: 6-15-16 1445 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5	CL	Clay fill and silt with shale pieces, organic material, dry, firm. Dark yellowish brown 10YR 3/4	NA	SL-154 Approx 4' above ground. Collect field duplicate ECCLSL9017
2 3		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):

RATIONALE FOR LOCATION SELECTION: Distal range east main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: 2.

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-155
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE main berm
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1420
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-~~3~~ 2.5
DEPTH TO WATER	NA

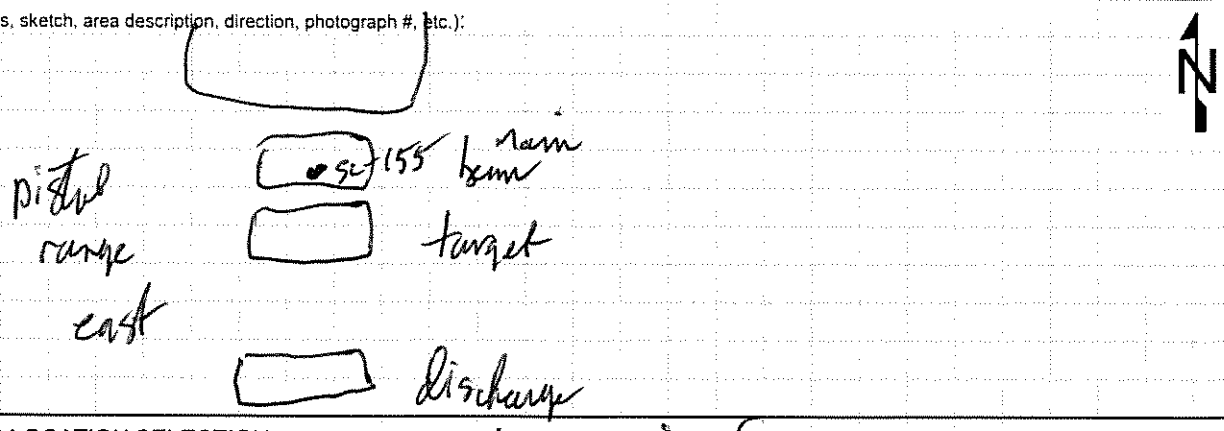
Sample ID: ECCLSL01~~55~~	Sample Date / Time: 6-15-16 1420	Sample Depth: 0-~~3~~ 2.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5	CL	CLAY fill, with silt and shale pieces, organic material, dry, firm	NA	SL-155 ~ 3' up berm
~~2~~ 2.5		Boring terminated and backfilled with bentonite chips. TD = 2.5		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, main berm

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-30-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-156
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL ~~for~~ PRE ~~Discharge~~
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1400
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

Main berm

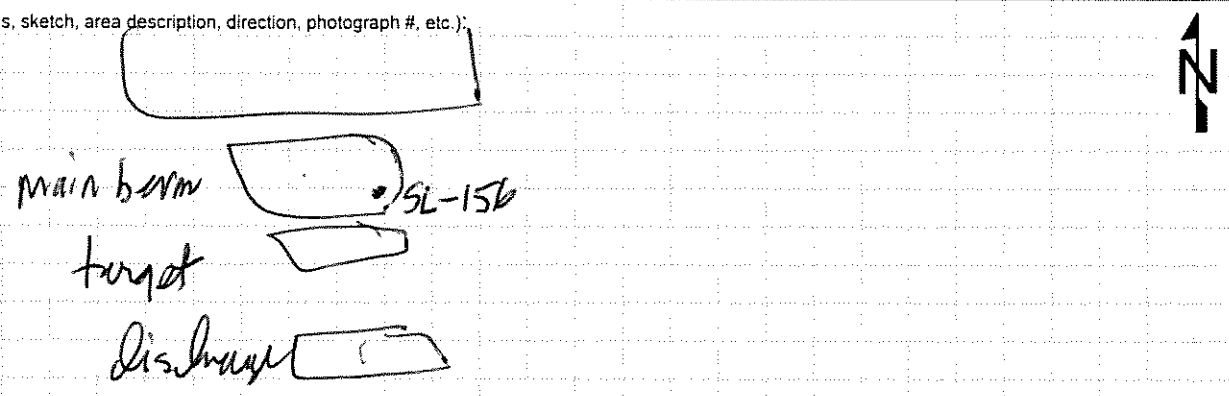
Sample ID: ECCL SL0156	Sample Date / Time: 6-15-16 1400	Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5	CL	Clay, with silt, firm, dry, organic material low plasticity 10YR 3/3, dark brown	NA	SL-156 Approx 4' Above ground level
3		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east main berm

GEOLOGIST SIGNATURE/DATE: Paul Conlon 6-15-16	QA/QC SIGNATURE/DATE: J. Mayer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-~~13~~ 157
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE high fire
NAME OF DRILLER	LM / RS
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1645
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

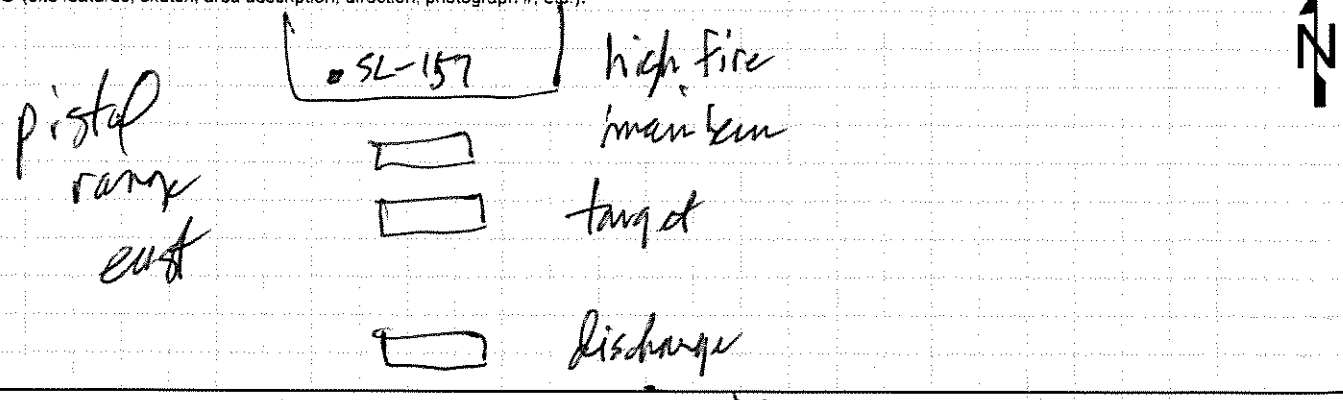
Sample ID: ECCLSL0157 | Sample Date / Time: 6-15-16 1645 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle) VOCs SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay, and silt, black (10YR 2/1), dry, firm organic material and roots, low plasticity	NA	Approx 5' from the berm
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol range east, high fire

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-30-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-~~13~~
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE high fire
NAME OF DRILLER	LM/RS
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1235
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

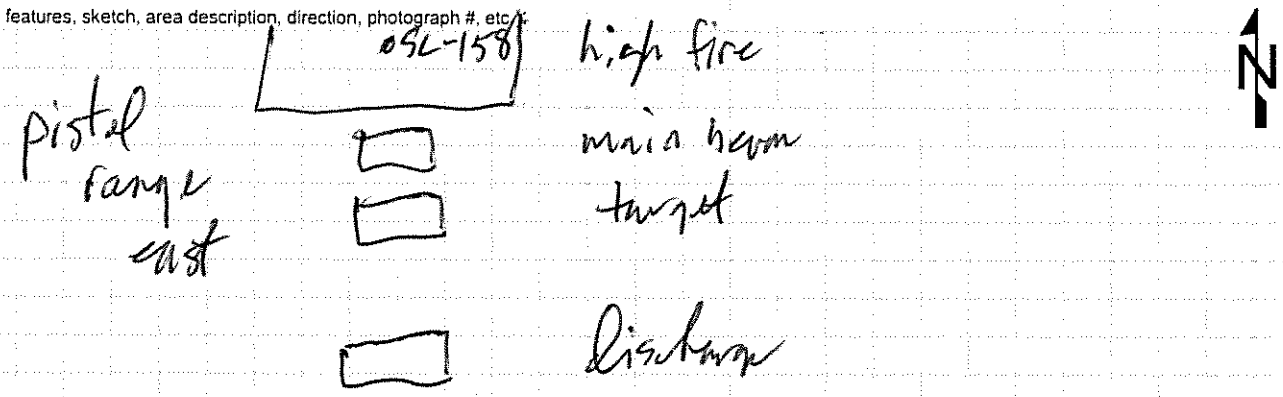
Sample ID: ECCLSL0158 | Sample Date / Time: 6-15-16 1635 | Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC SVOCs PCBs Herbicides Pesticides Explosives Metals Pb Asbestos Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY and silt, ~~with~~ or black (10YR 2/1), dry, fine organic material and roots, low plasticity	NA	
2				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east high fire area

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: L. Moser 6-30-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-~~130~~ 159
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE high fire
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.15.16 COMPLETED: 1625
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1'
DEPTH TO WATER	NA

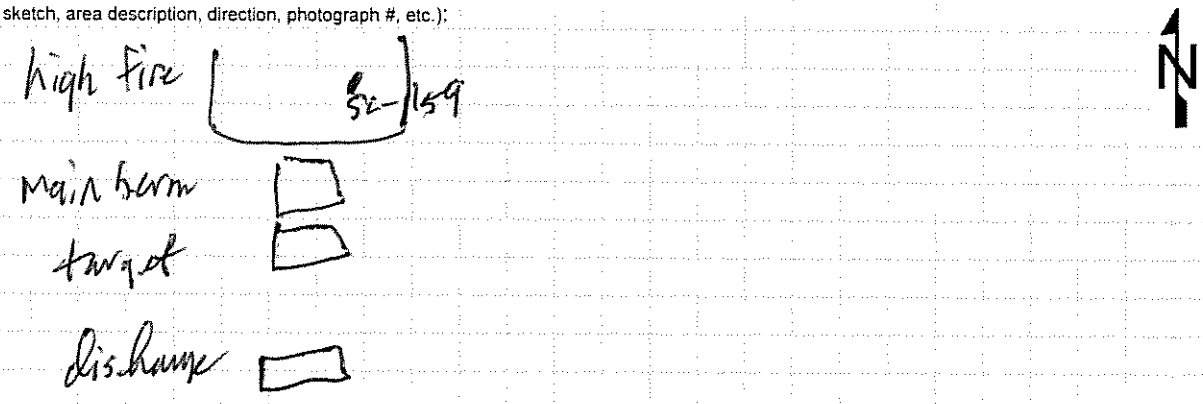
Sample ID: ECCLSL0~~130~~ 159	Sample Date / Time: 6.15.16 1625	Sample Depth: 0-1'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals Fe, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY, and silt, black (10YR 2/1), dry, firm, organic material and roots, low plasticity	NA	
2		TD = 1'		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east high fire

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-15-16	[signature] 6-30-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-160
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCC PBE lateral berm west
NAME OF DRILLER	FR
DRILL DATE/TIME	STARTED: 6:15/16 COMPLETED: 0925
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

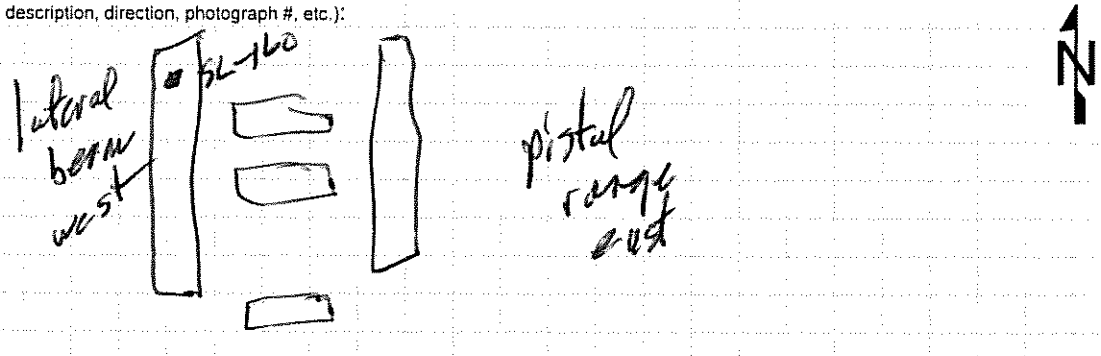
Sample ID: ECCLSCL160 | Sample Date / Time: 6.15.16 0925 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 4/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5		CLAY ~~and~~ fill and silt w/ shale pieces to 1", dark yellowish brown (10YR 4/4), dry, organic		SL-160 ~ 7' up berm
3		Boring terminated and backfilled with bentonite chips. TD=3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm west

GEOLOGIST SIGNATURE/DATE	6-15-16
QA/QC SIGNATURE/DATE	Q. Moser 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-16
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE lateral berm west
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6.15.16 COMPLETED: 0850
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

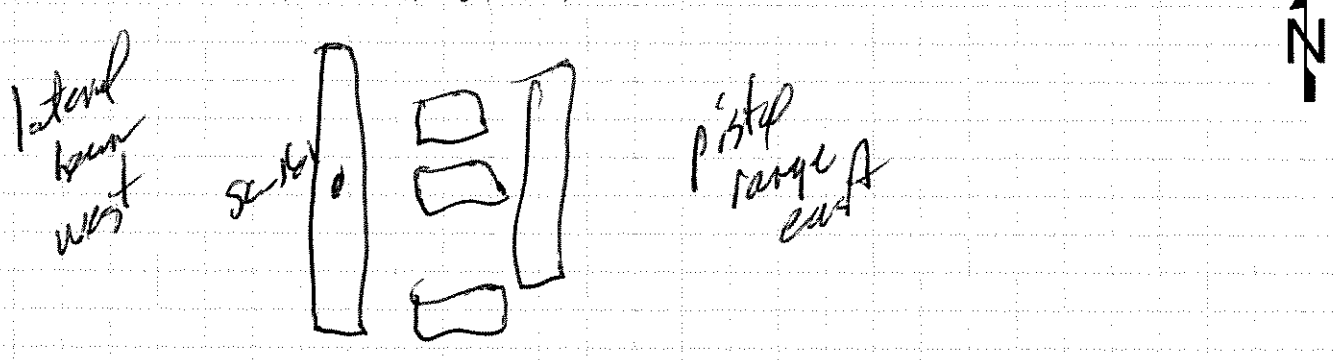
Sample ID: ECCLSL0161 ECCLSL9016 | Sample Date / Time: 6.15.16 0850 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5	CL	CLAY fill and silt w/ shale pieces and bullet casings, dark yellowish brown (10YR 4/4), dry, organics	NA	shotgun wads casings at surface; SL-16 is 4' above normal; collect Field Duplicate ECCLSL9016
3		Boring terminated and backfilled with bentonite chips. TD=3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm west

GEOLOGIST SIGNATURE/DATE: [signature] 6.15.16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

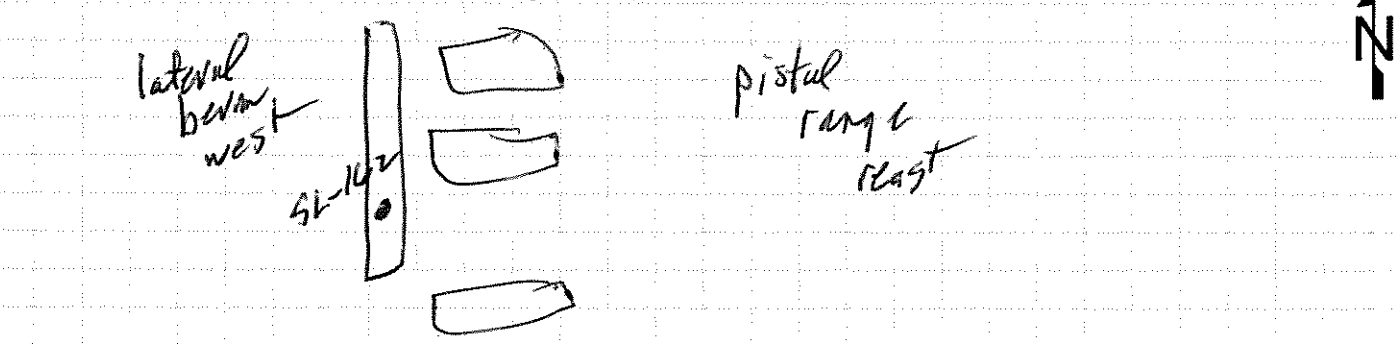
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-162
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRR lateral berm west
NAME OF DRILLER	Lay
DRILL DATE/TIME	STARTED: 6.15.16 COMPLETED: 0845
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA
Sample ID:	ECCLSL0162
Sample Date / Time:	6.15.16 0845
Sample Depth:	0-2' (refusal)
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals Pb Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	clay fill and silt w/ shale pieces to 1" and bullet casings, dark yellowish brown (10YR 4/4), dry organic	N/A	shell casings observed; SL-162 ~ 3' above ground
2				
		Boring terminated and backfilled with bentonite chips. TD = 2' (auger refusal)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm west

GEOLOGIST SIGNATURE/DATE	6.15.16
QA/QC SIGNATURE/DATE	6.29.16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-163
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL PRE / lateral berm west
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 0835
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

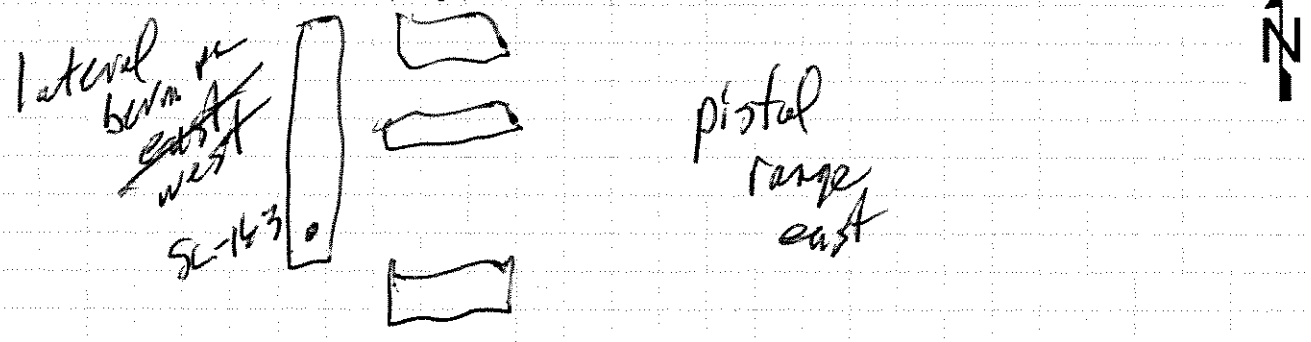
Sample ID: ECCLSL0163 | Sample Date / Time: 6.15.16 0835 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 4/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
0 – 1.5	CL	Clay fill and silt w/ shale pieces to 1", dark yellowish brown (10YR 4/4), dry, organic	N/A	SL-163 – 3' above ground
3		Boring terminated and backfilled with bentonite chips. TD = 3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm west

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: R. Mayer 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-164
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE lateral berm east
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1330
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

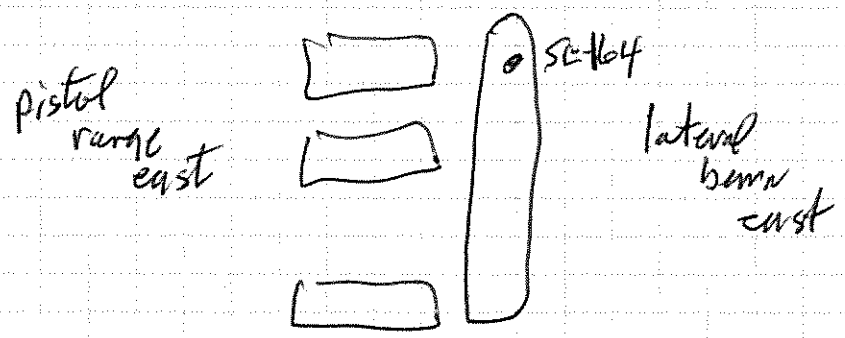
Sample ID: ECCLSL0164 | Sample Date / Time: 6.15.16 1330 | Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FA, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5	CL	Clay fill and silt with shale pieces to 1", dark yellowish brown (10YR 3/4), dry, low plasticity, organic with roots	NA	corner of berm and wall — wood and metal debris from possibly backstop
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm east wood/metal debris

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

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BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-165
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE lateral berm east
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1340
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1 (refusal)
DEPTH TO WATER	NA

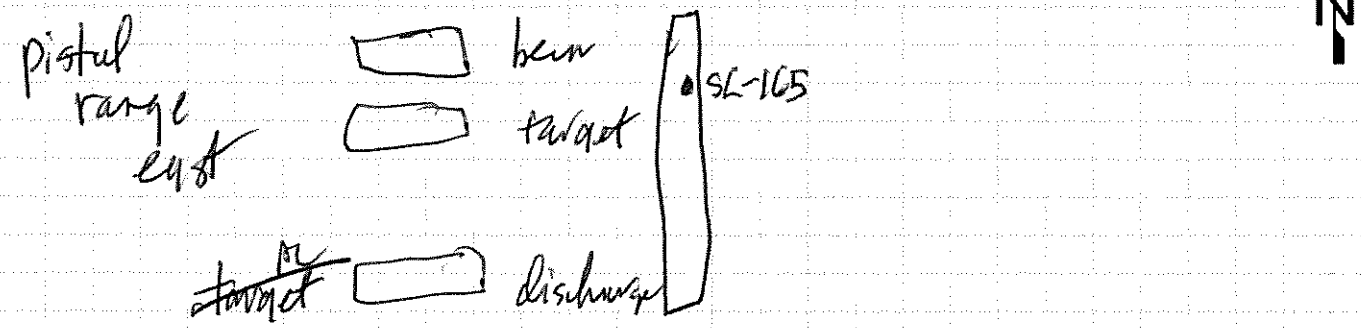
Sample ID: ECCLSL0165	Sample Date / Time: 6-15-16 1340	Sample Depth: 0-1 (refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL:	PID SERIAL#:	Colors from Munsell Soil Color Chart, Rev
NA	NA	10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fill and silt with shale pieces to 3" dark yellowish brown (10YR 3/4), dry, low plasticity, organic with roots	NA	corner of berm and well — wood and metal debris from possibly backstop
2		TD=1' auger refusal due to large shale		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm east, wood + metal debris

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
Kane Landon 6-15-16	R. Mayer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SC-166
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL pistol range east, lateral berm east
NAME OF DRILLER	JP
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 1310
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-3'
DEPTH TO WATER	NA

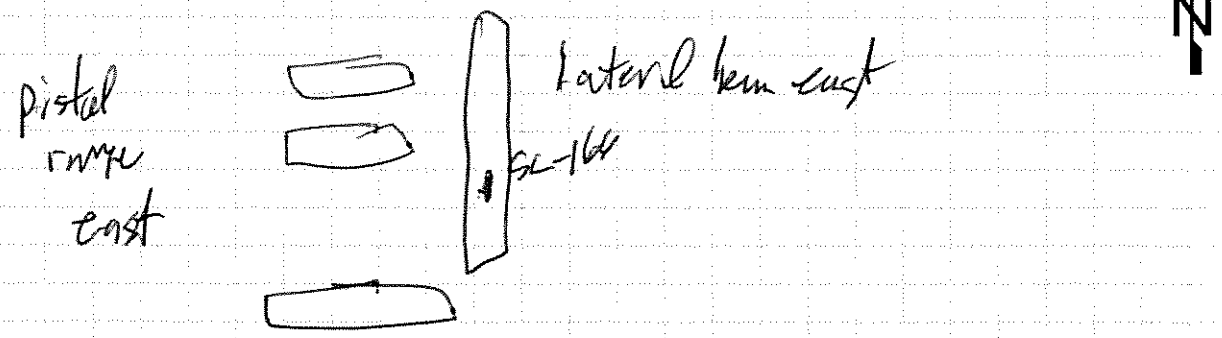
Sample ID: ECCLSC0166	Sample Date / Time: 6-15-16 1310	Sample Depth: 0-3'

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/4

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1.5	CL	CLAY fill, and silt, with shale pieces to 1" dark yellowish brown (10YR 3/4) organic w/ roots, dry, low plasticity	NA	SC-166 3' upbern CL
3		Boring terminated and backfilled with bentonite chips. TD=3'		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: Pistol range east, lateral berm east

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-15-16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-167
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL pre, lateral berm east
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.15-16 COMPLETED: 1315
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (refusal)
DEPTH TO WATER	NA

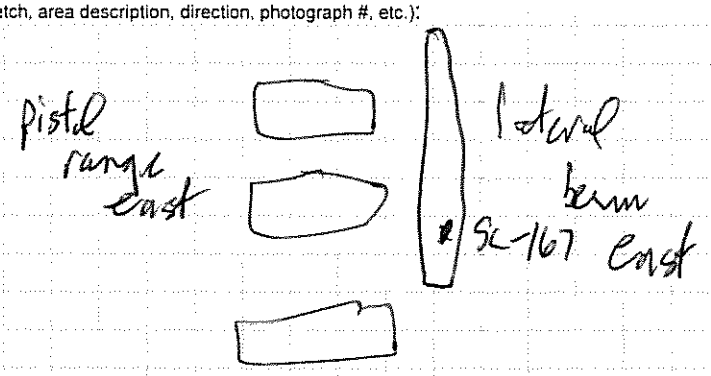
Sample ID: ECCLSL0167 | Sample Date / Time: 6-15-16 1315 | Sample Depth: 0-2' (refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	Clay fill ~~with~~ and silt with shale pieces to 1", dark yellowish brown (10YR 3/4) dry, low plasticity, organics and roots	NA	SL-167 2' up berm
2				auger refusal at 2 feet
		Boring terminated and backfilled with bentonite chips. TD = 2' (refusal)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm east

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SL-168
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL PRE lateral berm east
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6-15-16 COMPLETED: 0950
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2' (auger refusal)
DEPTH TO WATER	NA

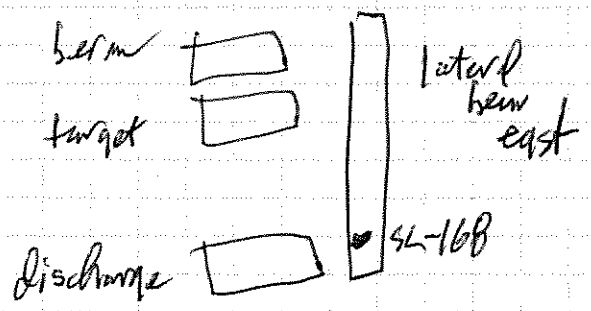
Sample ID: ECCLSC0168 | Sample Date / Time: 6.15-16 0950 | Sample Depth: 0-2' (auger refusal)

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PA, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	fill CLAY and silt with shale pieces, dark yellowish brown (10YR 3/6), some organics, low plasticity	NA	SL-168 ~3' up berm
2		Boring terminated and backfilled with bentonite chips. TD = 2' (auger refusal)		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: pistol range east, lateral berm west

GEOLOGIST SIGNATURE/DATE: [signature] 6-15-16

QA/QC SIGNATURE/DATE: D. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-001
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR DRAINAGE DITCH
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 0810
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0 - 1.75
DEPTH TO WATER	NA

Sample ID: ECCLSD001 | Sample Date / Time: 6.10.16 0810 | Sample Depth: 0 - 1.75

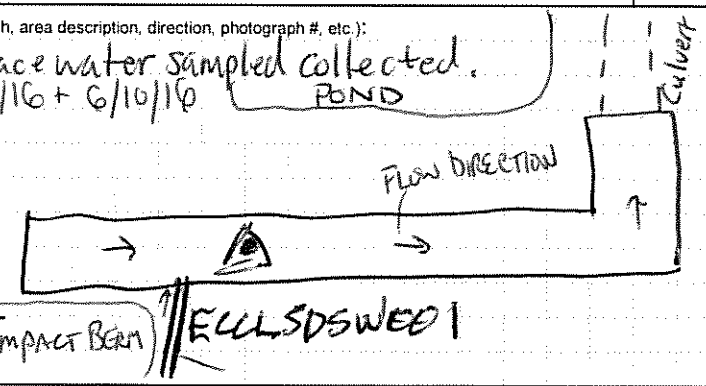
CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	PT	HIGHLY ORGANIC SOIL, and clay and silt, dark brown (10YR 3/3), very soft, damp	NA	
1				FT
	CL	CLAY, and silt, organic, dark brown (10YR 3/3), soft, moist, low plasticity	NA	
2		TD = 1.75 (auger refusal)		
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):

Dry/No surface water sampled collected. Dry on 6/8/16 + 6/10/16



N

RATIONALE FOR LOCATION SELECTION: RUNOFF FROM RANGES, downstream of confluence

GEOLOGIST SIGNATURE/DATE: Paul Beulin 6.10.16

QA/QC SIGNATURE/DATE: L. Meyer 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-002
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	LM
DRILL DATE/TIME STARTED:	6/9/16
COMPLETED:	1715
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1.5
DEPTH TO WATER	1.4

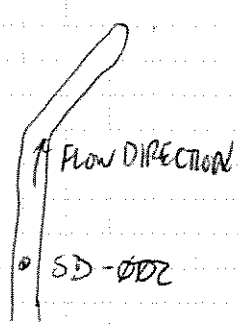
Sample ID: ECCLSD0002, ECCLSD9002 | Sample Date / Time: 6/9/16 1715 | Sample Depth: 0 - 1.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev ~~2000~~ 10YR 3/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	SILT AND CLAY, ~~BRO~~ DARK BROWN 10YR3/3, SOFT, MOIST, NON-PLASTIC, GRAVEL, SHOT GUN WADS	NA	Shale fragments
▽		GRAVEL		
2		Refusal @ 1.5'		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.): DRY/NO SURFACE WATER SAMPLE COLLECTED. Dry on 6/3/16 and 6/9/16



N

RATIONALE FOR LOCATION SELECTION: Drainage Ditch N of Trap/Skeet Range Discharge Area Downstream of where Ditch Banks/ground covered with clay pigeons

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
Michael Reilly 6/9/16	L. Moore 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SD-003
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME STARTED:	6/9/16
COMPLETED:	1610
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1.5
DEPTH TO WATER	NA

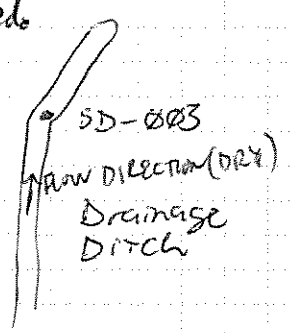
Sample ID: ECCLSD003	Sample Date / Time: 6/9/16 1610	Sample Depth: 0-1.5

CHEMICAL ANALYSES (circle) VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 10YR 3/4 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY AND SILT, (10YR 3/4) DARK YELLOWISH BROWN, SOFT, WET, NON PLASTIC. ↓ GRAVEL ↓ 10YR 4/6 DARK YELLOWISH BROWN	NA	Drainage ditch
2		Refusal @ 1.5'		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):
Dry/No surface water sample collected.



N

RATIONALE FOR LOCATION SELECTION: Drainage ditch N of Trap/Skeet Ranges.

GEOLOGIST SIGNATURE/DATE	6/9/16
QA/QC SIGNATURE/DATE	6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SD-004
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1600
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	1.5
DEPTH TO WATER	NA

Sample ID: ECCLSD004 | Sample Date / Time: 6/9/16 1600 | Sample Depth: 0 - 1.5

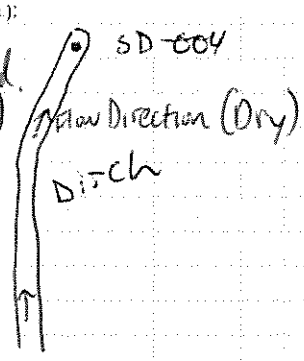
CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY AND SILT, BLACK (10YR 2/1), SOFT, ~~WE~~ MOIST NON PLASTIC, ROOTS ~~AND~~ ORGANIC MATERIAL	NA	Drainage ditch
		SOME GRAVEL		
2		Refusal @ 1.5'		
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):

Downstream end location N of Ranges
Dry/No surface water sample collected.
Ditchbanks had some surficial rocks (3-6")



N

RATIONALE FOR LOCATION SELECTION: Drainage ditch N of Firing Ranges (Trap/Skeet)

GEOLOGIST SIGNATURE/DATE	Mind Rilly 6/9/16
QA/QC SIGNATURE/DATE	2. Moor 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SD-005
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization **(ECCL FR)**
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME STARTED:	6/9/16 1635
COMPLETED:	
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; ~~Scoop/Spoon~~
TOTAL DEPTH OF BOREHOLE	1.5
DEPTH TO WATER	NA

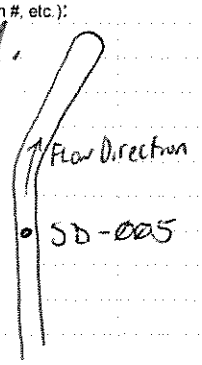
Sample ID: ECCLSD0005	Sample Date / Time: 6/9/16 1635	Sample Depth: 0 - 1.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	CL	SILT AND CLAY, BLACK (10YR 2/1) SOFT, MOIST, NON PLASTIC, ROOTS SHOTGUN WADS, GRAVEL	NA	
1				
		REFUSAL AT 1.5' BGS.		
2				
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):
Dry/No Surface water sample collected.



N

RATIONALE FOR LOCATION SELECTION: Drainage Ditch N of Trap/Skeet Ranges.

GEOLOGIST SIGNATURE/DATE	Mark Rolly 6/9/16
QA/QC SIGNATURE/DATE	A. Moore 6-29-16

leidos

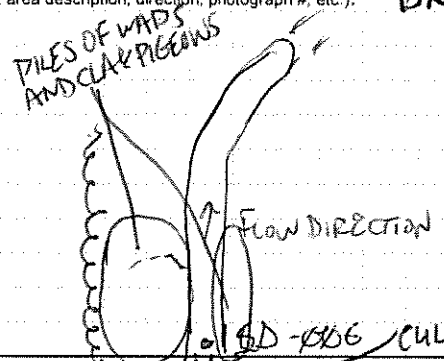
BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SD-006
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6/9/16 COMPLETED: 1700
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	~~2.0~~ JMR 6/9/16 2.0
DEPTH TO WATER	NA
Sample ID:	ECCLSD0006
Sample Date / Time:	6/9/16 1700
Sample Depth:	0 - 2.0
CHEMICAL ANALYSES (circle)	VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FX, Asbestos, Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 2/1 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	CL	CLAY AND SILT, BLACK (10YR 2/1), SOFT, MOIST, NON-PLASTIC, ABUNDANT CLAY TARGETS, SHOT GUN WADS.	N/A	Pile of wads and clays up bank
2				
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.): DRY/NO SURFACE WATER SAMPLE COLLECTED.

Dry on 6/3 and 6/9



RATIONALE FOR LOCATION SELECTION: BANKS COVERED IN CLAY PIGEONS/WADS Drainage Ditch immediately N of Trap/Skeet Range Discharge Areas.

GEOLOGIST SIGNATURE/DATE	Mind Rilly 6/9/16
QA/QC SIGNATURE/DATE	L. Mayer 6-29-16

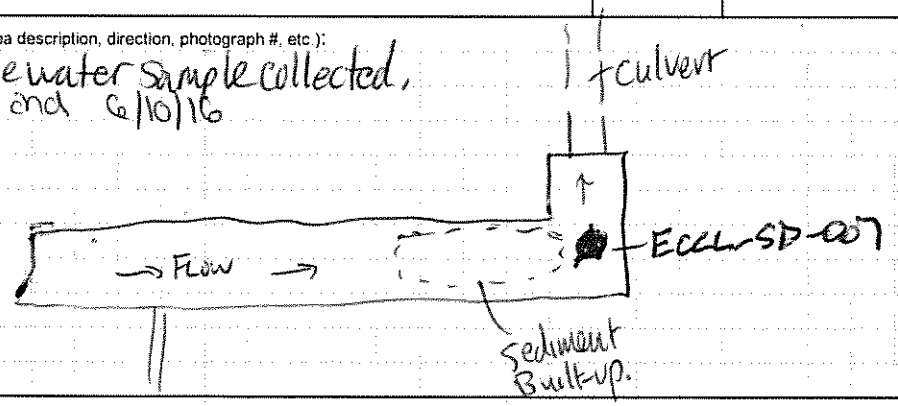
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SD-007
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR DRAINAGE DITCH
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 0725
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1.5' (refusal)
DEPTH TO WATER	NA
Sample ID:	ECCLSD0007
Sample Date / Time:	6.10.16 0725
Sample Depth:	0-1.5
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev	10YR 2/3 2000

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	PT	HIGHLY ORGANIC SOIL, dark brown (10YR 3/3), very soft, ~~moist~~ damp, organic material	NA	south drainage ditch to capture runoff from ranges
1	CL	CLAY, with silt, organic, dark brown, soft, low plasticity		
		1.5' (refusal)		auger refusal @ 1.5'
2				
3				
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):
Dry/No surface water sample collected, PW on 6/8/16 and 6/10/16



RATIONALE FOR LOCATION SELECTION: CAPTURE RUNOFF FROM RANGES

GEOLOGIST SIGNATURE/DATE	6-10-16
QA/QC SIGNATURE/DATE	2 Mar 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SD-008
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL FR DRAINAGE DITCH
NAME OF DRILLER	LM
DRILL DATE/TIME	STARTED: 6.10.16 COMPLETED: 0735
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-1.5 (refusal)
DEPTH TO WATER	NA

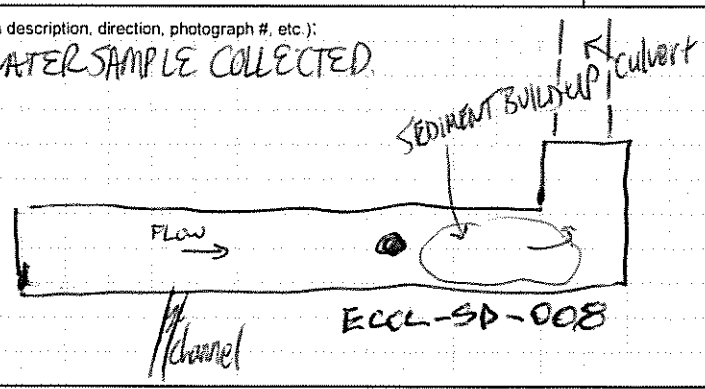
Sample ID: ECCLSD0008 | Sample Date / Time: 6.10.16 0735 | Sample Depth: 0-1.5

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	PT	HIGHLY ORGANIC SOIL, and clay and silt, dark brown (10YR 3/3), very soft, damp	NA	
	CL	CLAY, and silt, organic, dark brown (10YR 3/3), very soft, damp, low plasticity		
2		TD-1.5 RUBER REFUSAL @ 1.5'		
3		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):
DRY/NO SURFACE WATER SAMPLE COLLECTED.



N

RATIONALE FOR LOCATION SELECTION: RUNOFF FROM BANKS

GEOLOGIST SIGNATURE/DATE: [signature] 6.10.16

QA/QC SIGNATURE/DATE: [signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SD-009
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL FR DRAINAGE DITCH
NAME OF DRILLER	JR
DRILL DATE/TIME	STARTED: 6-10-16 COMPLETED: 0800
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger, Scoop/Spoon
TOTAL DEPTH OF BOREHOLE	0-2
DEPTH TO WATER	NA

Sample ID: ECCLSD009 | Sample Date / Time: 6-10-16 0800 | Sample Depth: 0-2

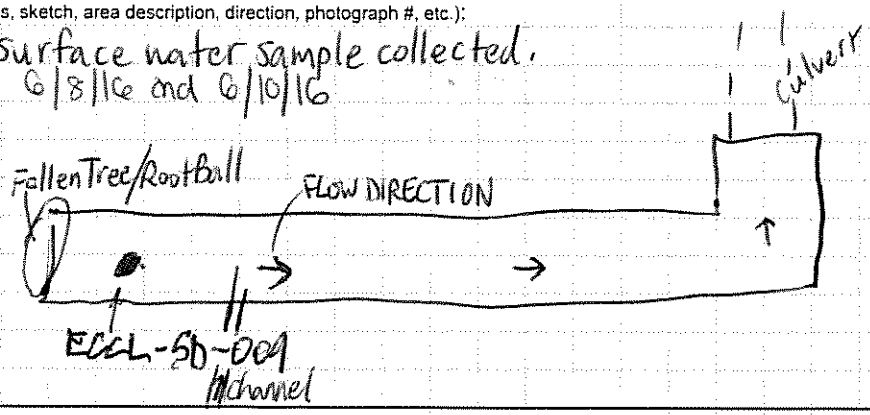
CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev. 2000: 10YR 5/3 and 3/3

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	PT	HIGHLY ORGANIC SOIL, and clay, silt moist, dark brown (10YR 3/3) very soft	NA	fallen tree root ball blocking upstream
1	CL	CLAY, and silt, yellowish brown (10YR 5/5) moist, low plasticity organic material		
2	CL	CLAY SHALE, very hard, very dark brown 10YR 2/2, damp to moist		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):

Dry/No surface water sample collected. Dry on 6/8/16 and 6/10/16



RATIONALE FOR LOCATION SELECTION: RUNOFF FROM FIRING RANGES,

GEOLOGIST SIGNATURE/DATE: Paul Lindsay 6-10-16

QA/QC SIGNATURE/DATE: L. Moyer 6-29-16

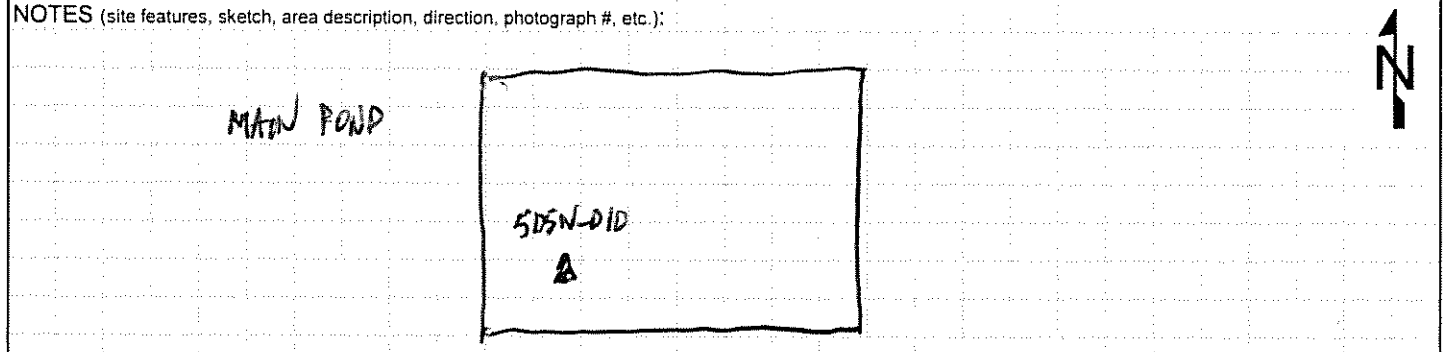
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-010
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (ECCL FR)
BOREHOLE SITE	ECCL MAIN POND
NAME OF DRILLER	JR/JS
DRILL DATE/TIME	STARTED: 6-8-16 COMPLETED: 0930 (SW) 0940 (SD)
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon SD; Bottle/hand
TOTAL DEPTH OF BOREHOLE	~~NA SW/SD~~ - 0-0.5
DEPTH TO WATER	NA - SW/SD
Sample ID:	ECCL SW010 / SD010 (MS/MSD)
Sample Date / Time:	6-8-16 0930/0940
Sample Depth:	NA SW/SD 0-0.5
CHEMICAL ANALYSES (circle)	VOC; SVOCs; PCBs; Herbicides; Pesticides; Explosives; Metals FR; Asbestos; Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev 2000	10YR 3/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
PV	NA	ECCLSW010 - clear, colorless, odorless temp 21.76°C cond 0.250 mS/cm pH - 3.59 turb 11.7 NTU ORP - 406 mV DO 5.59 mg/L	NA	
PV	PT	ECCLSD012 - collected ~2.5' below surface HIGHLY ORGANIC SOILS, dark yellowish brown (10YR 3/6); saturated, organic odor, pieces of shale		poor and hand auger attempts failed to recover sample
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: MAIN POND, SW

GEOLOGIST SIGNATURE/DATE: Paul Powlesik 6-8-16

QA/QC SIGNATURE/DATE: Mike Rilly 6-10-16

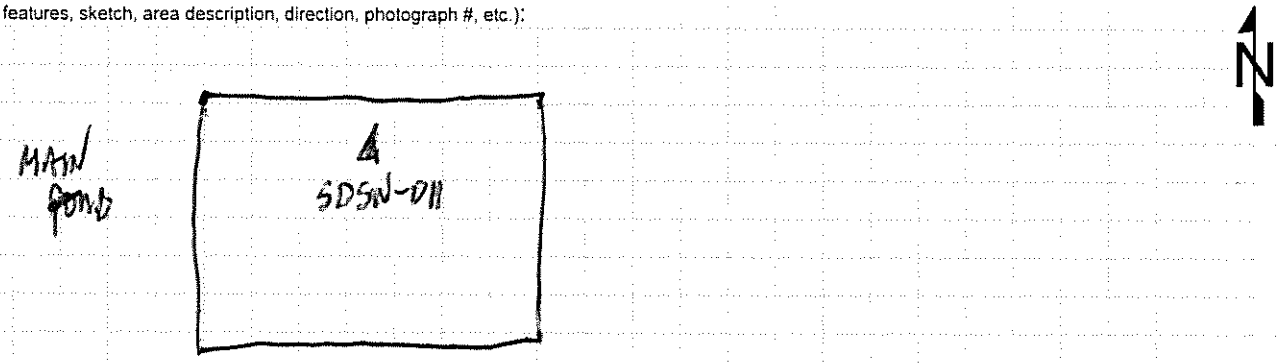
leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-011
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL MAIN POND
NAME OF DRILLER	JR/RS
DRILL DATE/TIME	STARTED: 6-8-16 COMPLETED: 1005 (SW) 1025 (SD)
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger bottle/hand (SW) Scoop/Spoon SD
TOTAL DEPTH OF BOREHOLE	NA - SW/SD 0 ~~0.5~~ 2MG-29-6
DEPTH TO WATER	NA - SW/SD
Sample ID:	ECCL SW011 (MS/MSD) / SD011 2MG-29-6 ECCL SD9001, 11 11
Sample Date / Time:	6-8-16 1005/1025
Sample Depth:	NA - SW/SD 2MG-29-6 0-0.5 SD
CHEMICAL ANALYSES (circle)	VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint
PID MAKE/MODEL:	NA
PID SERIAL#:	NA
Colors from Munsell Soil Color Chart, Rev 2000	10YR 3/6

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
PW	NA	ECCLSW011 - clear, colorless, odorless temp °C cond ms/cm pH turb NTU ORP mV DO mg/L	N/A	collected MS/MSD ~~ECCLSW~~ PL
PW	PT	ECCLSD011 - collected ~4 ft below surface HIGHLY ORGANIC SOIL, dark yellowish brown (10YR 3/6), saturated, organic odor.		collected Field duplicate ECCLSD9001
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: MAIN POND NORTH

GEOLOGIST SIGNATURE/DATE	Paul Tondiarla 6-8-16
QA/QC SIGNATURE/DATE	[illegible] 6-10-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-012
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL MAIN POND
NAME OF DRILLER	JR/RS
DRILL DATE/TIME	STARTED: 6-8-16 COMPLETED SW, SD 0835/0905
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon; Bottle (hand) - SW; ponar - SD
TOTAL DEPTH OF BOREHOLE	~~NA~~ - SW/SD - 0 - 0.5
DEPTH TO WATER	NA - SW/SD

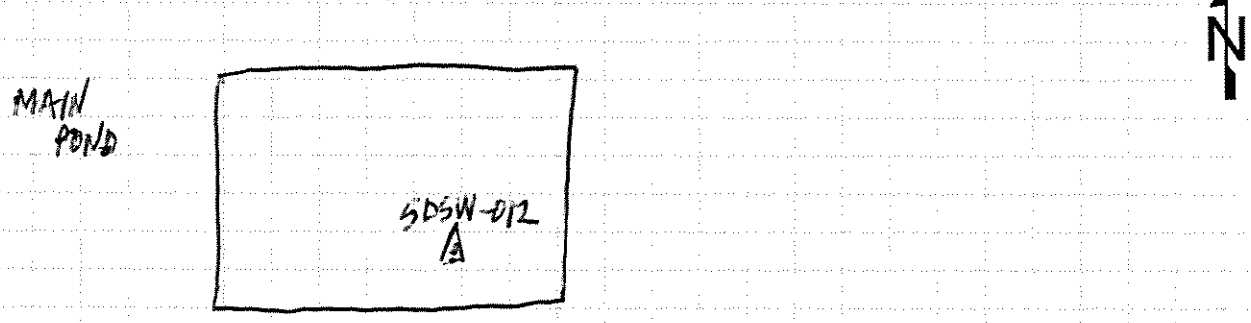
Sample ID: ECCLSW012/SD012	Sample Date / Time: 6-8-16 0835	Sample Depth: NA SW/SD SD - 0.05	

CHEMICAL ANALYSES (circle): VOC, (SVOCs), PCBs, Herbicides, Pesticides, Explosives, (Metals FR), Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: ~~NA~~ 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	NA	ECCLSW012 - clear, colorless, odorless Temp 21.26 cond 0.25 ms/cm pH 3.42 turb 22.7 NTU ORP 399 mV DO 5.63 mg/L	NA	field dup - ECCLSW9001 (confirmed pH reading w/ backup horiba)
	PT	ECCLSD012 - collected ~ 5' below surface HIGHLY ORGANIC SOILS, dark yellowish brown (10YR, 3/2); saturated, organic odor		hand bottom; difficult to collect sufficient sample volume
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: MAIN POND, SE

GEOLOGIST SIGNATURE/DATE	Paul Lowdermilk 6-8-16
QA/QC SIGNATURE/DATE	Michael Reilly 6-10-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-~~DT~~ SD-013
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL LONG POND
NAME OF DRILLER	JR / RS
DRILL DATE/TIME	STARTED: 6-8-16 COMPLETED: 1125 / 1135
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger; Scoop/Spoon; hand bottle (SW); PONAR (sed)
TOTAL DEPTH OF BOREHOLE	NA - SW / SD - 0.05
DEPTH TO WATER	NA - SW / SD

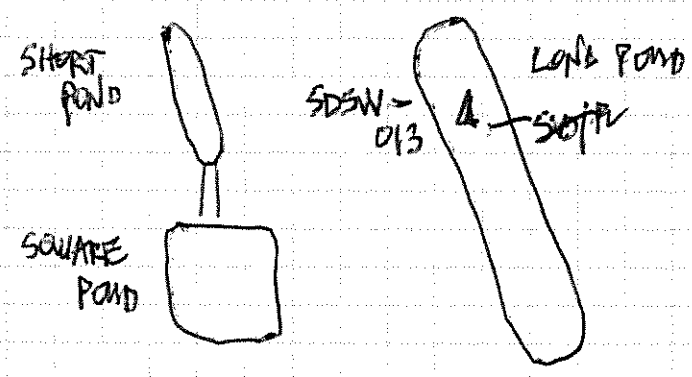
Sample ID: ECCLSW013 / SD013	Sample Date / Time: 6-8-16 1125 SW 1135 SD	Sample Depth: NA - SW / SD 0-0.5 SD

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals PR, Asbestos, Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev 2000: 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	NA	ECCLSW013 - clear, colorless, odorless temp 21.14 °C cond 0.430 mS/cm pH 3.04 turb 1.3 NTU ORP 417 mV DO 5.98 mg/L	NA	
	PT	ECCLSD013 - collected @ 2' below surface HIGHLY ORGANIC SOIL, very dark grayish brown (10YR 3/2), saturated, strong organic odor		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: LONG POND NORTH

GEOLOGIST SIGNATURE/DATE: Paul Fondenille 6-8-16	QA/QC SIGNATURE/DATE: Mark Reilly 6-10-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-014
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL LONG POND
NAME OF DRILLER	JR/RS
DRILL DATE/TIME	STARTED: 6-8-16 COMPLETED: 1145/1155
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	
3" Hand Auger	bottle head -SW
Scoop/Spoon	ponar -SD
TOTAL DEPTH OF BOREHOLE	~~NA - SW~~ 2ft bgs/SD - 0.-0.5
DEPTH TO WATER	NA - SW/SD

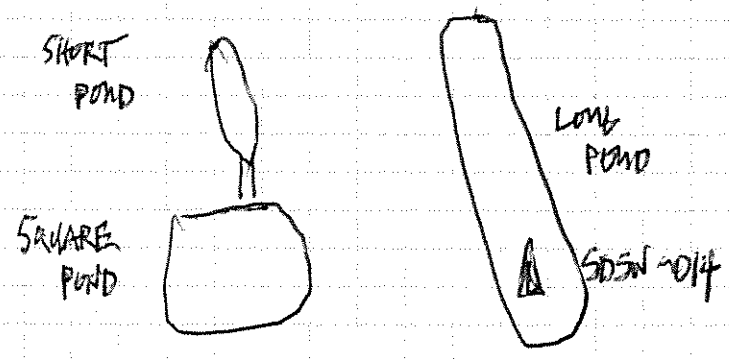
Sample ID: ECCL-SW014/SD014 ~~ECCL-FR-002~~	Sample Date / Time: 6-8-16 1145 SW 1155 SD	Sample Depth: NA -SW/SD 2ft bgs 0-0.5 SD

CHEMICAL ANALYSES (circle) VOC SVOCs PCBs Herbicides Pesticides Explosives Metals FR Asbestos Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Spil Color Chart, Rev 2000 10YR 3/2

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	NA	ECCLSW014 - clear, colorless, odorless temp 21.00 °C cond 0.435 mS/cm pH 3.66 turb 0.7 NTU ORP 416 mV do 5.68 mg/L	N/A	
	PT	ECCLSD014 - collected at 2' below surface HIGHLY ORGANIC SOIL, very dark grayish brown (10YR 3/2), saturated, strong organic odor		
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



N

RATIONALE FOR LOCATION SELECTION: LONG POND SOUTH

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-10-16	[signature] 6-10-16

leidos	CLIENT: NASA	LOCATION NUMBER/STATION ID: ECCL-SDSW-015
BORING LOG	LOCATION: NASA Plum Brook Station Sandusky, Ohio	SHEET 1 OF 1

PROJECT: Multi-site Site Characterization (**ECCL FR**)	BOREHOLE SITE: ECCL SHORT POND
NAME OF DRILLER: JR/RS	DRILL DATE/TIME: STARTED: 6-8-16 COMPLETED: 1525(SW)/1535(SD)
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle): 3" Hand Auger: hand bottle; Scoop/Spoon: ponar	TOTAL DEPTH OF BOREHOLE: SD-0.5
	DEPTH TO WATER: NA-SW/SED

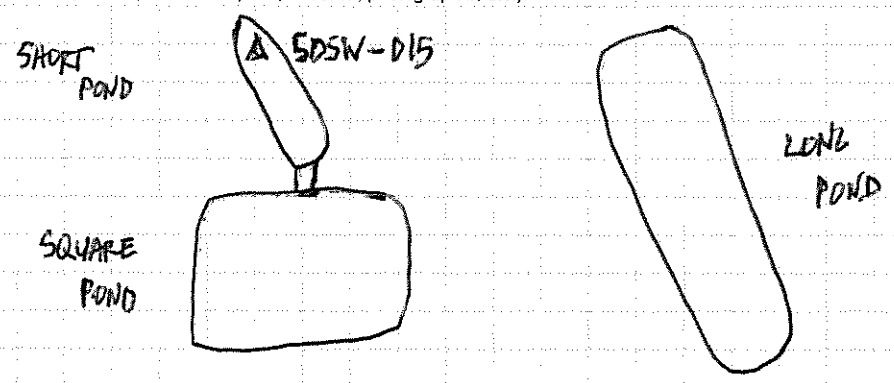
Sample ID: ECCLSW015/SD015	Sample Date / Time: 6-8-16 1525(SW) 1535(SD)	Sample Depth: NA-SW 0-0.5-SD

CHEMICAL ANALYSES (circle): VOC (SVOCs) PCBs Herbicides Pesticides Explosives Metals (FR) Asbestos Lead Paint

PID MAKE/MODEL: NA PID SERIAL#: NA Colors from Munsell Soil Color Chart, Rev. 2000: 10YR 2/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
— PL 1	N/A	ECCLSW015 – clear, odorless, colorless temp 21.34°C cond 0.348 mS/cm pH 4.53 turb 1.8 NTU orp 340 mV DO 2.66 mg/L	N/A	stagnant film on top of water
— PL 2	PT	~~ECCL-SD5~~ PL ECCLSD015 – collected ~2.5 ft below surface HIGHLY ORGANIC SOIL, black (10YR 2/1), saturated, strong organic odor	N/A	
		Boring terminated and backfilled with bentonite chips. ~~SHORT POND NORTH~~ PL		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SHORT POND SOUTH

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
[signature] 6-8-16	[signature] 6-29-16

leidos

BORING LOG

CLIENT	NASA
LOCATION NUMBER/STATION ID	ECCL-SDSW-016
LOCATION	NASA Plum Brook Station Sandusky, Ohio
SHEET	1 OF 1
PROJECT	Multi-site Site Characterization (**ECCL FR**)
BOREHOLE SITE	ECCL SHORT POND
NAME OF DRILLER	JR/RS
DRILL DATE/TIME	STARTED: 6-8-16 COMPLETED: 1545(SW) 1555(SD)
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle)	3" Hand Auger: hand/bottle; Scoop/Spoon: ponar
TOTAL DEPTH OF BOREHOLE	SD 0-0.5
DEPTH TO WATER	NA - SW/SD

Sample ID: ECCLSW016 / SD016

Sample Date / Time: 6-8-16 1545(SW) 1555(SD)

Sample Depth: NA - SW 0-0.5 - SD

CHEMICAL ANALYSES (circle): VOC, (SVOCs), PCBs, Herbicides, Pesticides, Explosives, (Metals FR), Asbestos, Lead Paint

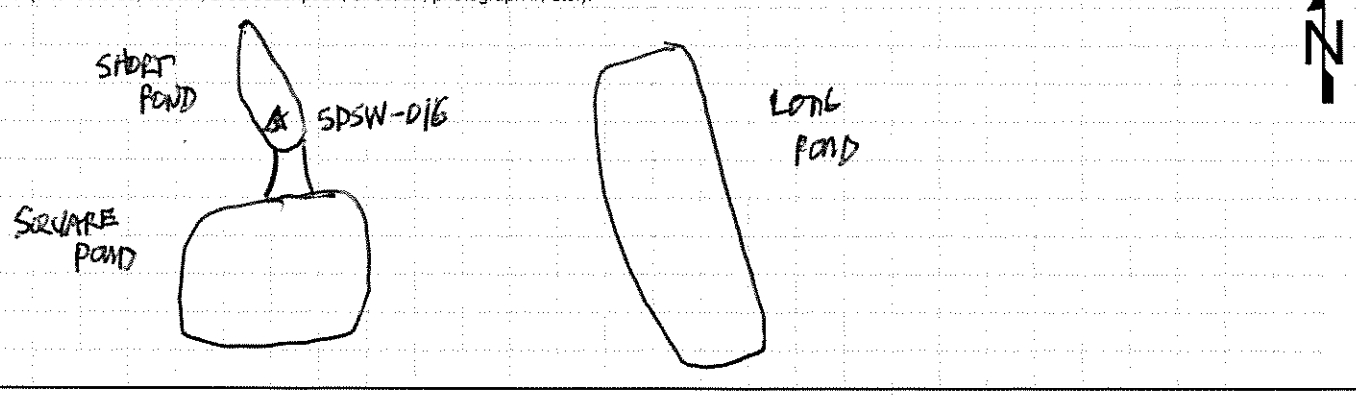
PID MAKE/MODEL: NA

PID SERIAL#: NA

Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
PL	N/A	ECCLSW016 - temp 21.47°C, cond 0.350 mS/cm, pH 4.60, turb 2.4 NTU, ORP 312 mV, DO 2.59 mg/L	N/A	stagnant film on top of water
PL	PT	ECCLSD015 — collected ~ 2.5 ft below surface HIGHLY ORGANIC SOIL, black (10YR 2/1) saturated, strong organic odor	N/A	
		Boring terminated and backfilled with bentonite chips. ~~SHORT POND SOUTH~~ PL		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SHORT POND SOUTH

GEOLOGIST SIGNATURE/DATE	Paul Lordemann 6-8-16
QA/QC SIGNATURE/DATE	[illegible] 6-29-16

leidos	CLIENT: NASA	LOCATION NUMBER/STATION ID: ECCL-SDSW-017
BORING LOG	LOCATION: NASA Plum Brook Station Sandusky, Ohio	SHEET 1 OF 1

PROJECT: Multi-site Site Characterization (**ECCL FR**)	BOREHOLE SITE: ECCL SQUARE POND
NAME OF DRILLER: JR/RS	DRILL DATE/TIME: STARTED: 6-8-16 COMPLETED: 1205 (SW) 1215 (SD)
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle): 3" Hand Auger — hand bottle (SW); Scoop/Spoon — ponar (SD)	TOTAL DEPTH OF BOREHOLE: ~~NA - SW~~/SD 0-0.5
	DEPTH TO WATER: NA - SW/SD

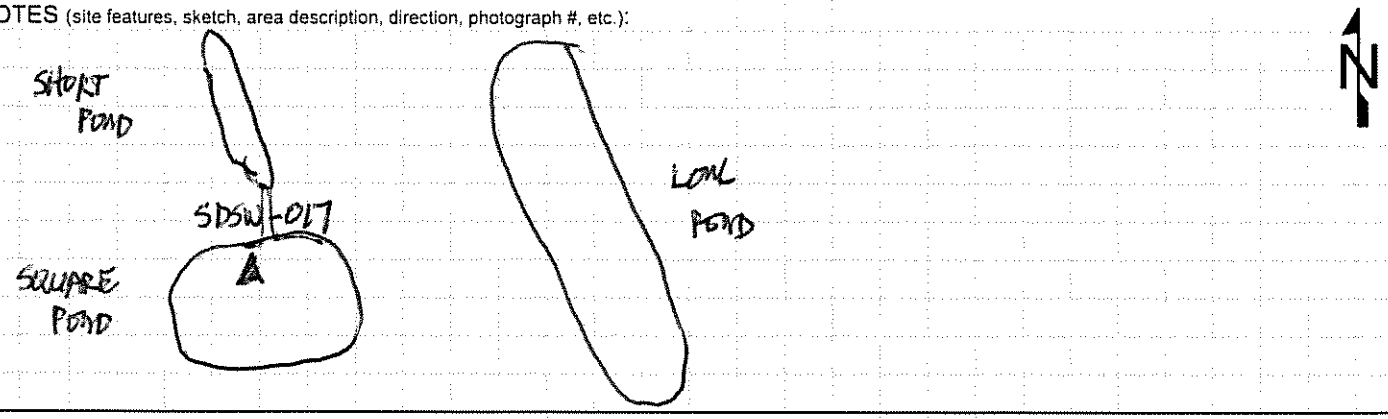
Sample ID: ECCLSW017/SD017	Sample Date / Time: 6-8-16 1205 SW 1215 SD	Sample Depth: NA - SW/SD 0-0.5 SD 2M 6-29-16

CHEMICAL ANALYSES (circle): VOC, (SVOCs), PCBs, Herbicides, Pesticides, Explosives, (Metals FR), Asbestos, Lead Paint

PID MAKE/MODEL: NA — PID SERIAL#: NA — Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
1	NA	ECCLSW017 - clear, colorless, odorless; temp 20.41°C; pH 4.71; orp 3.32 mV; cond 0.351 mS/cm; turb 2.0 NTU; do 3.0 mg/L (AC 4.13)	N/A	Floating vegetation
2	PT	ECCLSD017 - collected at 2' below surface; HIGHLY ORGANIC SOIL, black (10YR 2/1), saturated, strong organic odor	N/A	
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SQUARE POND NORTH

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
Paul Vandermeulen 6-8-16	R. Mayer 6-29-16

leidos	CLIENT: NASA	LOCATION NUMBER/STATION ID: ECCL-SDSW-018
BORING LOG	LOCATION: NASA Plum Brook Station Sandusky, Ohio	SHEET 1 OF 1

PROJECT: Multi-site Site Characterization (**ECCL FR**)	BOREHOLE SITE: ECCL SQUARE POND
NAME OF DRILLER: JR/RS	DRILL DATE/TIME: STARTED: 6-8-16 COMPLETED: 1225/1235
SIZES AND TYPES OF SAMPLING EQUIPMENT (circle): 3" Hand Auger — hand bottle (SW); Scoop/Spoon — ponar (SD)	TOTAL DEPTH OF BOREHOLE: ~~NA-SW~~/SD - 0.05
	DEPTH TO WATER: NA - SW/SD

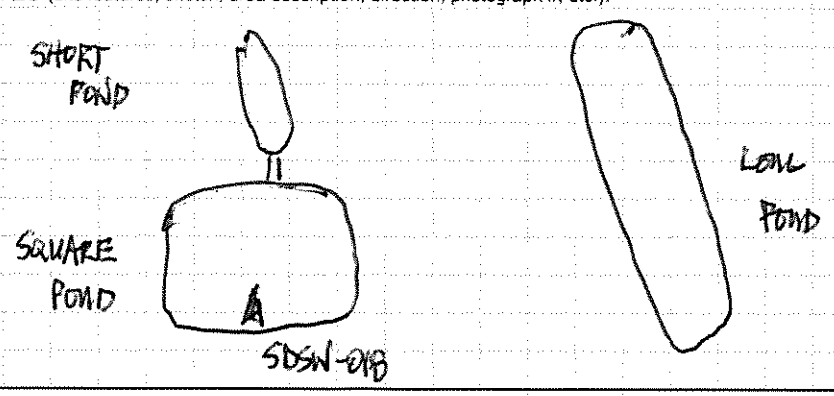
Sample ID: ECCLSW018/SD018	Sample Date / Time: 6.8.16 1225 SW 1235 SD	Sample Depth: NA - SW/~~SD~~ 0-0.5 SD

CHEMICAL ANALYSES (circle): VOC, SVOCs, PCBs, Herbicides, Pesticides, Explosives, Metals FR, Asbestos, Lead Paint

PID MAKE/MODEL: NA | PID SERIAL#: NA | Colors from Munsell Soil Color Chart, Rev 2000: 10YR 2/1

DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	AMBIENT MONITORING (PPM)	REMARKS, OBSERVATIONS, DEVIATIONS, etc.
	N/A	ECCLSW018 - clear, odorless, colorless temp 20.75 °C cond 0.349 ms/cm pH 4.73 turb 1.7 NTU orp 326 mV do 6.34 mg/L	N/A	floating vegetation
	PT	ECCLSD018 - collected ~ 2.5 ft below surface HIGHLY ORGANIC SOIL, black (10YR 2/1), saturated, strong organic odor	N/A	
		Boring terminated and backfilled with bentonite chips.		

NOTES (site features, sketch, area description, direction, photograph #, etc.):



RATIONALE FOR LOCATION SELECTION: SQUARE POND SOUTH

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE
Paul [illegible] 6-8-16	2Mac 6-29-16

ECCL FIRING RANGE
2019
SOIL, SEDIMENT, AND GROUNDWATER SAMPLE LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS

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HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-169	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Macro-Core Sampler, Acetate liner	8. BOREHOLE LOCATION: Trap and Skeet Yard Former Clubhouse	
	9. DRILL DATE/TIME STARTED: 7-29-19 / 1244	COMPLETED: 7/29/19 / 1345
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

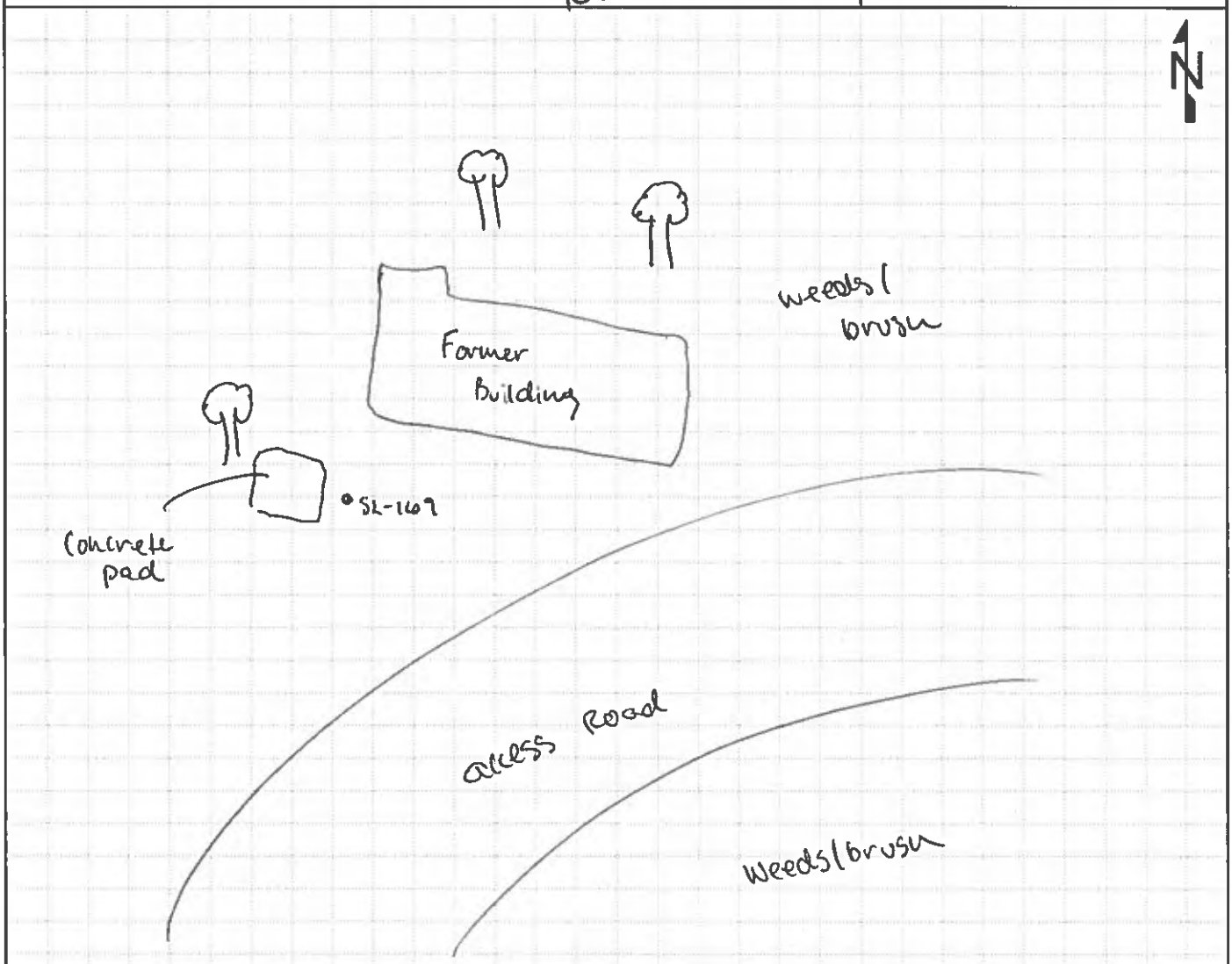
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/29/19	7/30/19	SL-169

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-169	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic rich topsoil, SILT and some sand, fine, subangular, 10YR 2/2, soft, damp, non-plastic	3.6/4	40	No odor in 7/h. ~~ECCL0169~~ ECCLSL0169 @ 1515 0-1' MS+MSD DUPLICATE
	2		Trace fine gravel ~~(0.25")~~ (0.25") JD 7-29-17		20	
	2.1' 2.2'	GC	SILT and CLAY, some weathered shale (0.5"), angular, 10YR 2/2, soft, damp, nonplastic		10	
	3	CL	CLAY, 10YR w/1 mottled w/ 10YR 5/3			
	4	SH	weathered shale, 10YR 3/1, angular fragments, damp, non-plastic		30	
			B.O.H.			
	5					
	6					
	7					
	8		JD 7/29/17			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/29/17	7/30/17	SL-169

HTRW DRILLING LOG

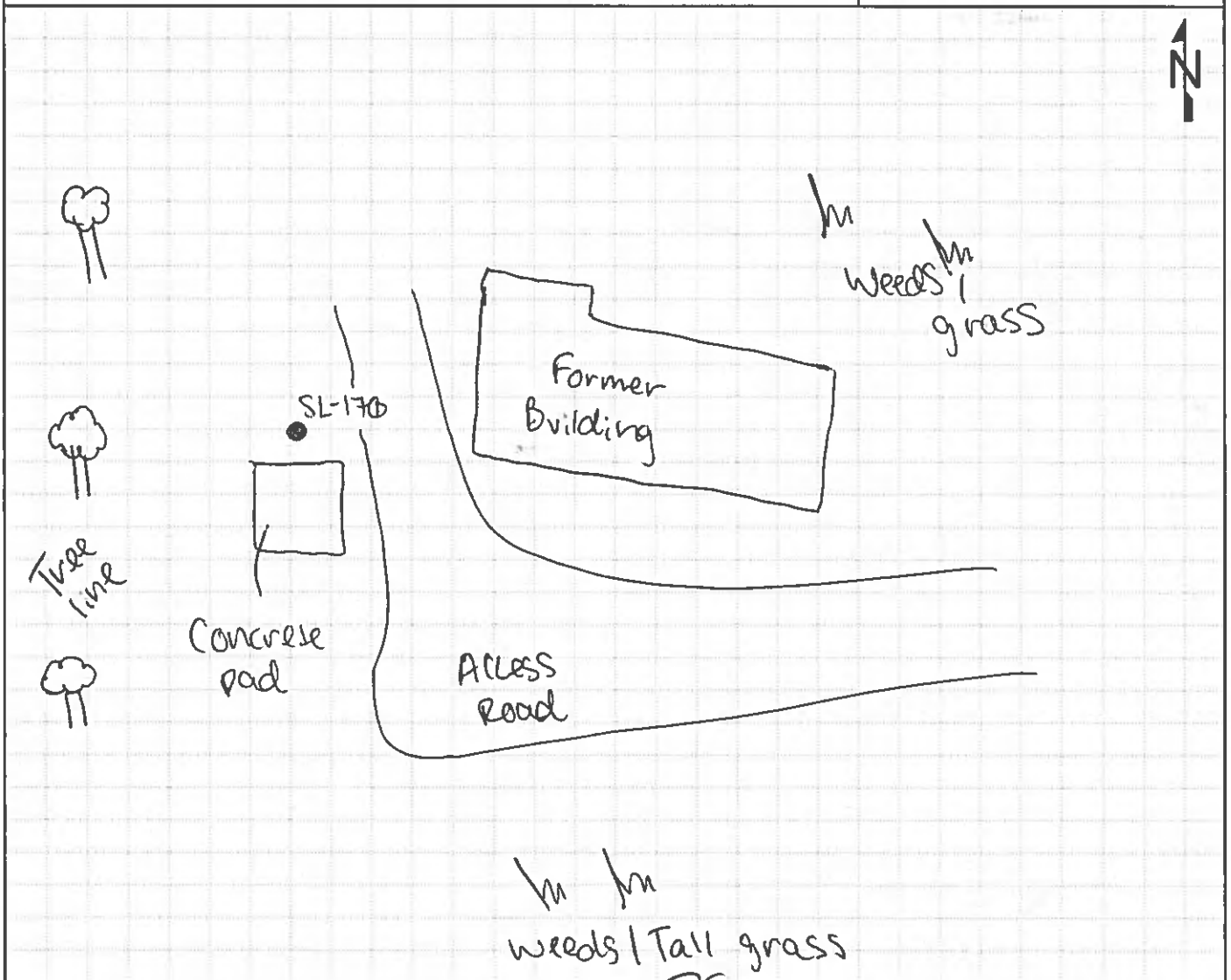
CLIENT: NASA	BOREHOLE NUMBER: SL-170	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner	8. BOREHOLE LOCATION: Trap and Skeet Yard former Clubhouse	
	9. DRILL DATE/TIME STARTED: 7/29/19 | 1352	COMPLETED: 7/29/19 | 1420
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: NA	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/29/19	7/30/19	SL-170

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-170	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF Cr Pb	REMARKS (Sample IDs/Depths/Etc.)
	0.5'	OL	~~Topsoil, Silt and Sand, 10YR 2/1~~ Gravel fill, small to large (1" to 0.2") angular gravel	1.2 / 4	40	No odor *Lead pellets (~0.25") found in 0'-1' interval ~~ECCL0170~~ ECCL SL0170 @ 1355 0-1'
	1	Fill			40	
	2					
	3	SM	Weathered shale, 10YR 2/2, iron staining, angular fragments		30	Iron staining, No odor
	4				20	
	5		BOH			
	6					
	7					
	8					
	9					
	10					

BSJ 7/29/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/29/19	7/30/19	SL-170

HTRW DRILLING LOG

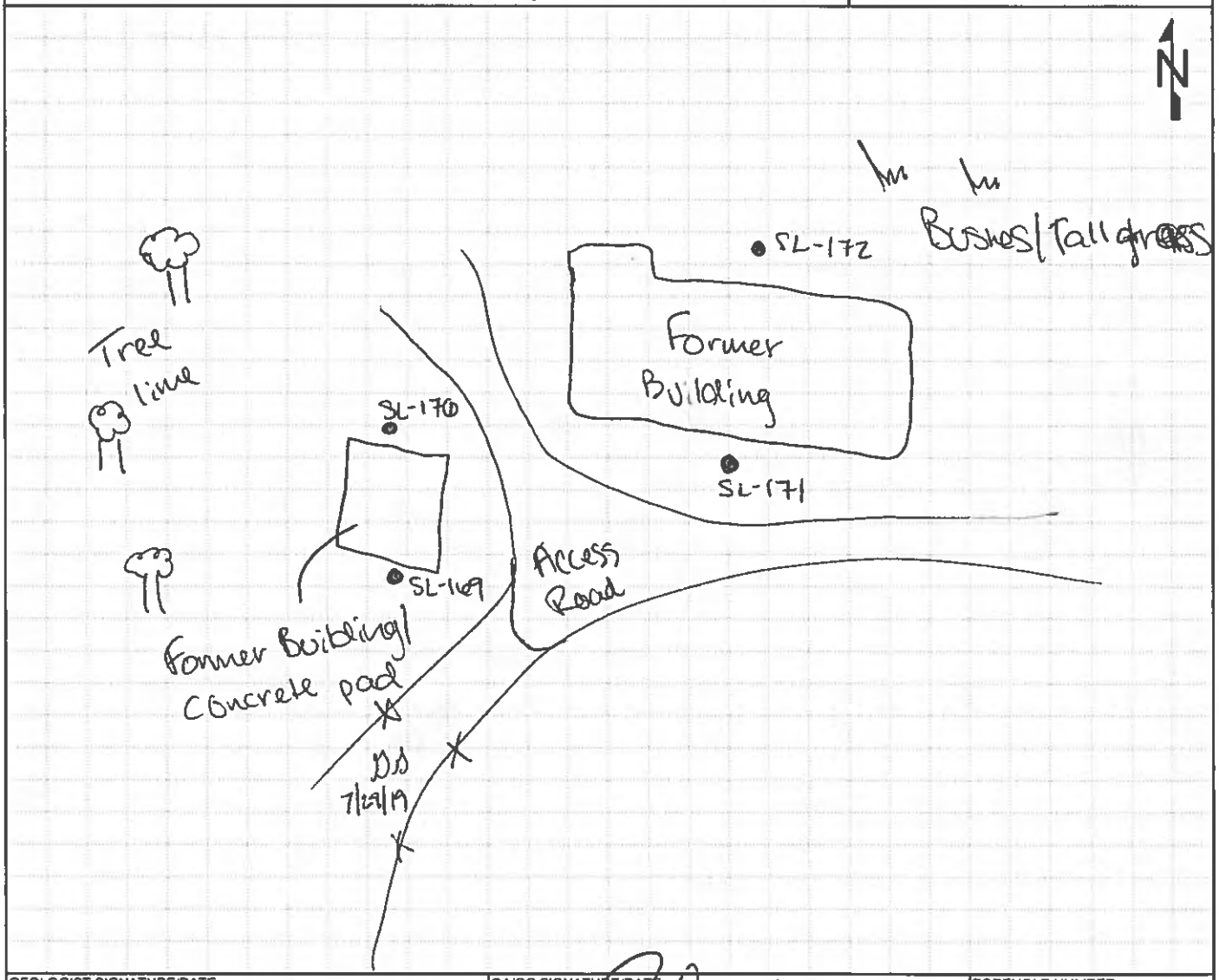
CLIENT: NASA	BOREHOLE NUMBER: SL-171	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner	8. BOREHOLE LOCATION: Trap and Skeet Range Former Clubhouse	
	9. DRILL DATE/TIME STARTED: 7/29/19 1548	COMPLETED: 7/29/19 1600
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/29	7/30/19	SL-171

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: ~~SL-172~~ SL-171	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Top Soil (organic), SILT and some sand, 10YR 2/2, ~~fine~~ fine sand, subangular, damp, soft	1.2/4	30	No odor Poor recovery ECCLSL0171 @ 1600 0-1'
	2				30	
	3	SH	Weathered shale, 10YR 2/1, iron staining, dry		20	Iron staining No odor
	4				30	
	5		BOH			
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/29/19	7/30/19	SL-171

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-172	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner	8. BOREHOLE LOCATION: Trap and Skeet Yard Former Clubhouse	
	9. DRILL DATE/TIME STARTED: 7/29/19 1528	COMPLETED: 7/29/19 1534
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13 DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15 TOTAL DEPTH OF BOREHOLE: 4'		

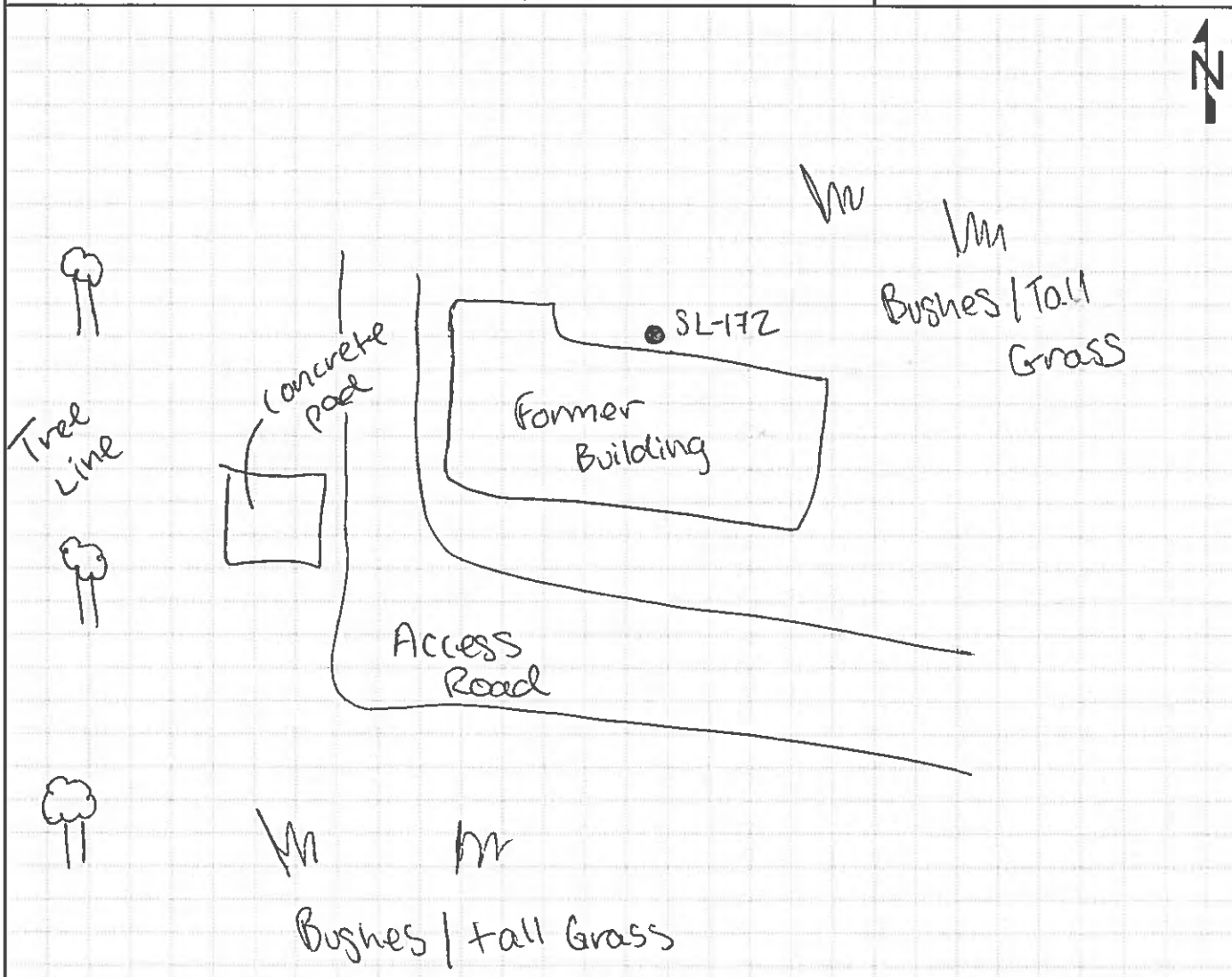
16 DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background — BGS: Below Ground Surface — PPM: Parts per Million

▽ : First Water Encountered — ▼ : Static Water Level — NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 7/29/19	QA/QC SIGNATURE/DATE: 7/30/19	BOREHOLE NUMBER: SL-172

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-172	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic rich topsoil, SILT and little sand, fine grained, sub-angular, damp, non-plastic, soft, 10YR 2/2	3.6/4	140	No odor, ECCLSL0172@1550 0-1'
	2		Clay and silt with some sand, 10YR 8/1 mottled with 10YR 4/3		50	
	2.8	CL	Clay and silt, 10YR 2/1, trace sand, fine, firm, damp, non-plastic		20	
	3	CL	Clay, 10YR 4/3 mottled with 10YR 5/6, soft, moist, non-plastic		10	
	4					
	5		BOH			
	6					
	7					
	8					
	9					
	10					

DS 7/29/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/29/19	7/30/19	SL-172

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-173	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shell hammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS. Hand Auger (3" bucket)	8. BOREHOLE LOCATION: Trap ~~and Skeet~~ Range	
	9. DRILL DATE/TIME STARTED: 8/2/19 | 0827	COMPLETED: 8/2/19 | 0832
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, (PAHs), TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

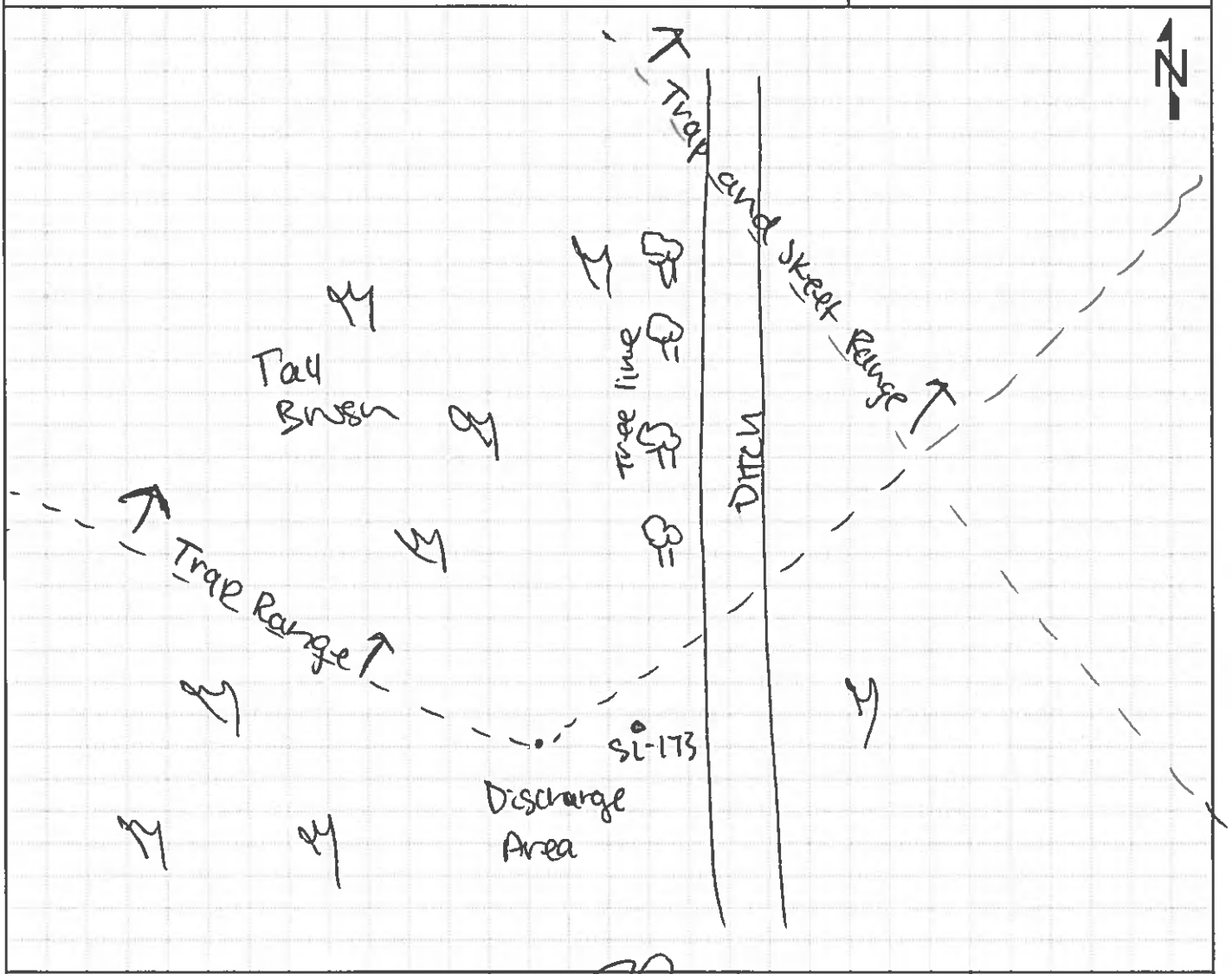
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: NA SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/2/19	8/6/19	SL-173

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-173

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic rich topsoil, SILT and some sand, 10YR 3/2, non-plastic, dry to damp	1/1	N/A No pid XRF	Organic odor ECCLSL0173 @ 0835 (0'-1')
	2		BOH		SCREENING OF LOCATION	
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

MJ 8/2/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/2/19	8/6/19	SL-173

HTRW DRILLING LOG

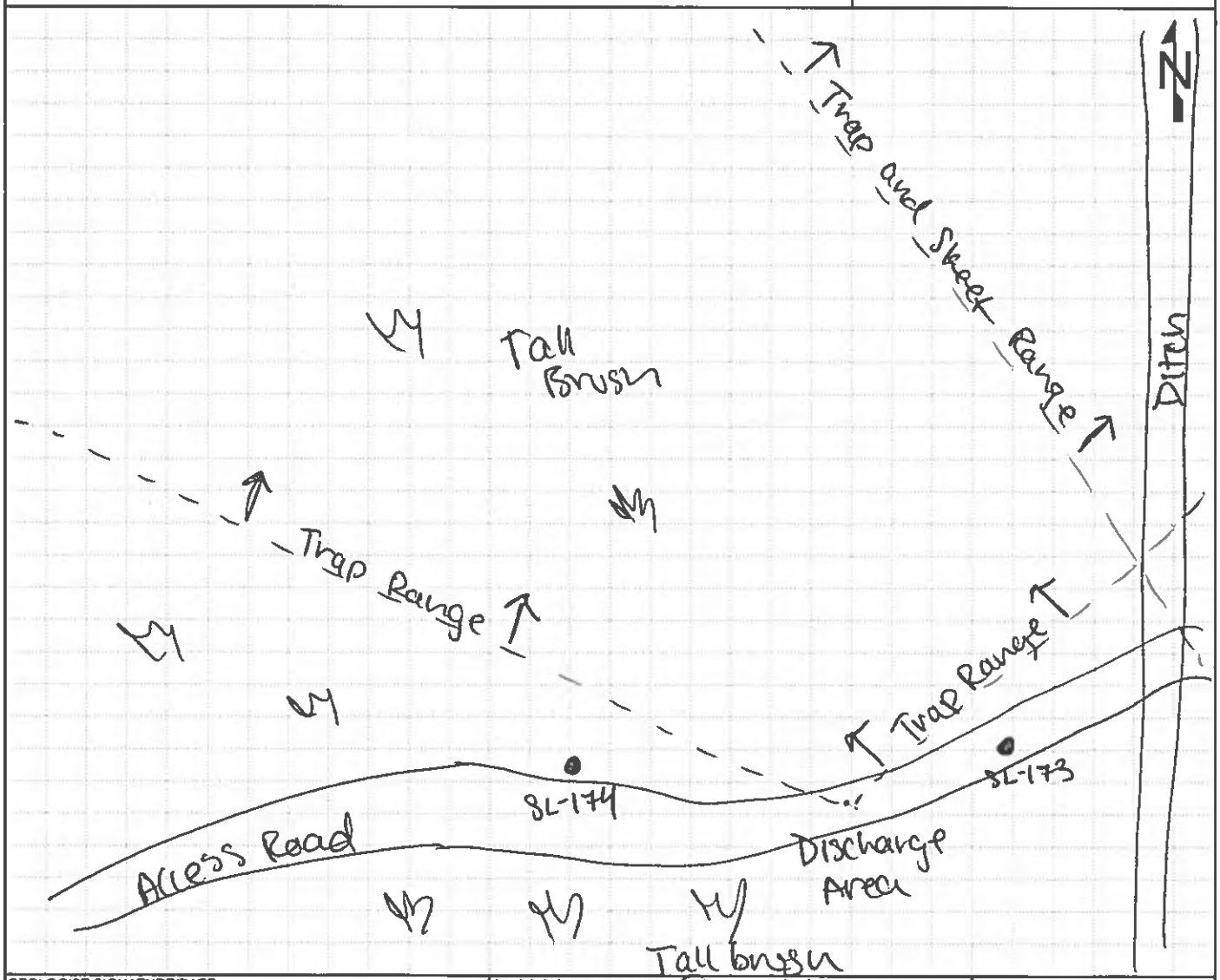
CLIENT: NASA	BOREHOLE NUMBER: SL-174	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME STARTED: 8/2/19 | 0836	COMPLETED: 8/2/19 | 0840
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/2/19	QA/QC SIGNATURE/DATE: 8/6/19	BOREHOLE NUMBER: SL-174

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-174

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL CL	Organic topsoil, silt and some fine sand, 10YR 3/2, damp, soft SANDY CLAY, 10YR 7/1 and 10YR 5/6 mottled, fine sand, firm, non-plastic, damp	1/1	N/A No pb XRF screening at location	Organic odor ECCLSL0174 @ 0845 (0'-1')
	2		BOH			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

BOH 8/2/17

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
[signature] 8/2/17		SL-174

HTRW DRILLING LOG

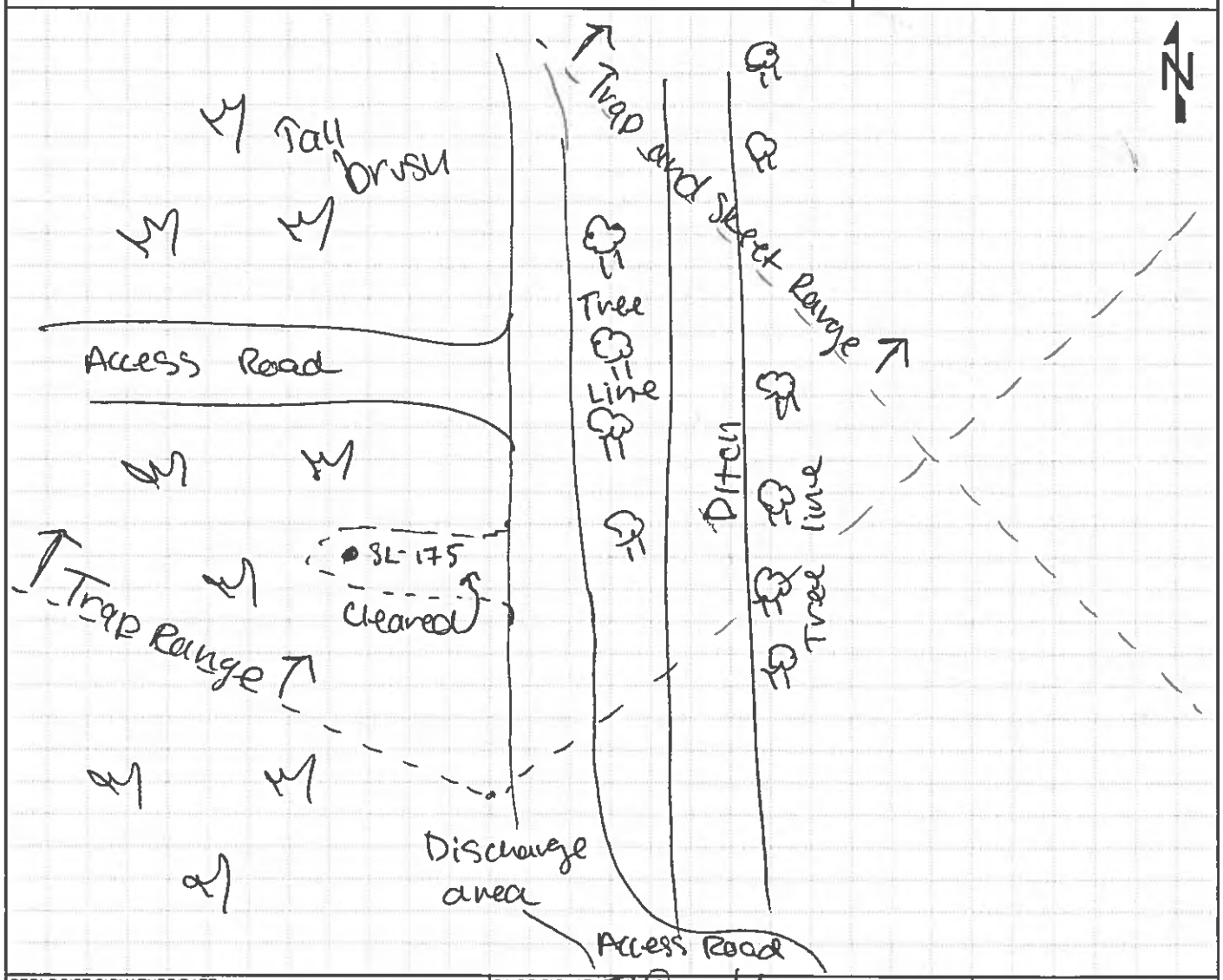
CLIENT: NASA	BOREHOLE NUMBER: SL-~~125~~ 175 (8/1/19)	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap ~~and Skeet~~ Range (8/2/19)	
	9. DRILL DATE/TIME STARTED: 1541 / 8/1/19 COMPLETED: 8/2/19 / 1555	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: ~~5.8~~ 5.3' (8/1/19)	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs; TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 5.3		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: NA

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS NA — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/1/19	QA/QC SIGNATURE/DATE: 8/6/19	BOREHOLE NUMBER: SL-175

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-175

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for pb	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, SILT and some sand, 10YR 2/2, soft to firm less organics/roots		N/A	Organic odor, clay pigeons in top 1' ~~No odor~~ AS 8/1/19 ECCLSL0175 @ 1550 (1'-2')
	2	CL	Clay and little silt, 10YR 7/1 mottled with 10YR 5/6, damp, firm, non plastic - moist, low plasticity	3.4/4	60	ECCLSL0176 @ 1600 (2'-3')
	3		- 10YR 5/6 mottled w/ 10YR 2/2		20	
	4	SH	weathered SHALE, 10YR 2/2, iron staining, broken fragments between layers of dust, silt layers, dry, unconsolidated material		10	No odor
5.3'	5			1.3/1.3	10	Bedrock Refusal @ 5.3'
	6		BOH			RL 8/6/19 XRF SCREENING NOT REQUIRED AT LOCATION UNDER SAP TABLE 5-1. REQUESTED IN FIELD BY PROJ. MGMT.
	7					
	8		AS 8/1/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/6/19	SL-175

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-176	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap ~~and Skeet~~ Range 2023 8/2/19	
	9. DRILL DATE/TIME STARTED: 8/1/19 / 0737	COMPLETED: 8/1/19 / 0845
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.8'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, (PAHs), TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.8'		

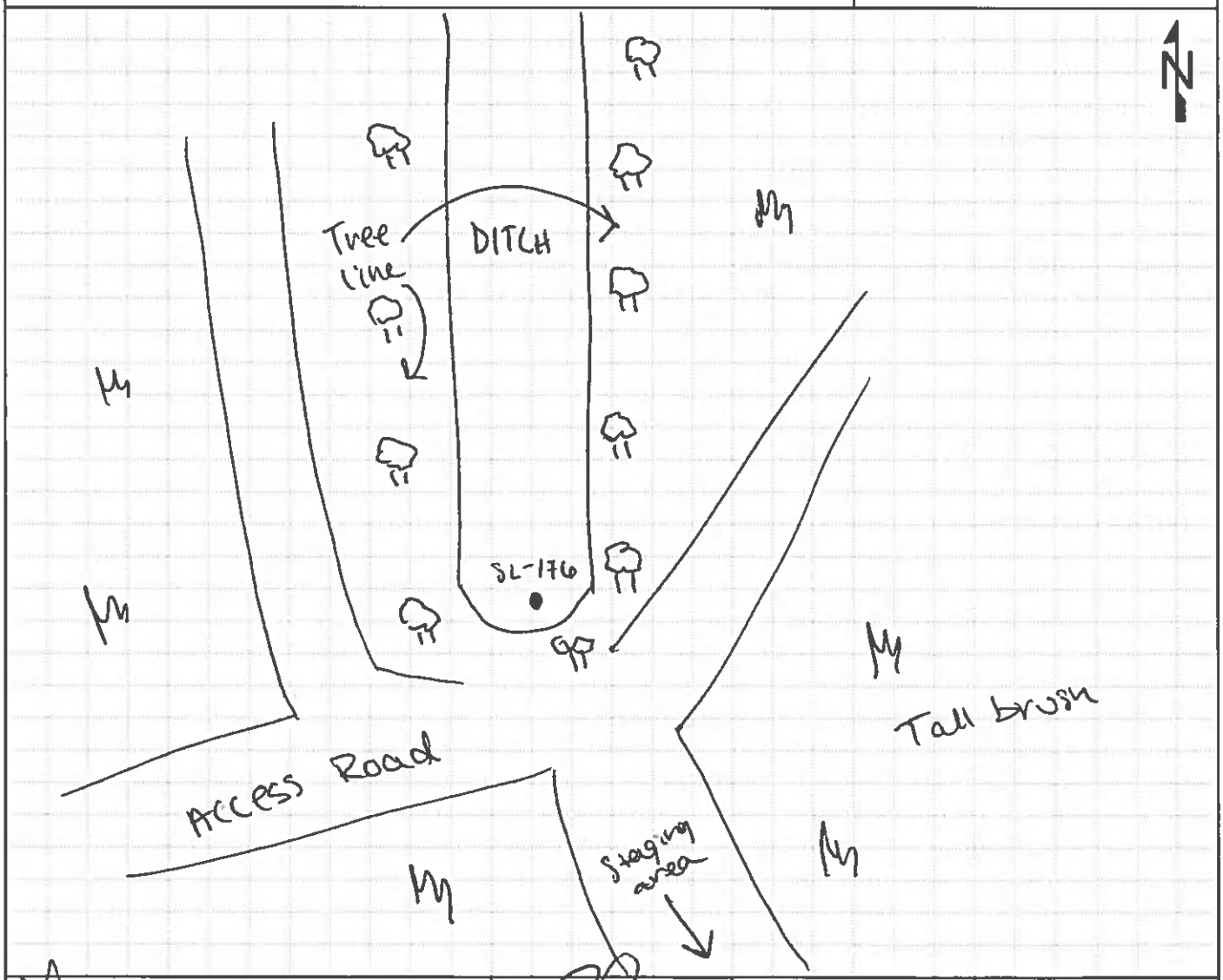
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: N/A SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/6/19	SL-176

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-176

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL# 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	SILT and some fine sand, 10YR 2/2, soft, non-plastic, damp organic material		N/A no pb XRF SCREENING AT BIS LOCATION	Organic odor, clay pigeons throughout top 1' (dig 1' deep hole for sample collection core to reduce contamination downward by sluffing)
	1.5			3.9/4		
	2	ML	SILT and little fine ~~clay~~ sand, 10YR 3/2, soft, dry to damp MS 8/2/19 10YR 5/6			
	3	SM	SAND and little clay, 10YR 5/6, fine, subrounded, firm, damp to dry. - some clay, 70% SAND and 30% clay; mottled 10YR 5/6 and 10YR 7/1			trace gravel, (<.25"), subrounded No gravel
	4	CL	CLAY, 10YR 5/6 + 10YR 7/1 mottling			
		SH	weathered SHALE, 10YR 2/1, fissile, silt between layers			
	5		BOH 4.5'			ECCLSL0177 @ 0805 (1'-2')
	6					ECCLSL0178 @ 0810 (2'-3')
	7					ECCLSL0293 @ 0815 (3'-4') - hold for pending analysis
	8		MS 8/2/19		RL 8/6/19 * MS/MSD	ECCLSL0178MS ECCLSL0178MSD
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
[signature]	[signature] 8/6/19	SL-176

HTRW DRILLING LOG

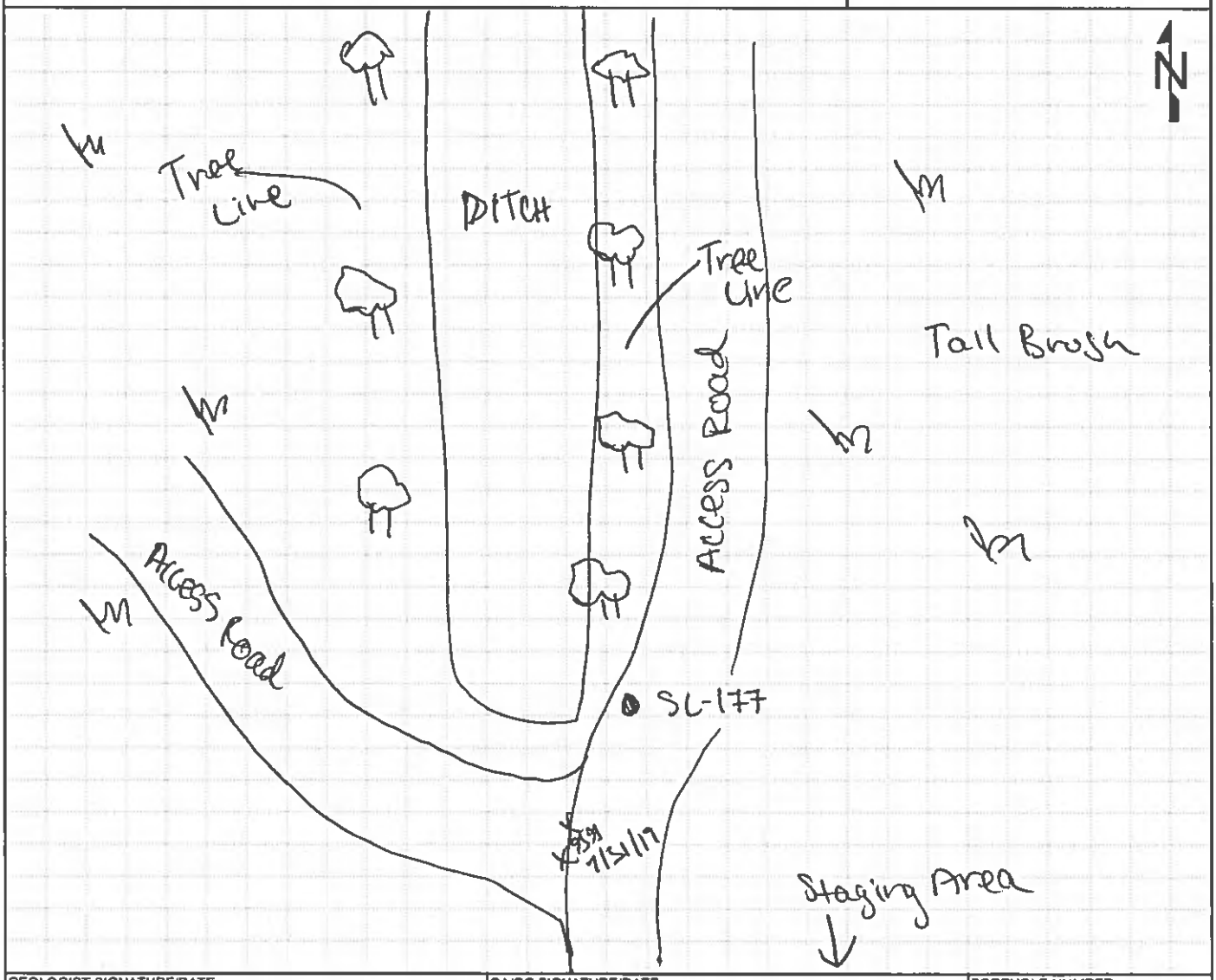
CLIENT: NASA	BOREHOLE NUMBER: SL-177	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Skeet and Trap Range	
	9. DRILL DATE/TIME STARTED: 7/31/19 / 1200	COMPLETED: 7/31/19 / 1212
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb (carbazole only)	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: NA

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-177

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-177	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, silt and some fine sand, 10YR 2/2, dry, firm, non plastic, clay pigeons abundant	3.8/4	CS 8/2/19	Organic odor, clay pigeon pieces scatter throughout core (~1.2') NO odor ECCLSL0179 1215 (1-2) ECCLSL0180 1220 (2-3) ~~ECCLSL0181~~ (3'-4') ECCLSL0292@1222'
	2		SAND and little clay, fine, sub rounded, non plastic, firm, damp 10YR 5/6			
	3	SM				
	4					
	4.5'	SH	weathered SHALE, 10YR 2/2, iron staining, laminated/fissile, broken fragments	unknown		Bedrock refusal 4.5' Recovery unknown because crumbled rock fell out of acetate liner.
	5		BOH			
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-177

HTRW DRILLING LOG

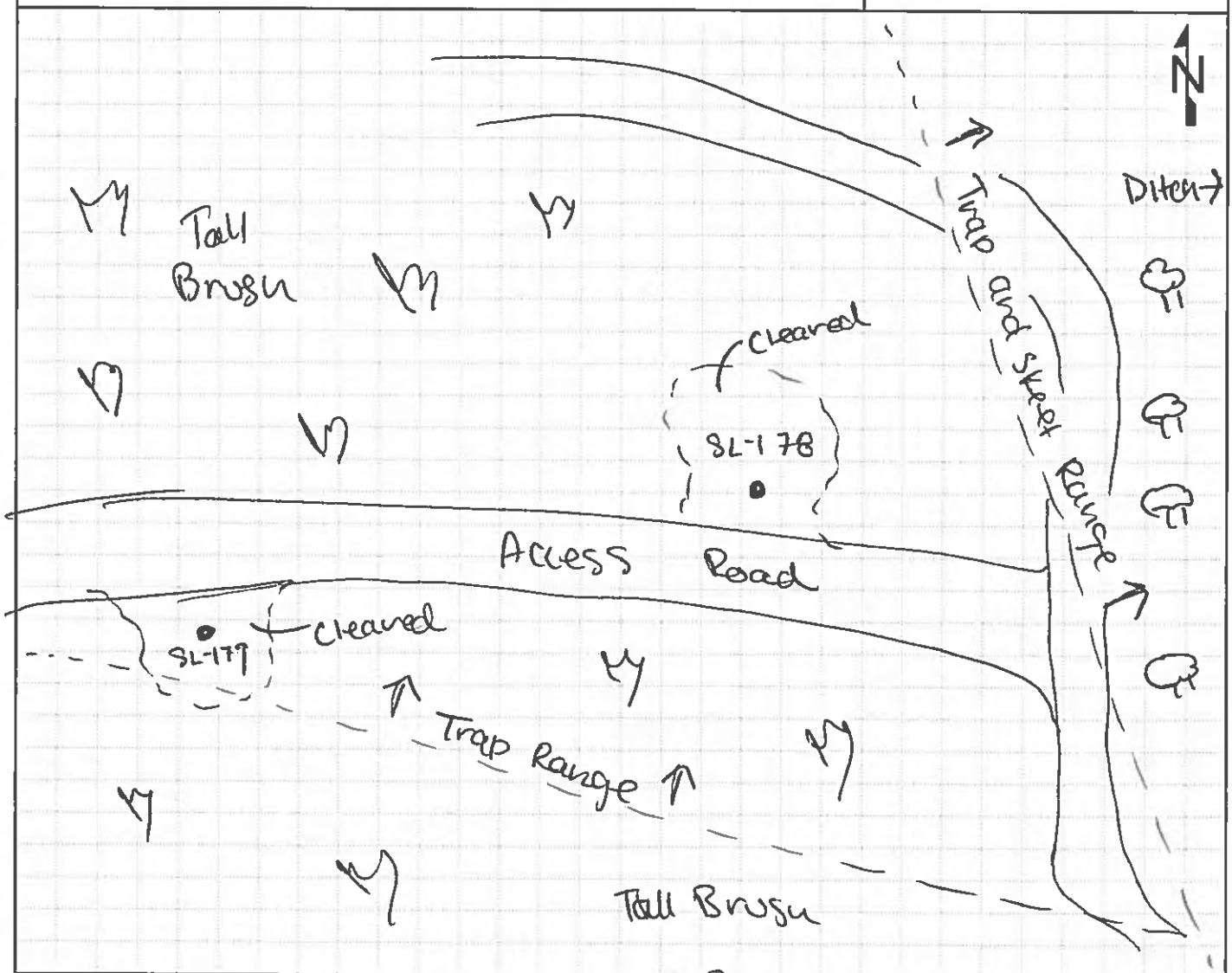
CLIENT: NASA	BOREHOLE NUMBER: SL-178	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap ~~and Skeet~~ Range per 8/6/19	
	9. DRILL DATE/TIME: STARTED 8/2/19 0853; COMPLETED 8/2/19 0909	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/2/19	8/6/19	SL-178

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-178	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RL 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, SILT and little fine sand and trace clay, 10YR 3/2, firm to hard, damp		200	Organic odor, Clay pigeons in top 1' ECCLSL0181 @ 0835 (0'-1')
	2	SM	SAND and ~~some~~ little Clay and little silt, 10YR 5/6 mottled w/ 10YR 7/1, ~~soft~~ fine, subrounded sand, firm, dry 8/2/19 non plastic	4/4	10	No odor
	3	CL	Clay and some silt, 10YR 3/2 and 10YR 5/8 layered in thin interbeds, damp, non plastic, soft to firm		20	trace gravel No gravel
	4	SH	weathered SHALE		30	Bedrock Refusal
	5		BOH			
	6					
	7					
	8					
	9					
	10					

GSS 8/2/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/2/19	8/6/19	SL-178

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-179	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg A Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4')	8. BOREHOLE LOCATION: Trap ~~and Skeet~~ Range	
	9. DRILL DATE/TIME STARTED: 8/2/19 | 0920	COMPLETED: 8/2/19 | 0928
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, (PAHs), TAL Metals, Arsenic, FR Metals, Antimony, (Pb)	
15. TOTAL DEPTH OF BOREHOLE: 4'		

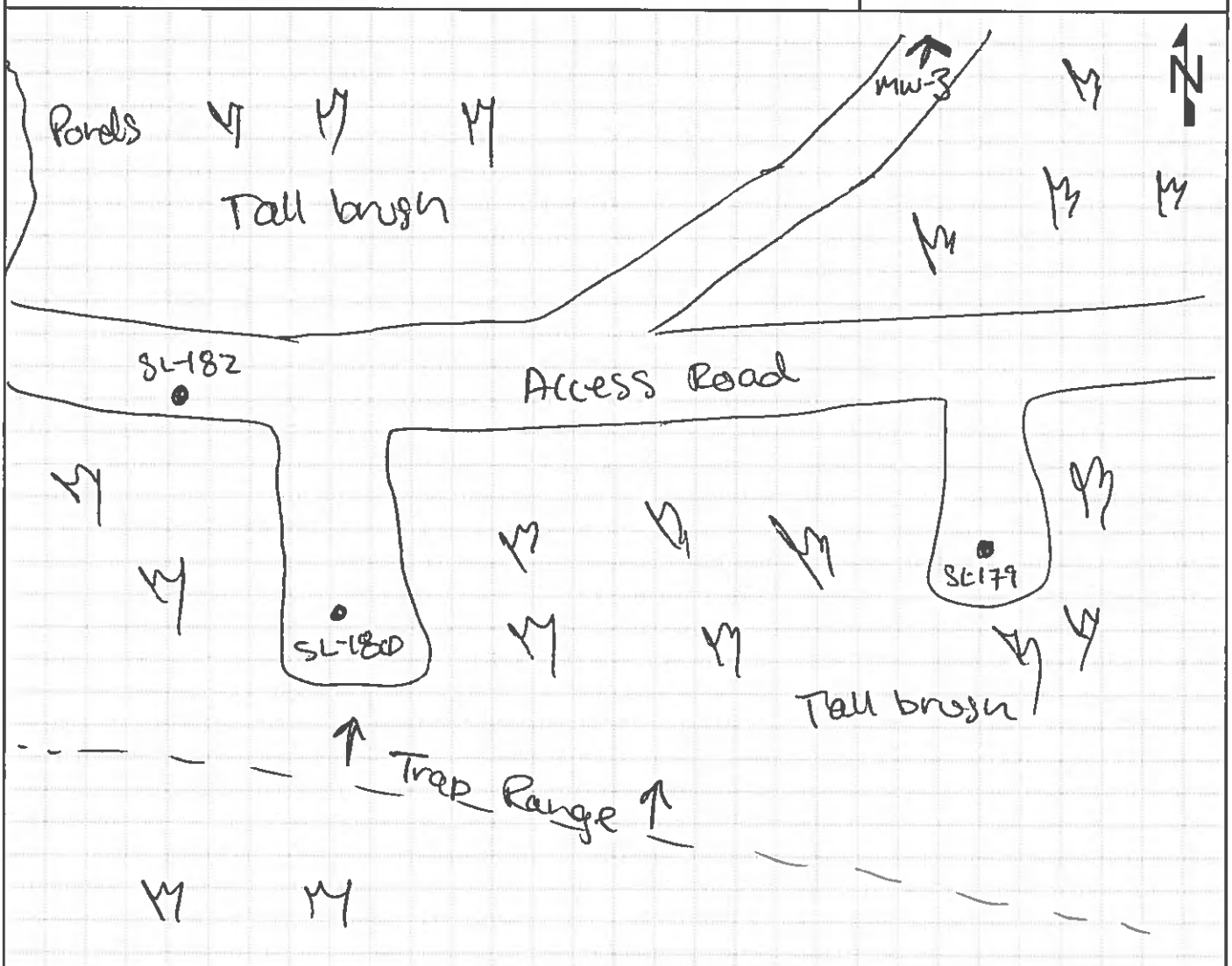
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/2/19	8/6/19	SL-179

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-179	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb Re 8/6/19

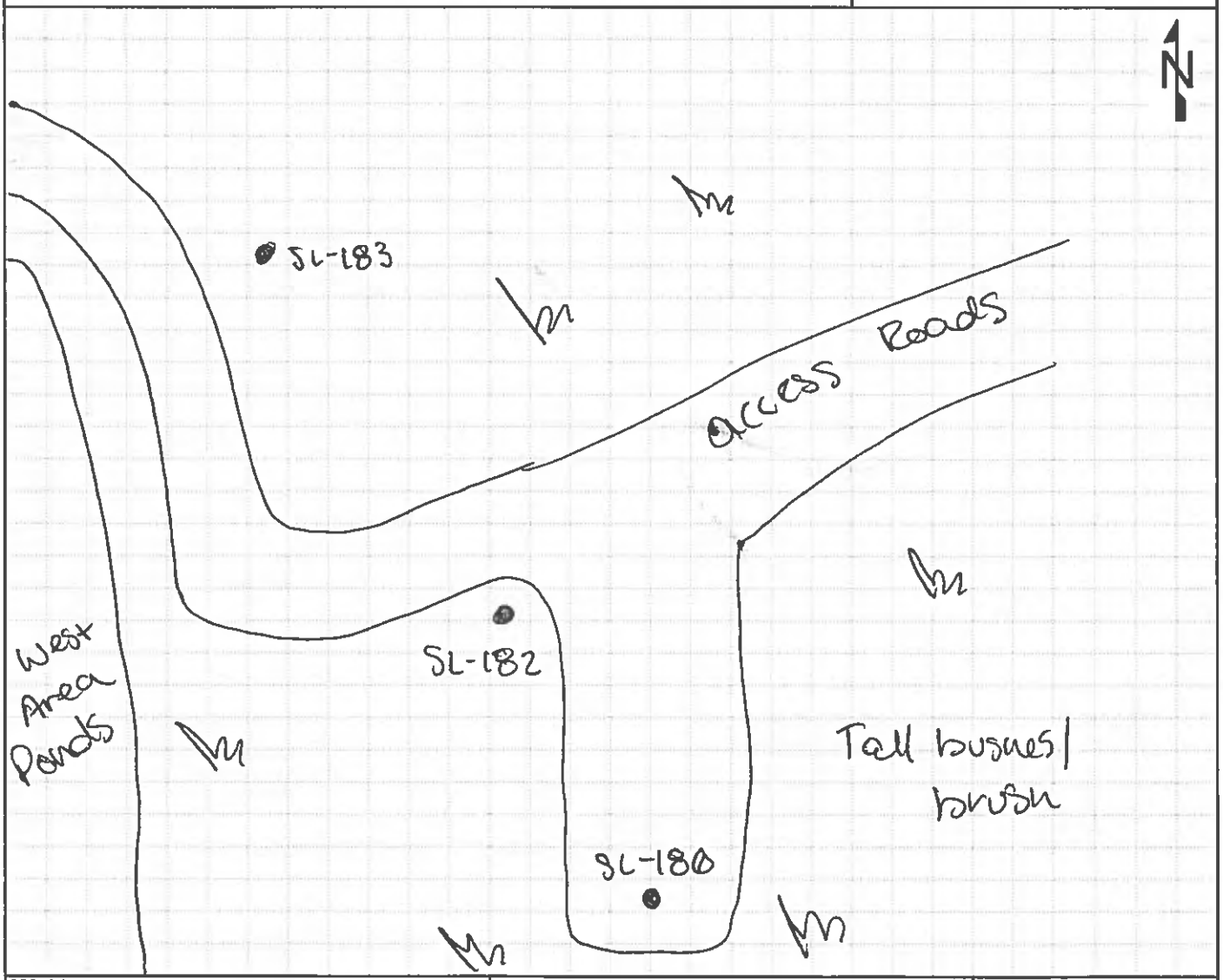
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	SILT and trace clay and sand, 10YR 2/1, damp, fine sand, non-plastic		350	Organic color and material ~~ECCL~~ SY 8/2/19 ECCLSL0182 @ 0920 (0'-1') No odor
	1		CLAY and some sand, 10YR 2/2; mottled with 10YR 5/6, and 10YR 7/1, damp, low plasticity, soft		20	
	2	CL		4/4	10	
	3		clay and little sand, B.A.A.			
	4	SH	weathered SHALE, fissile, non-consolidated, silt between rock layers, broken angular frags, dry		30	
	5		BOH			
	6					
	7					
	8		SY 8/2/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/2/19	8/6/19	SL-179

HTRW DRILLING LOG

CLIENT	NASA
BOREHOLE NUMBER	SL-180
1. COMPANY NAME	Leidos
2. DRILLING SUBCONTRACTOR	Geo-Environmental Drilling
SHEET	1 OF 2
3. PROJECT	ECCL Firing Range Removal Site Evaluation
4. LOCATION	NASA Plum Brook Station, Sandusky, Ohio
5. NAME OF DRILLER	Gregg Shellhammer
6. MAKE/MODEL OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF SAMPLING EQUIPMENT	Acetate Liner (4')
8. BOREHOLE LOCATION	Trap Range
9. DRILL DATE/TIME	7/31/19 STARTED: 1548 COMPLETED: 1600
10. DEPTH GROUNDWATER ENCOUNTERED	N/A
11. OVERBURDEN THICKNESS	4'
12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION	N/A
13. DEPTH DRILLED INTO BEDROCK	0'
14. CHEMICAL SAMPLES (circle)	VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb
15. TOTAL DEPTH OF BOREHOLE	4'
16. DISPOSITION OF BOREHOLE	BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: N/A
17. NOTES	BKG: Background BGS: Below Ground Surface PPM: Parts per Million ▽: First Water Encountered ▼: Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
[signature] 7/31/19	[signature] 8/2/19	SL-180

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-180	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING cs. (PPM) XRF	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and some sand, fine, subrounded, 10YR 2/2, soft, moist, non-plastic		8/2/19 ~~N/A~~ 270 Lead ppm	Organic odor
	1	SM	SAND with little silt, fine, subrounded, 10YR 4/3, moist to wet, soft, non plastic - silt lens 10YR 2/2	3.6 / 4	20 10	
	1.8' 2	CL	Clay and some sand, fine, 10YR 5/8 mottled 10YR 6/1, low plasticity - sand lenses between mottled clay; 10YR 6/1 (sand); clay 10YR 5/8, 10YR 6/1, 10YR 3/1		10 20 20 20 20	NO odor 7/31/19 BZ @ sample take: 0.009 mg/m³
	3					
	4	SH	Weathered SHALE, 10YR 2/2, fissile, layered, fragmented		30	Bedrock refusal
			BOH			
	5					
	6					
	7					
	8		BZ 7/31/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-180

HTRW DRILLING LOG

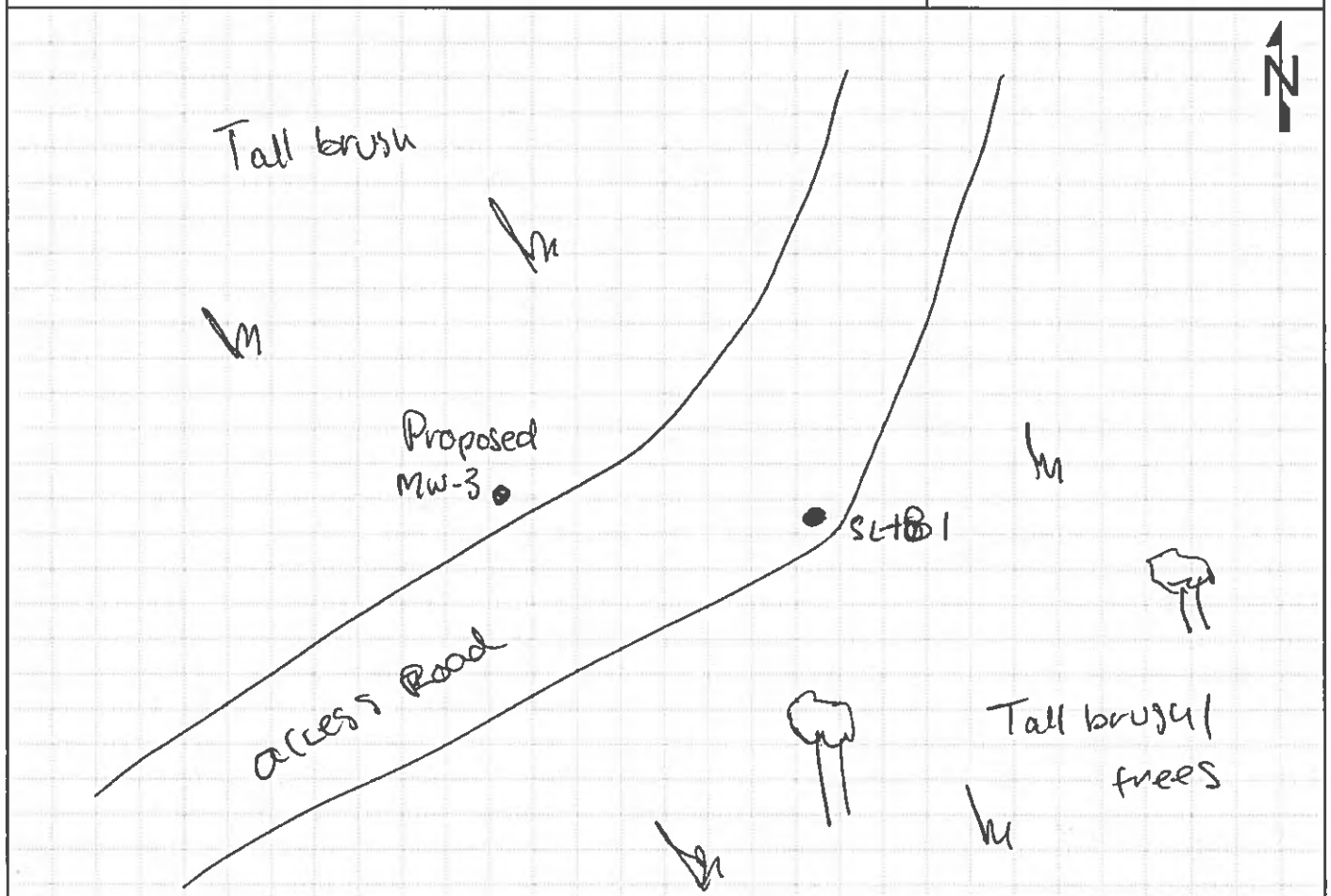
CLIENT: NASA	BOREHOLE NUMBER: SL-181	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Georgia Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME STARTED: 7/31/19 | 1505	COMPLETED: 1520
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 3.8'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs; TAL Metals: Arsenic; FR Metals: Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 3.8'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-181

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-181	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and some sand, fine, subangular, 10YR 2/2 damp, non plastic		cc 7/31/19 ~~N/A~~ Lead ppm 1060	Organic odor
	@.8' 1	SM	SAND and little silt, fine, sub-rounded, 10YR 6/6, damp to moist, non plastic, very soft	3.8 / 3.8	470	
					150	No odor
	2	CL	CLAY with little sand, very fine, mottled, 10YR 5/8 and 10YR 6/1		20	1510/7/31/19-B2 @ Geoprobe @ 0.08 mg/m3
	2.5'		weathered SHALE, clay and shale fragments, iron staining		20	
	3	SH	more consolidated shale material		40	
					30	
					30	Bedrock Refusal @ 3.8'
	4		BOH			
	5					
	6					
	7					
	8					
	9					
	10					

JB 7/31/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-181

HTRW DRILLING LOG

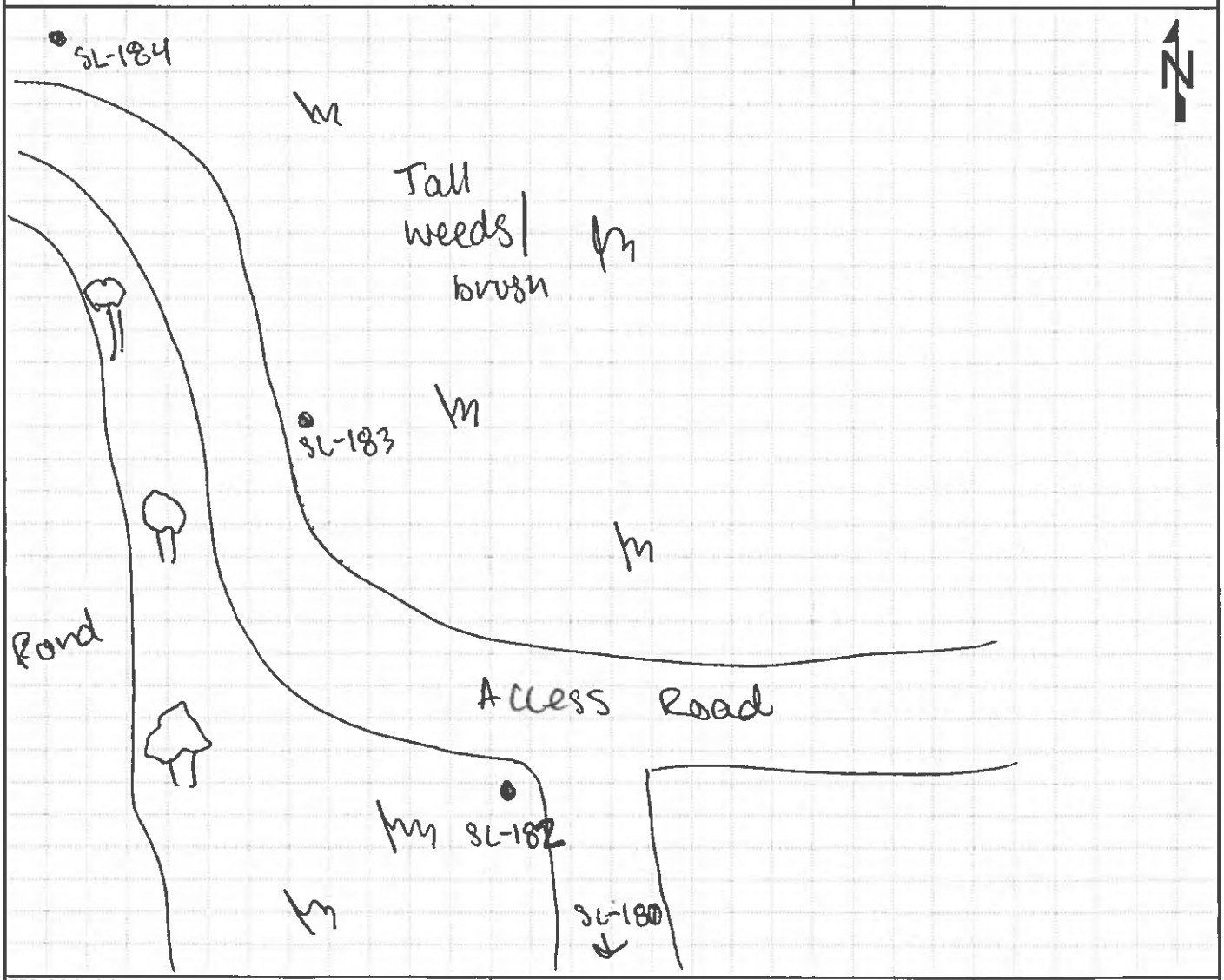
CLIENT: NASA		BOREHOLE NUMBER: SL-182
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg a Shell hammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 | 0843	COMPLETED: 8/1/19 | 0900
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 3.8'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 3.8'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-182

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-182

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and little fine sand, 10YR 2/2, soft, damp		1020	Organic odor ECCLSL0187 @ 0855 (0'-1'); Duplicate @ 0855 ECCLSL0220 no odor
	1		SAND and little silt and trace clay, 10YR 5/3, soft, moist, fine, subangular	3.5 / 3.8	60	
	2	SM	Interbedded layers of sandy clays (fine sand and clay, 10YR 7/1 and 10YR 5/8) and ~~moist~~ mottled fine sands 10YR 7/1		30	
	3					
	3.5'	CL	trace sand, CLAY, mottled 10YR 5/8 and 10YR 4/1, non plastic, damp		20	
3.8'	4	SH	weathered SHALE, 10YR 2/1, broken fragments			
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-182

HTRW DRILLING LOG

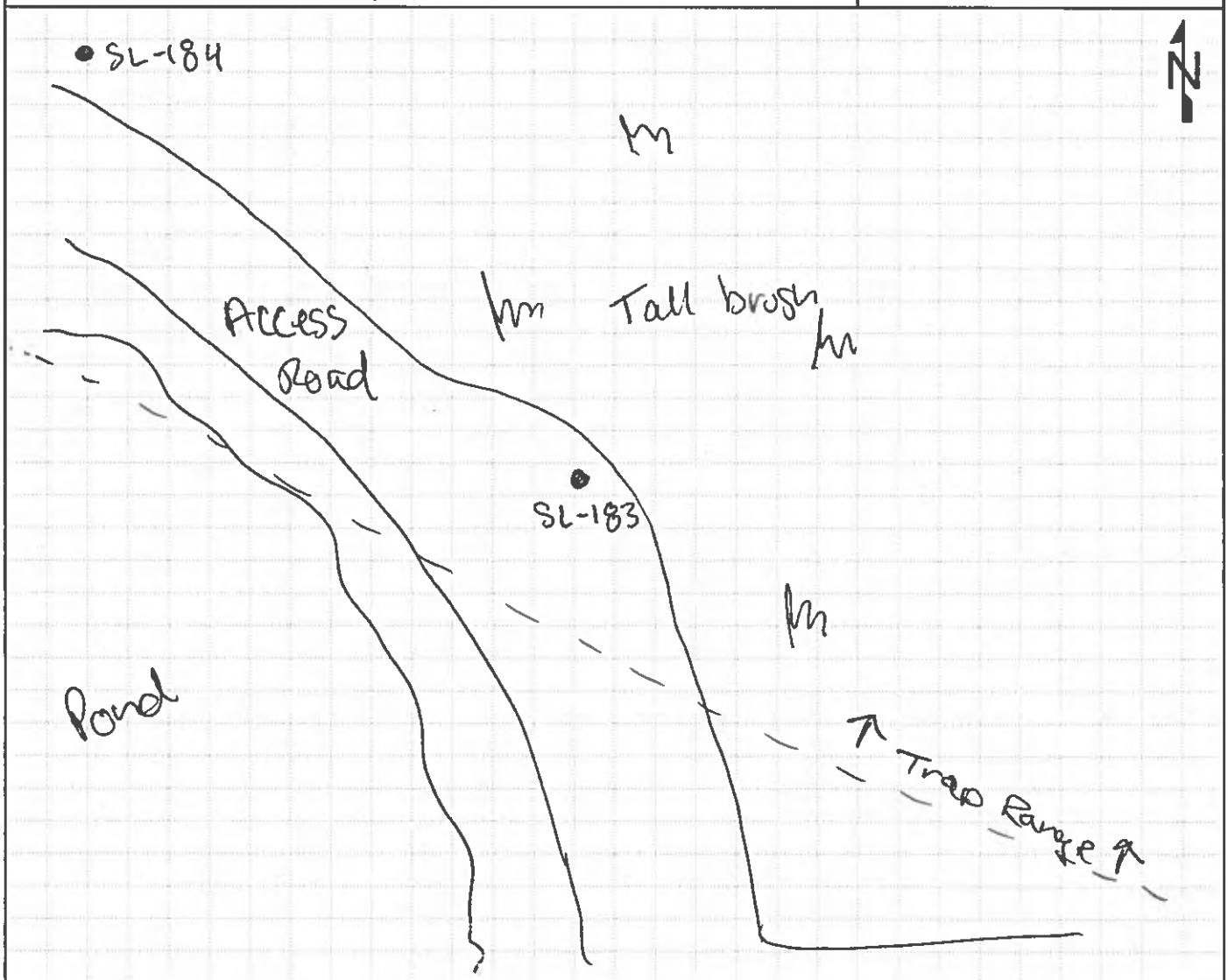
CLIENT: NASA	BOREHOLE NUMBER: SL-183	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME STARTED: 7/31/19 | 1525	COMPLETED: 1540
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.6'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.6'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-183

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-183	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic rich topsoil, SILT and some fine sand, trace VERY coarse sand, 10YR 2/1, fine sand sub angular, coarse sand sub rounded, soft, damp		ES 7/31/19 ~~N/A~~ Lead 1630 PPM; 500	Organic odor
	2	SM	SAND and little silt, well sorted fine and subangular, 10YR 6/6 soft, moist to wet	3.7/4	30; 10	1527/7/31/19 @ B2 @ Geoprobe is 0.031 mg/m
	3	CL	CLAY and little sand, firm, 10YR 5/8 and 10YR 6/1 mottled light clay, soft to firm, low plasticity		10; 20	
		XB 7/31/19	~~sand lenses~~, 10YR 4/1 mottled w/ 10YR 3/6 sand with little clay wet, fine sand		20; 20	No odor ~31
	4 3.9	SH	weathered SHALE, dry, broken, fragmented rock, some silt between layers		20; 40	Bedrock refusal
4.6						
	5		BOH			
	6					
	7					
	8					
	9					
	10					

DD 7/31/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-183

HTRW DRILLING LOG

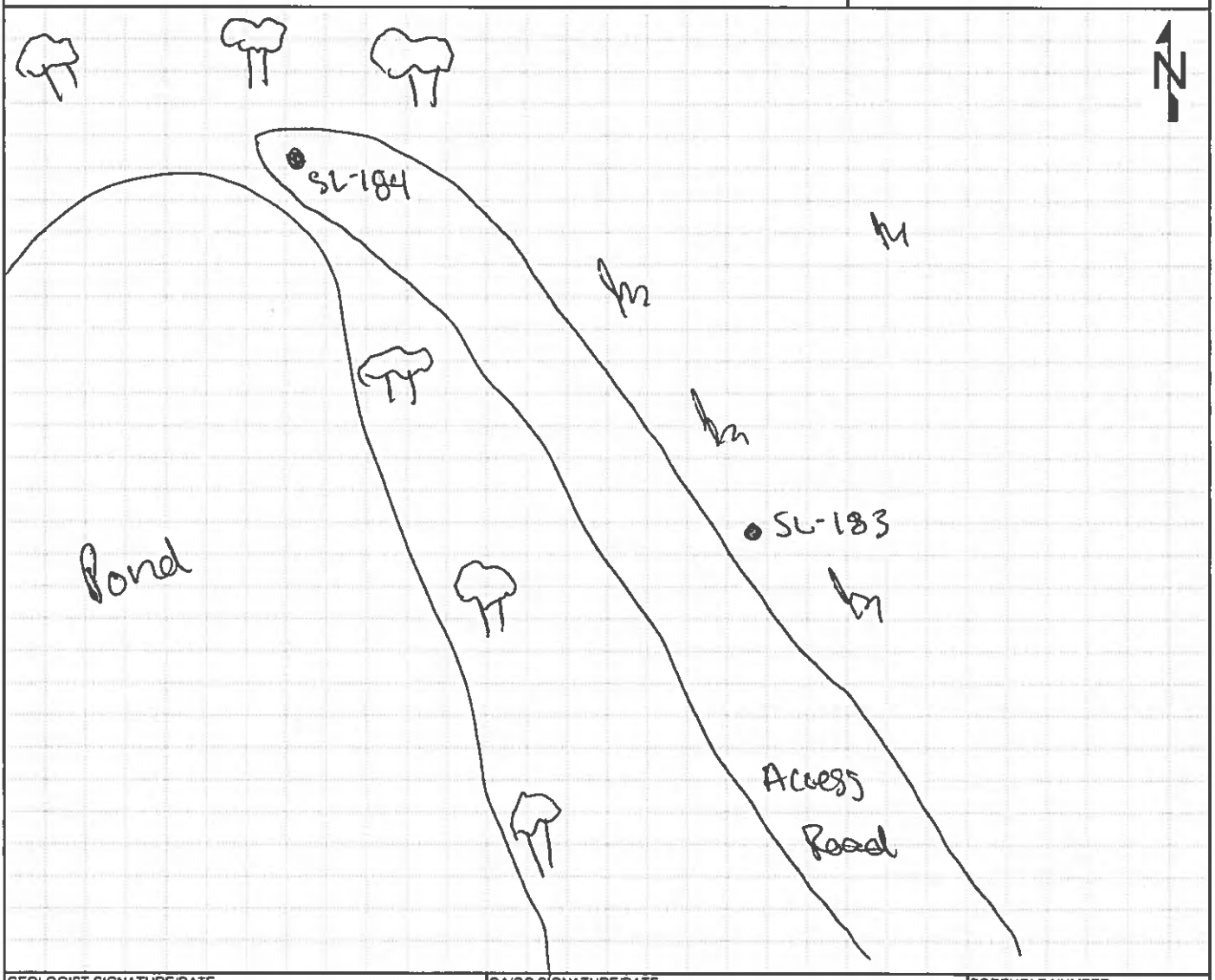
CLIENT: NASA	BOREHOLE NUMBER: SL-184	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 / 0810	COMPLETED: 8/1/19 / 0818
	10. DEPTH GROUNDWATER ENCOUNTERED: ~~N/A~~ 8/1/19 3.5'	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-184

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-184	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and little fine sand, 10YR 2/2, soft, damp		240	organic odor
	1					No odor
		SM	SAND and little silt, fine, sub-angular, 10YR 5/3, soft, damp to wet	4/4	N/A	ECCLSL0190 @ 0825 (0'-1')
	2		Trace silt, wet			
					10	
	3		Sand and trace clay and silt, 10YR 7/1 and 10YR 5/6, saturated MJ 8/1/19			Saturated @ 3.5'
	↓ 3.5'				N/A	
	4		Rock fragments, SHALE, sorted in sands			Bedrock frags
			BOH			
	5					
	6					
	7					
	8		JAS 8/1/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-184

HTRW DRILLING LOG

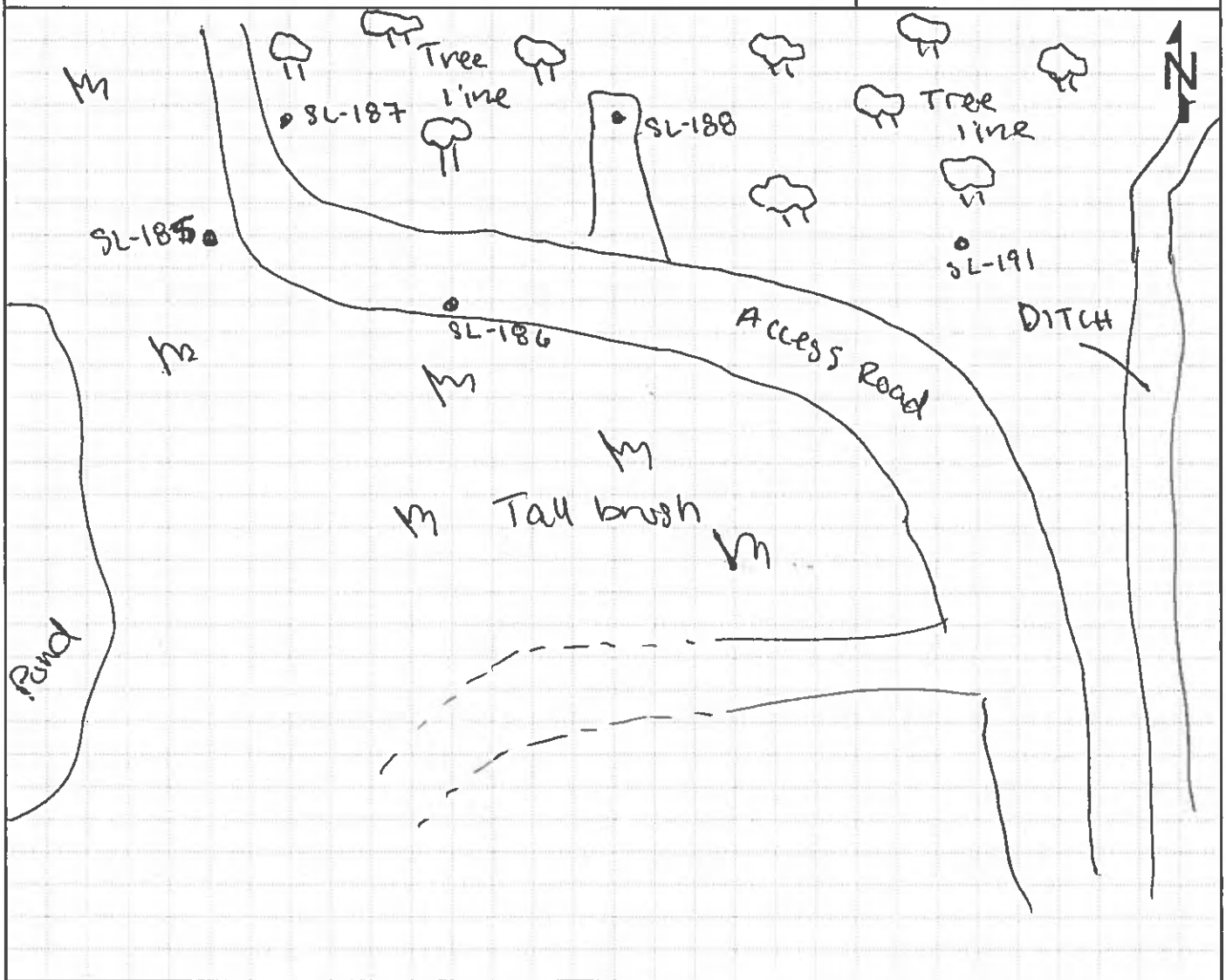
CLIENT: NASA	BOREHOLE NUMBER: SL-185	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 | 1059	COMPLETED: 8/1/19 | 1105
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-185

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-185

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT: ECCL Firing Range Removal Site Evaluation
4. DIRECTION OF BOREHOLE: VERTICAL

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead XRF (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and some sand, fine, damp, soft, 10YR 2/2		500	Organic odor ECCLSL0191 @ 11:10 (0'-1') * Duplicate ECCLSL9021
	0.7' 1	SM	SAND and trace silt, fine, sub-rounded, damp, 10YR 5/6			
		CL	Clay and sand, fine to coarse, subangular, poorly sorted, mottled 10YR 5/8 and 7/1, non-plastic, damp	4/4	30	
	2	CL	SAA, but clay and fine sand			
		CL	Clay with trace fine sand and silt, mottled 10YR 2/2 and 5/6		30	
	3	SH	weathered SHALE, non-consolidated material, sandy, silty weathered material between angular rock fragments, 10YR 2/2 and 10YR 7/1 (sand)		20	extremely organic odor Bedrock refusal
	4					
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-185

HTRW DRILLING LOG

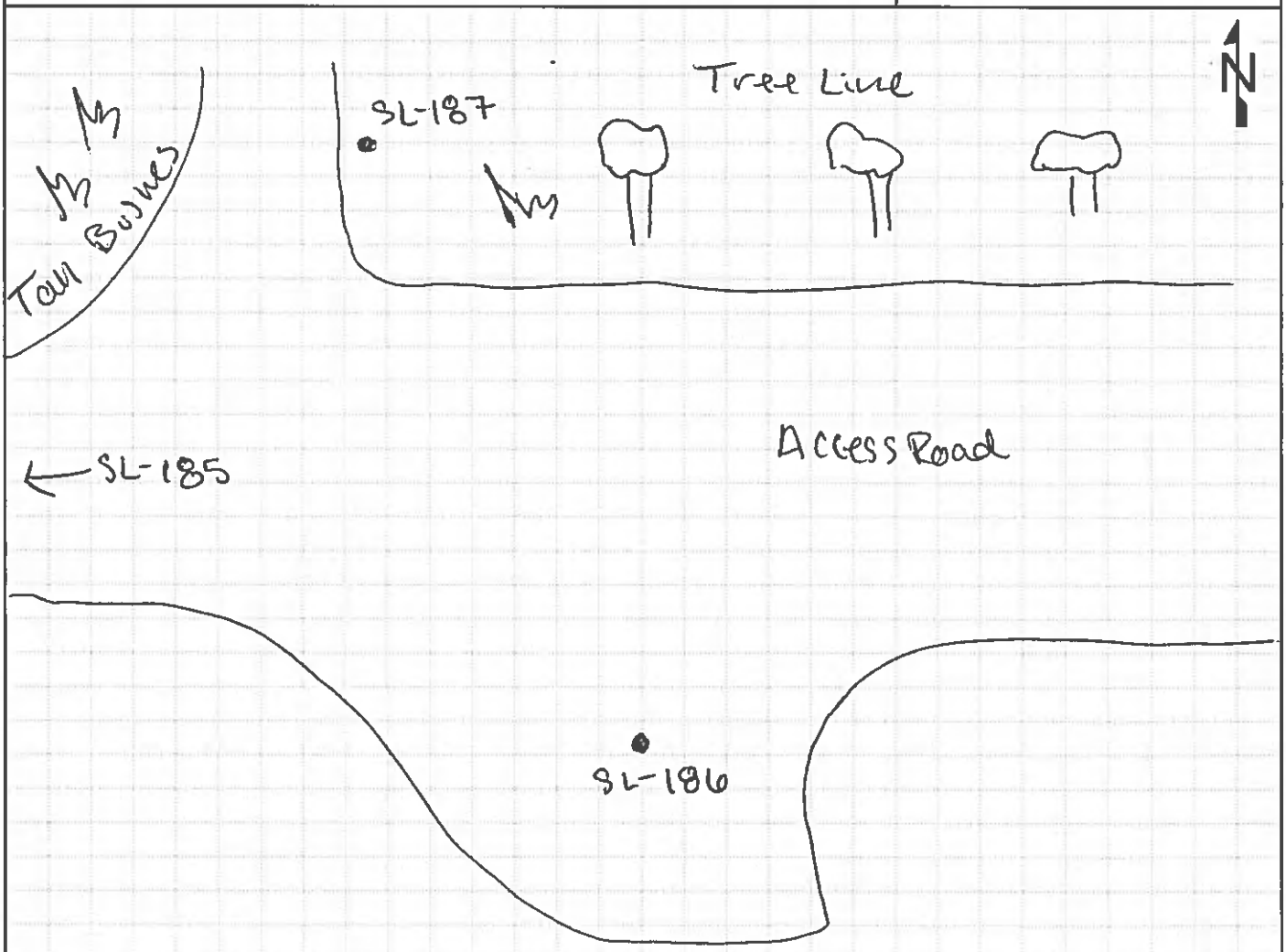
CLIENT: NASA		BOREHOLE NUMBER: SL-186
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregory Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner	8. BOREHOLE LOCATION: Trap ~~and Skeet~~ Range 8/1/19	
	9. DRILL DATE/TIME STARTED: 8/1/19 / 1038	COMPLETED: 8/1/19 / 1400
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 31	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 31'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-186

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-186	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: VITON XL3+ GOLD D+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and fine sand, 10YR 3/2, dry, soft to firm	2.5/3	1570	Organic odor ECCLSL0192 @ 1400 (0.5-1')
	1		angular sandstone fragments (~ 1/2" to 1") @ 0.8'		2250	No odor
	2.7	GC	Sand and silt with trace clay, 10YR 6/4, dry, soft to firm, non plastic		240	ECCLSL0193 @ 1405 (1'-1.5')
	2	CL	Clay with little silt, layered, mottled 10YR 4/1, 10YR 5/6 and 10 YR 7/1,		60	
					30	
		SH	weathered SHALE, fissile, angular broken fragments, 10YR 2/2		40	Bedrock refusal @ 3' BGS
	3					
			BOH			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

BS 8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-186

HTRW DRILLING LOG

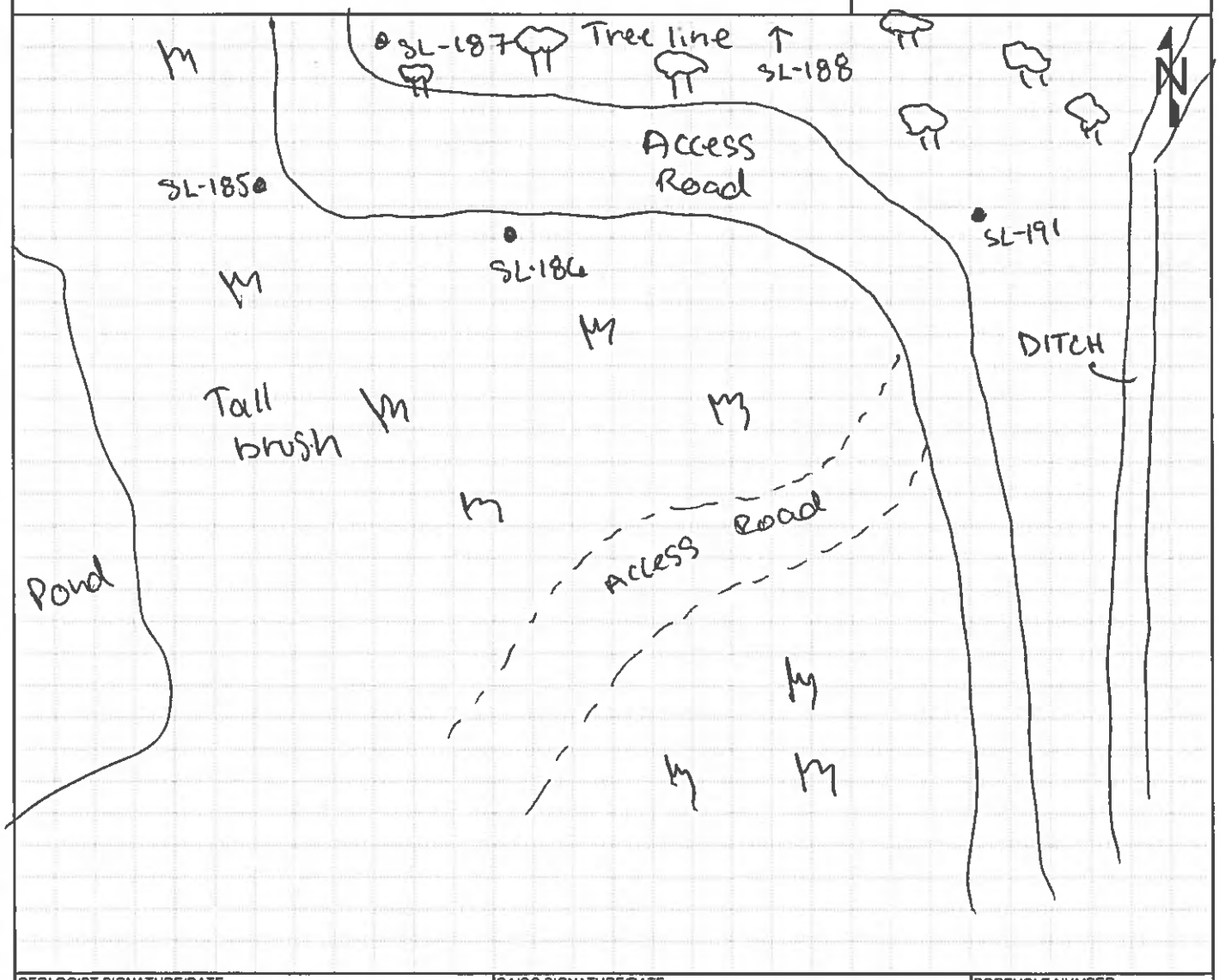
CLIENT: NASA	BOREHOLE NUMBER: SL-187	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7720 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 | 1121	COMPLETED: 8/1/19 | 1124
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: Ø'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-187

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-187	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) Lead XRF	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, SILT and fine sand, 10YR 2/2, dry, soft	3.6/4	460	organic color ECCLSL0194 @ 1140 (0'-1')
	2	SM	Sand and some silt, fine, sub-rounded, 10YR 5/3, damp, soft		20	
	3				20	
		CL	Clay, mottled 10YR 2/2, 10YR 5/3, non plastic, damp, firm		20	highly weathered bedrock, crumbly and sandy
	4	SH	SHALE fragments in clay silt mixture with some fine to coarse sand, saturated, 7.5YR 4/6 and 10YR 2/2			
	5		BGH			
	6					
	7					
	8					
	9					
	10					

BS 8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-187

HTRW DRILLING LOG

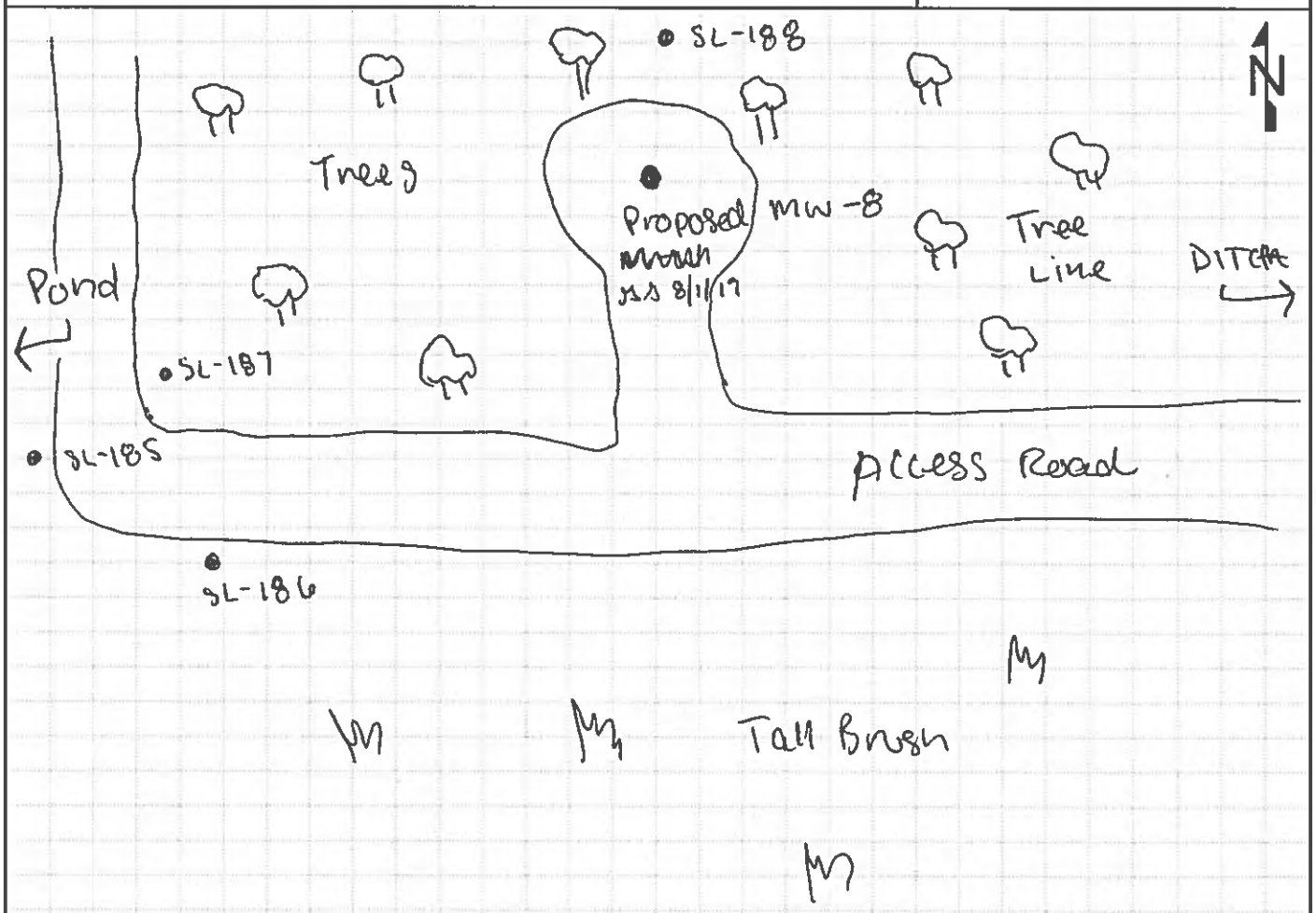
CLIENT: NASA	BOREHOLE NUMBER: SL-188	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: ~~Geoprobe~~ Gregg Swellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Hand Auger (SS; 3")	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 / 1235	COMPLETED: 8/1/19 / 1310
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: ~~2'~~ SS 8/1/19 0.8'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: ~~2'~~ SS 8/1/19 0.8'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS Hole offset ~1' — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-188

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-188	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
0.8'		OL	Organic rich topsoil, SILT and some fine sand, 10YR 3/2, damp, soft	0.8 / 0.8	300	Organic odor Bedrock refusal @ 0.8'
	1		Bolt			
	2					AS 8/1/19 ECCLSL~~125~~ 0125 @ 1250 (0'-0.8') * MSMSD
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-188

HTRW DRILLING LOG

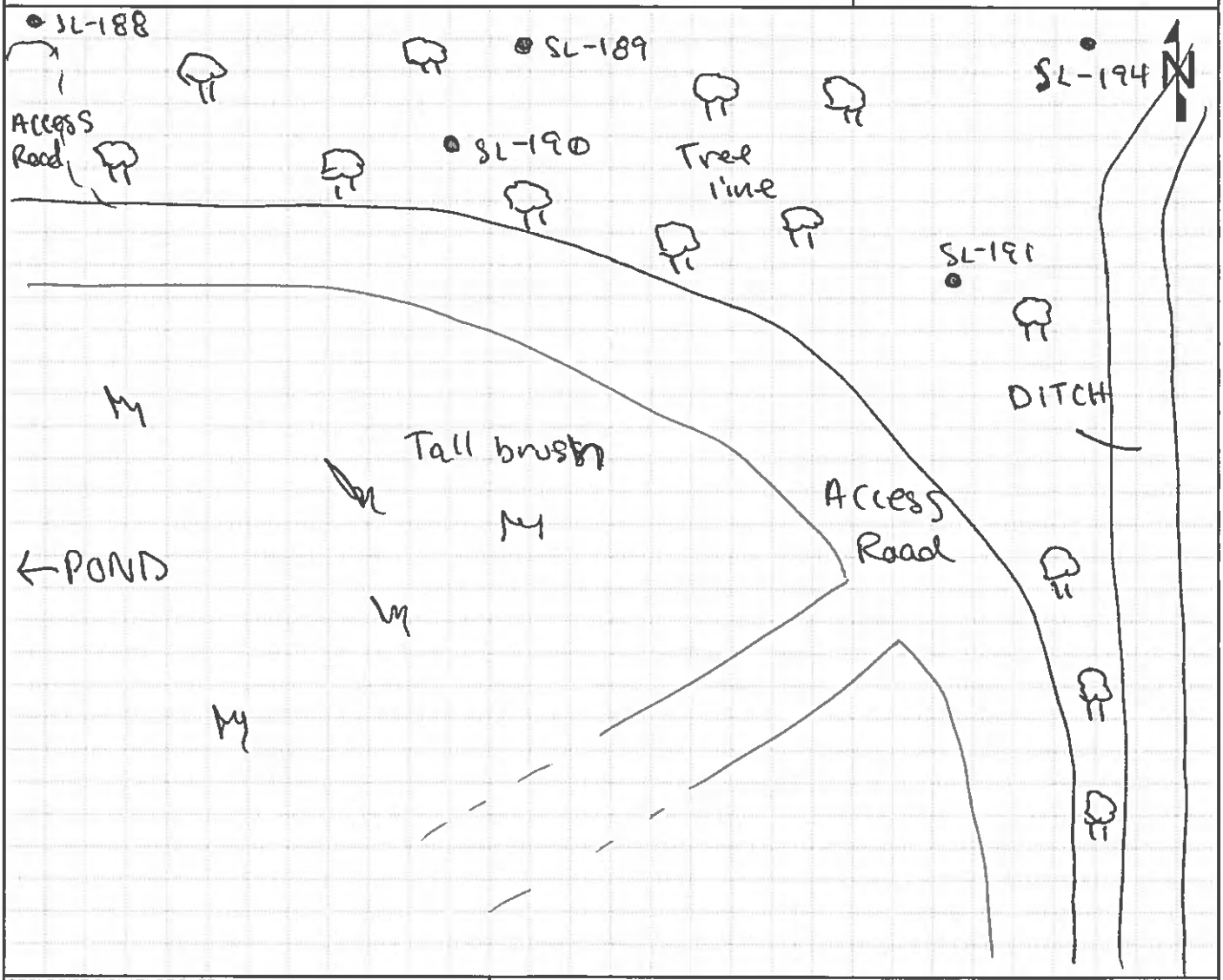
CLIENT: NASA	BOREHOLE NUMBER: SL-189	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Hand Auger (SS ; 3")	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 / 1331	COMPLETED: 8/1/19 / 1342
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 0.9'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 0.9'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-189

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-189

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.9'	OL	Organic topsoil, SILT and sandy little sand, 10YR3/6, damp, soft	0.9 / 0.9	700	Organic odor ECCLSL0196 @ 1345 (0'-0.9') Bedrock refusal @ 0.9
	1		BOH			
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-189

HTRW DRILLING LOG

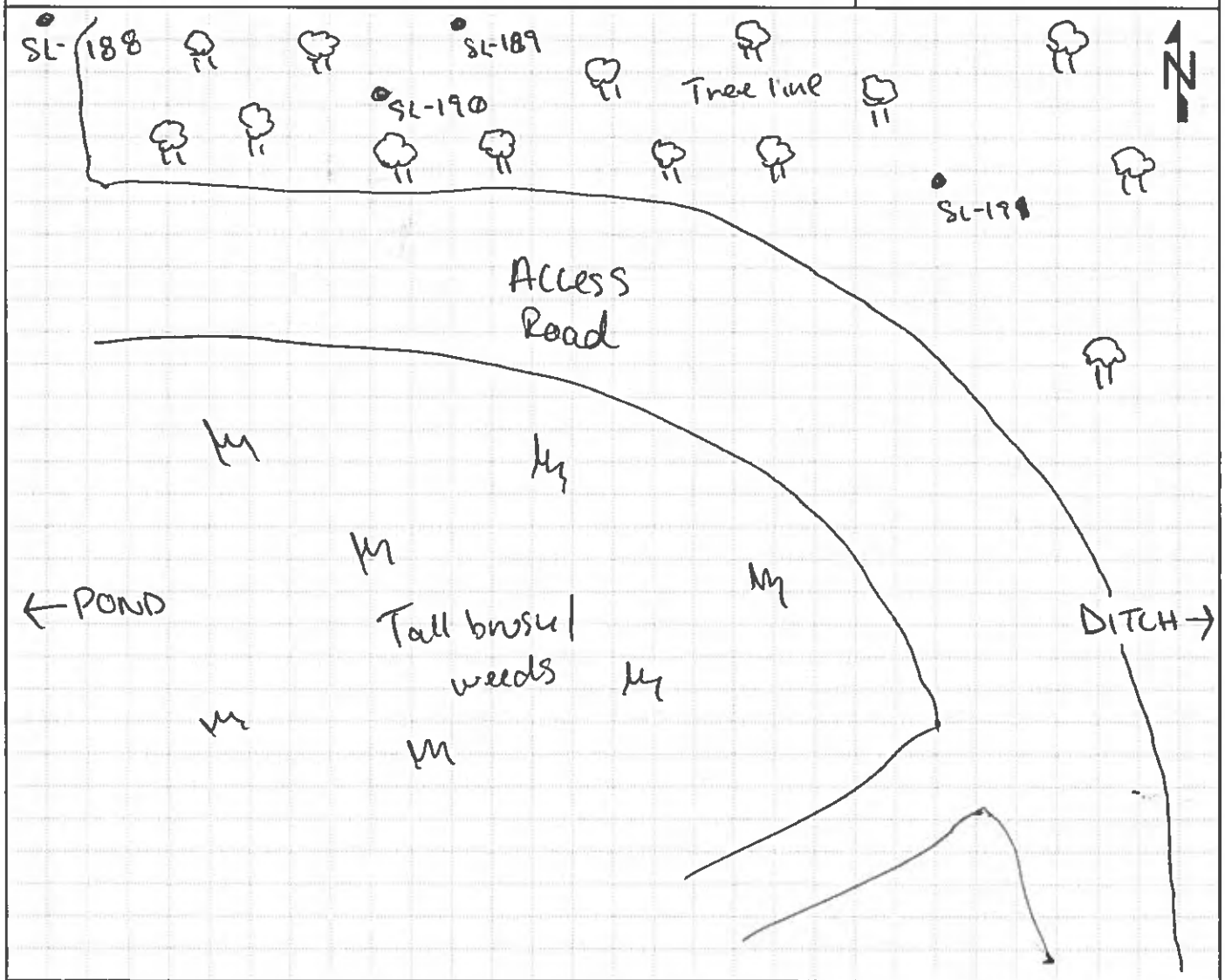
CLIENT: NASA	BOREHOLE NUMBER: SL-190	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Hand auger - SS, 3"	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 | 1320 COMPLETED: 8/1/19 | 1325	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: ~~0.25'~~ 1.25' (AD 8/1/19)	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1.25'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-190

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-190	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, SILT and little sand, fine, damp, soft	1/1	1380	Organic odor ECCLSL0197 @1330 (0-1)
	1.25'			0.25/0.25	550	Bedrock refusal 1.25'
	2		BOH			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

DD 8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-190

HTRW DRILLING LOG

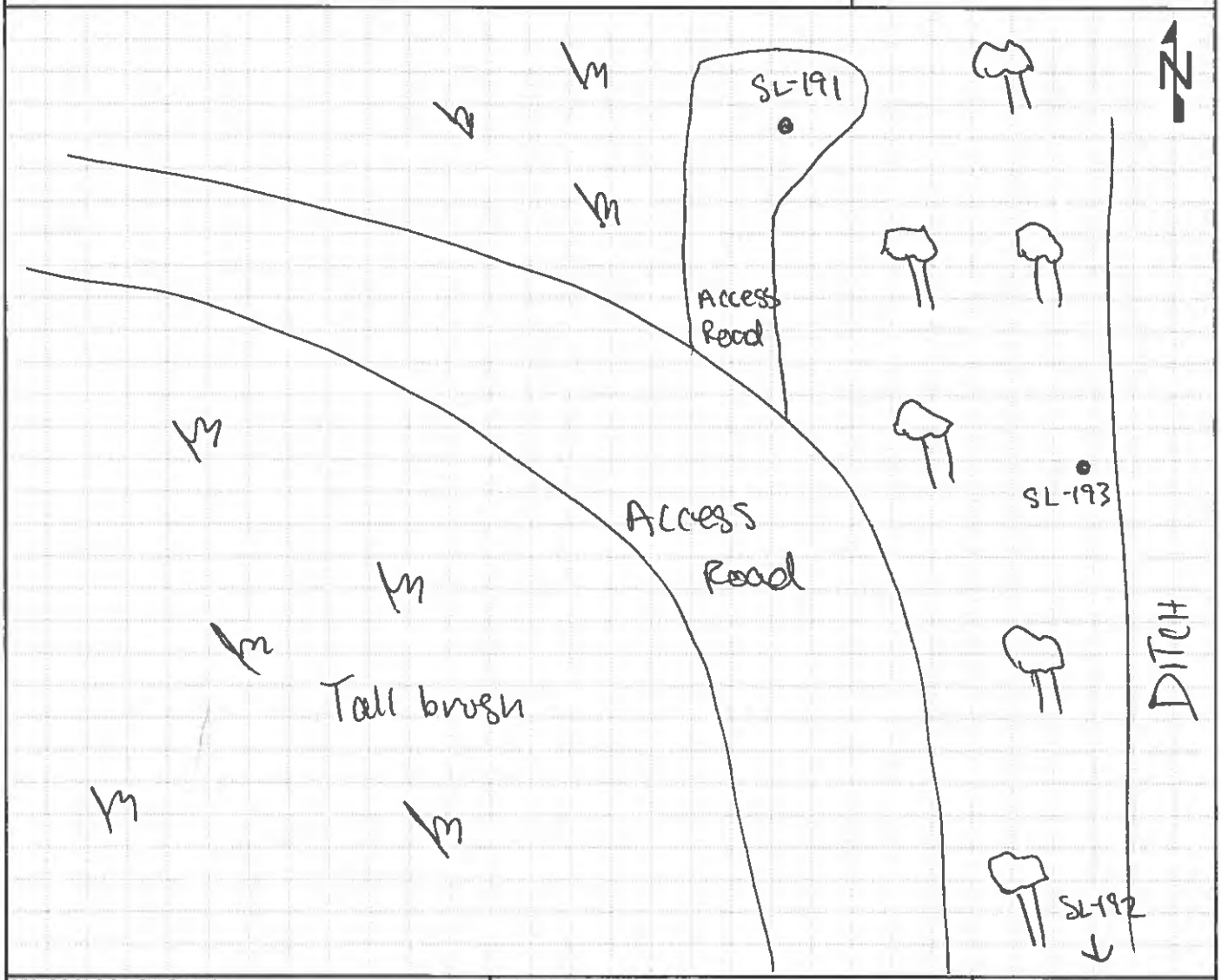
CLIENT: NASA	BOREHOLE NUMBER: SL-191	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Stellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 | 0942	COMPLETED: 8/1/19 | 1420
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0.3'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.3'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-191

8/1/19

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-191	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and some fine sand, 10YR 2/2, dry, soft		2460	Organic odor ECCLSB198 @ 1420 (0.5'-1')
	0.8'				2360	
	1	CL	Interbedded clay and sand; beds are very thin; clay is clay with little fine sand, 10YR 5/8 and 10YR 4/1 and 10YR 7/1, non-plastic, firm, damp; sand is fine to medium 10YR 7/1, poorly sorted	3.7/4	280	No odor ECCLSB199 @ 1425 (1'-1.5')
	2				30	
					30	
	3				20	
			10YR 2/2 and 10YR 5/8		50	
	3.7'					
	4	SH	weathered SHALE, fissile, non-consolidated material with rock powder between layers, silt, 10YR 2/2, iron staining		50	
	4.3	LS		0.3/0.3	40	
	5		LIMESTONE or SILTSTONE w/ lime cement, 10YR 7/1, massive, mica grains throughout		N/A	Bedrock Refusal
			BOH			
	6					
	7					
	8					
	9					
	10					

SS 8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-191

HTRW DRILLING LOG

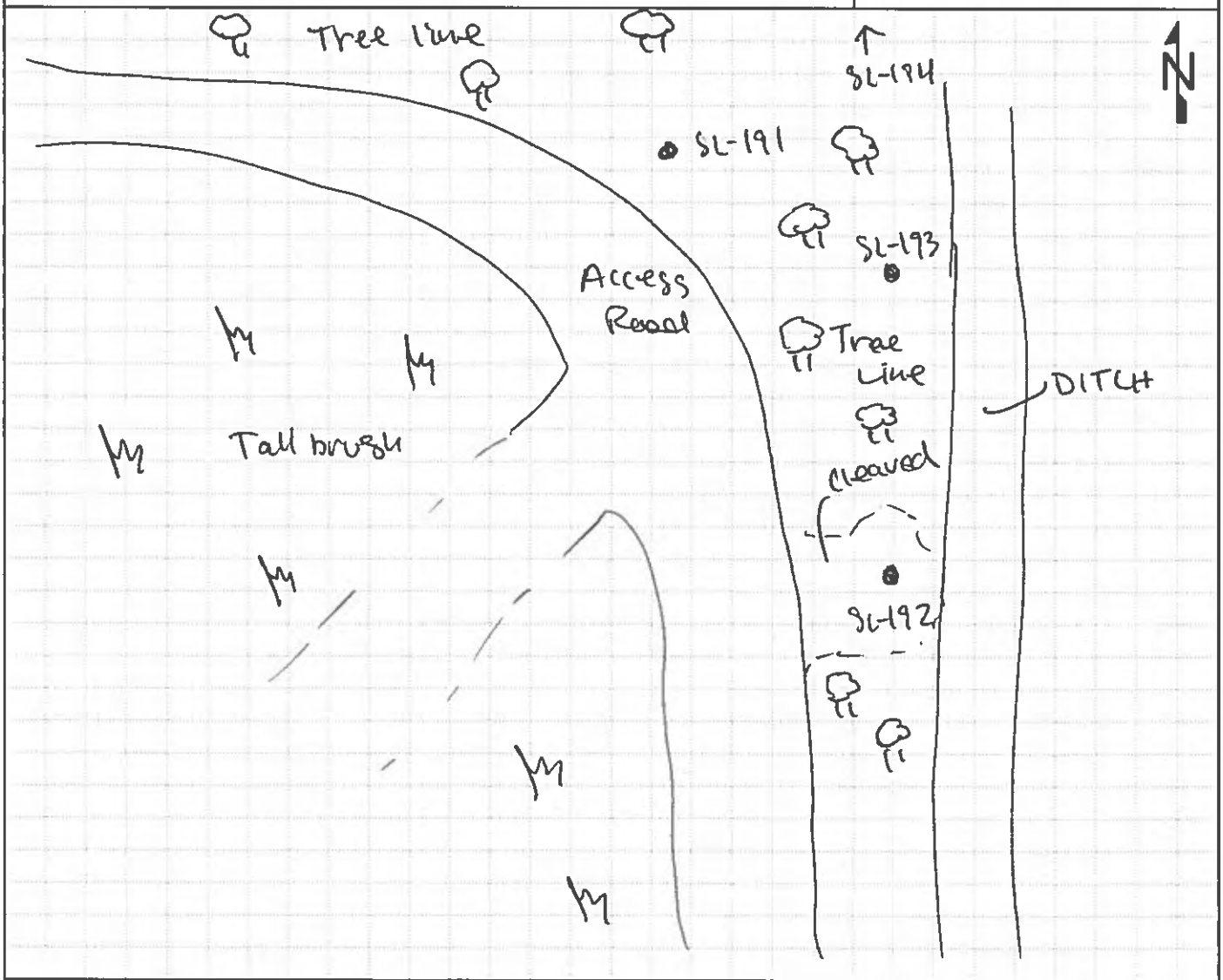
CLIENT: NASA	BOREHOLE NUMBER: SL-192	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4 LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8 BOREHOLE LOCATION: Trap and Skeet Range	
	9 DRILL DATE/TIME STARTED: 8/1/19 / 1513	COMPLETED: 8/1/19 / 1519
	10. DEPTH GROUNDWATER ENCOUNTERED	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-192

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-192	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, SILT and some fine sand, 10YR2/2, dry, soft to firm 10YR 2/1	3.8/4'	280 20	organic odor ECCLSL0200 @152 (0'-1')
	2	CL	Clay with little silt and some sand, 10YR 7/1 and 10YR5/6 and 10YR 2/2 mottled, firm, dry, nonplastic		20	
	3	~~SM~~ DS 8/1/19	moist, low plasticity, 10YR5/6 and 10YR 2/2 mottled.		20 20	No odor
	4					
	5		BOH			
	6					
	7					
	8		DS 8/1/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-192

HTRW DRILLING LOG

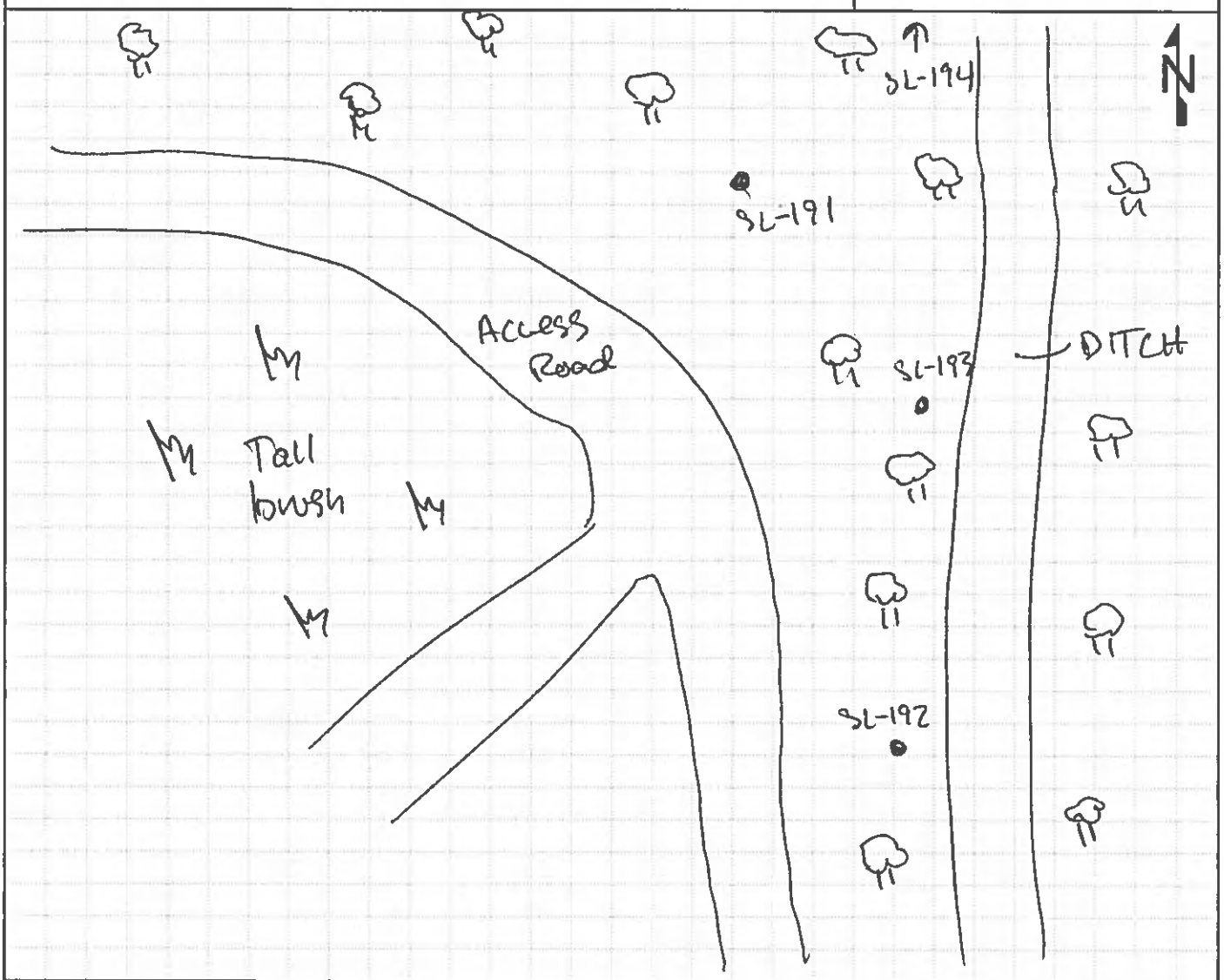
CLIENT: NASA	BOREHOLE NUMBER: SL-193	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 77DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 1432	COMPLETED: 8/1/19 1440
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-193

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-193	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) Lead XRF	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic rich topsoil, silt and some fine sand, dry, firm, non plastic, 10YR 3/6 little clay, hard to firm, dry to damp	3.7/4	2060	Organic odor ECCLSL0201@ 1440 (0'-1')
	1.5'				110	No odor
	2	CL	Clay and little silt and sand, 10YR 2/1 mottled w/ 10YR 5/6, sand is fine and 10YR 7/1, dry, very firm, ~ interbedded clays and sand above rock			
	2.6'				60	
	3	SH	weathered SHALE, 10YR 2/2, iron staining, broken fragments, powdered rock in upper portion of bedrock layer.		380	
	4					Bedrock Refusal
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

8/1/19 JDS

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-193

HTRW DRILLING LOG

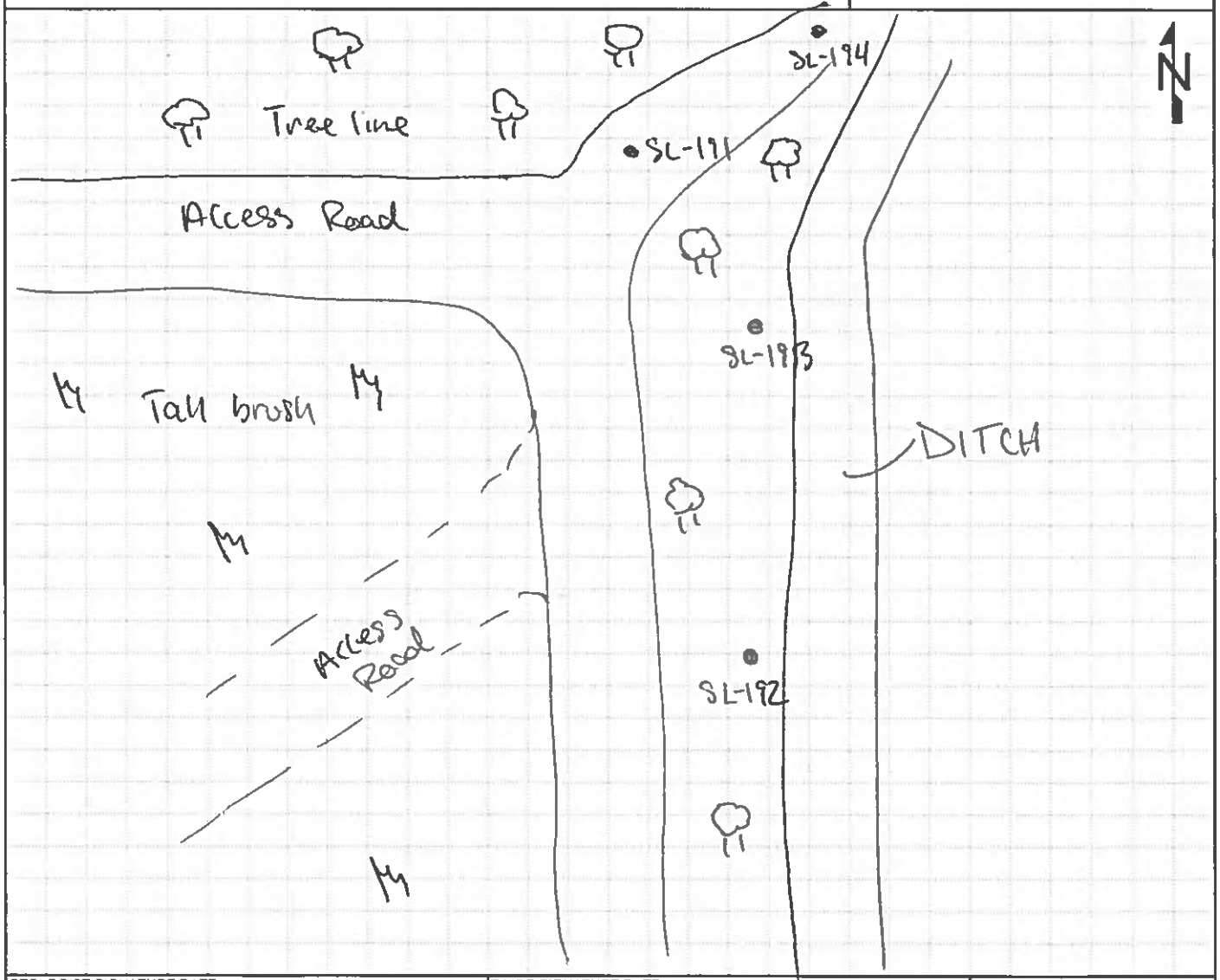
CLIENT: NASA		BOREHOLE NUMBER: SL-194
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL:	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME: STARTED 8/1/19 | 1444 COMPLETED 8/1/19 | 1448	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 2.1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0.3'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 2.4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-194

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-194	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, silt and some sand, 10YR 2/2, damp, soft	2.1/2.4	700	Organic odor ELCLSL0202@ 1500 (0'-1')
	1					
		SM	Sand and some silt, fine, sub-rounded, soft, damp, 10YR 5/6, -Clay, silt, and sand above rock		110	
	2					
	2.4'	LS	LIMESTONE, 10YR 7/1 (fresh), crinoid fossil		100	Bedrock Refusal @ 2.4
	3		BOH			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

JS 8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-194

HTRW DRILLING LOG

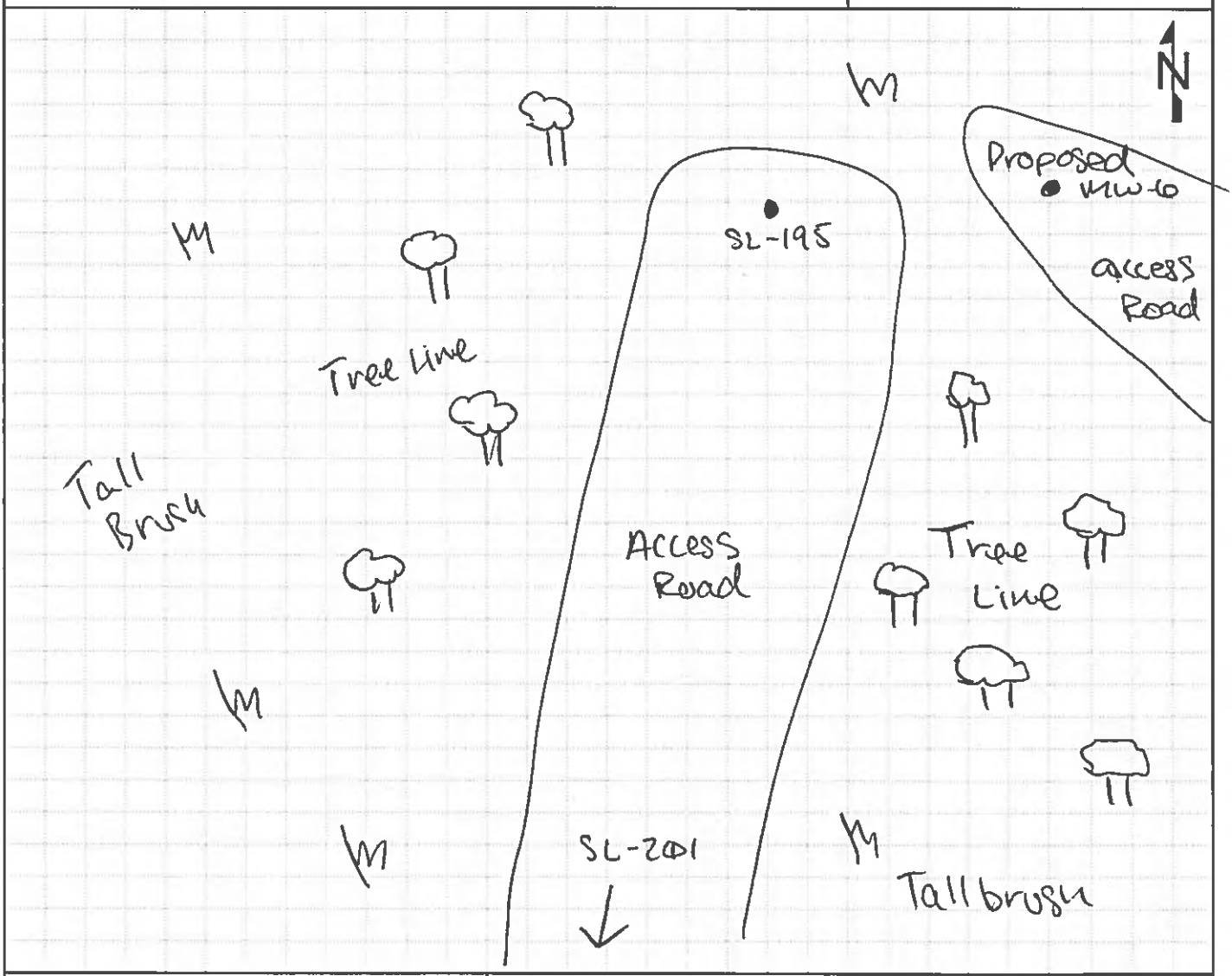
CLIENT: NASA	BOREHOLE NUMBER: SL-195	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Snellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/31/19 | 1117	COMPLETED: 7/31/19 | 1430
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs; TAL Metals: Arsenic; FR Metals: Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: NA

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-195

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-195

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	Organic topsoil, SILT with trace very fine sand, 10YR 2/2, damp, non-plastic, soft.		6250	Organic odor
					1000	NO odor
	1.3'	SM	SAND and some silt, fine, sub-rounded, 10YR 6/6 and 10YR 2/2 (mottled), damp, non-plastic -Some clay	3.6/4	1140	ECCLSL0203 @ 1430 (1'-1.5')
	2				40	ECCLSL0204 @ 1435 (1.5'-2')
					30	1435 B2 0.002' @ sample table
	3				20	
	3.3'	SH	weathered SHALE, 10YR 2/2, fissile, angular fragments, non-consolidated Rock		80	
	4				60	Bedrock Refusal
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

SS 7/31/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
[signature]		SL-195

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-196	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/31/19 | 0818 COMPLETED: 7/31/19 | 1005	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, (Pb)	
15. TOTAL DEPTH OF BOREHOLE: 5'		

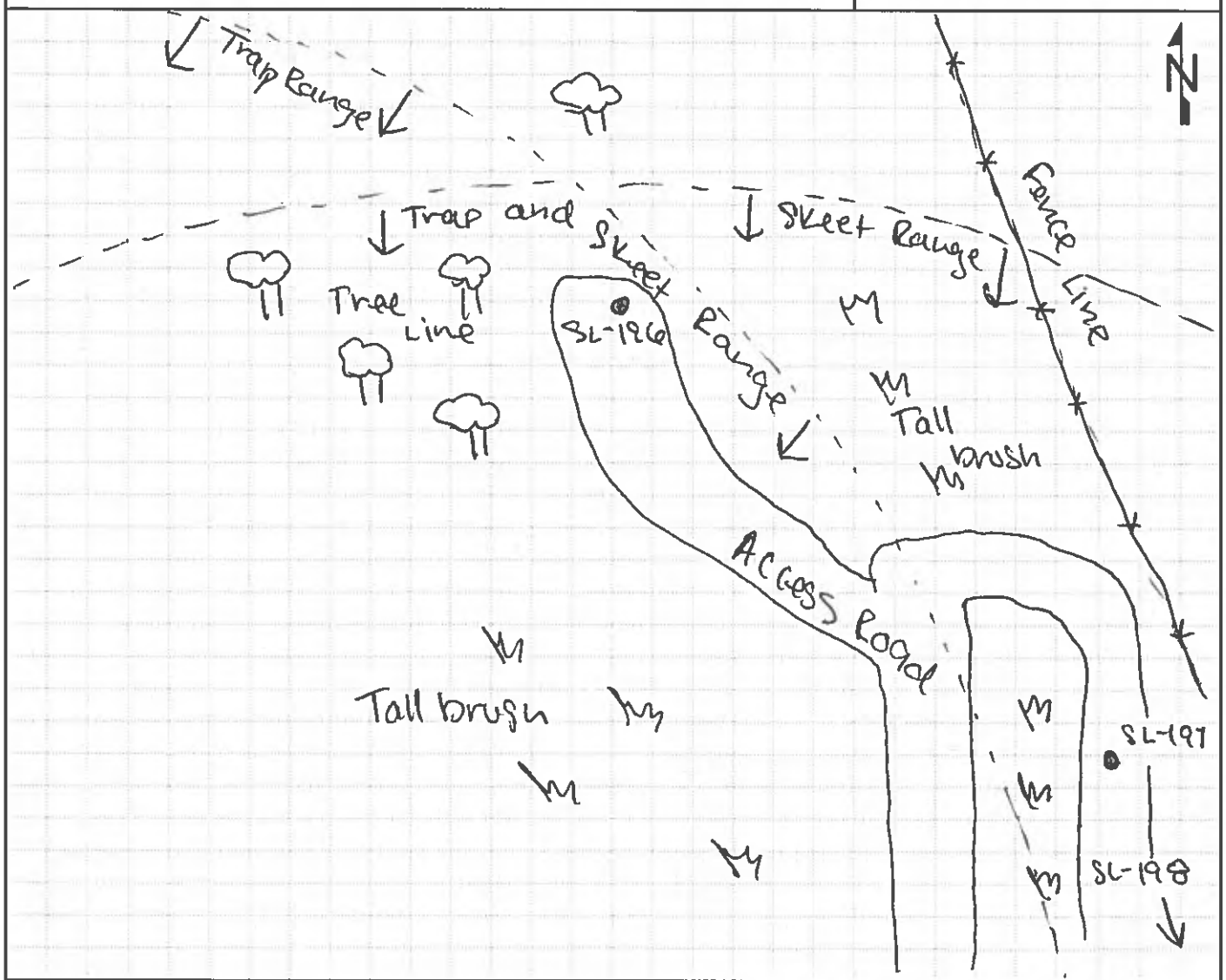
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-196

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-196	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)		REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic rich topsoil, SILT and some sand. 10YR2/1, damp, soft, non-plastic, sand fine, subangular		LS ~~N/A~~ 6900	Lead ppm	Organic odor
					5430		
	2	SM	SAND and little silt, fine, sub-angular, well sorted, damp, soft, non plastic 10YR 5/6 little ~~some~~ clay JJ 7/31/19	3.4 / 4	1890		NO odor ECCLSL0213 @ 1005 (1'-1.5') ECCLSL0214 @ 1010 (1.5'-2')
					120		
					50		
	3	ML	SAND and clay, fine, sub-angular, ~~well~~ JJ 7/31/19, damp, soft, moderate plasticity, 10YR 5/6 mottled with 10YR 5/1		20		
					20		
	4				N/A	N/A	
	5	SH	Weathered SHALE. 10YR 2/1, fissile, fragmented angular peices.	0.9 / 1	N/A	N/A	Bedrock Refusal
	6		BOH				
	7						
	8		JJ 7/31/19				
	9						
	10						

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-196

HTRW DRILLING LOG

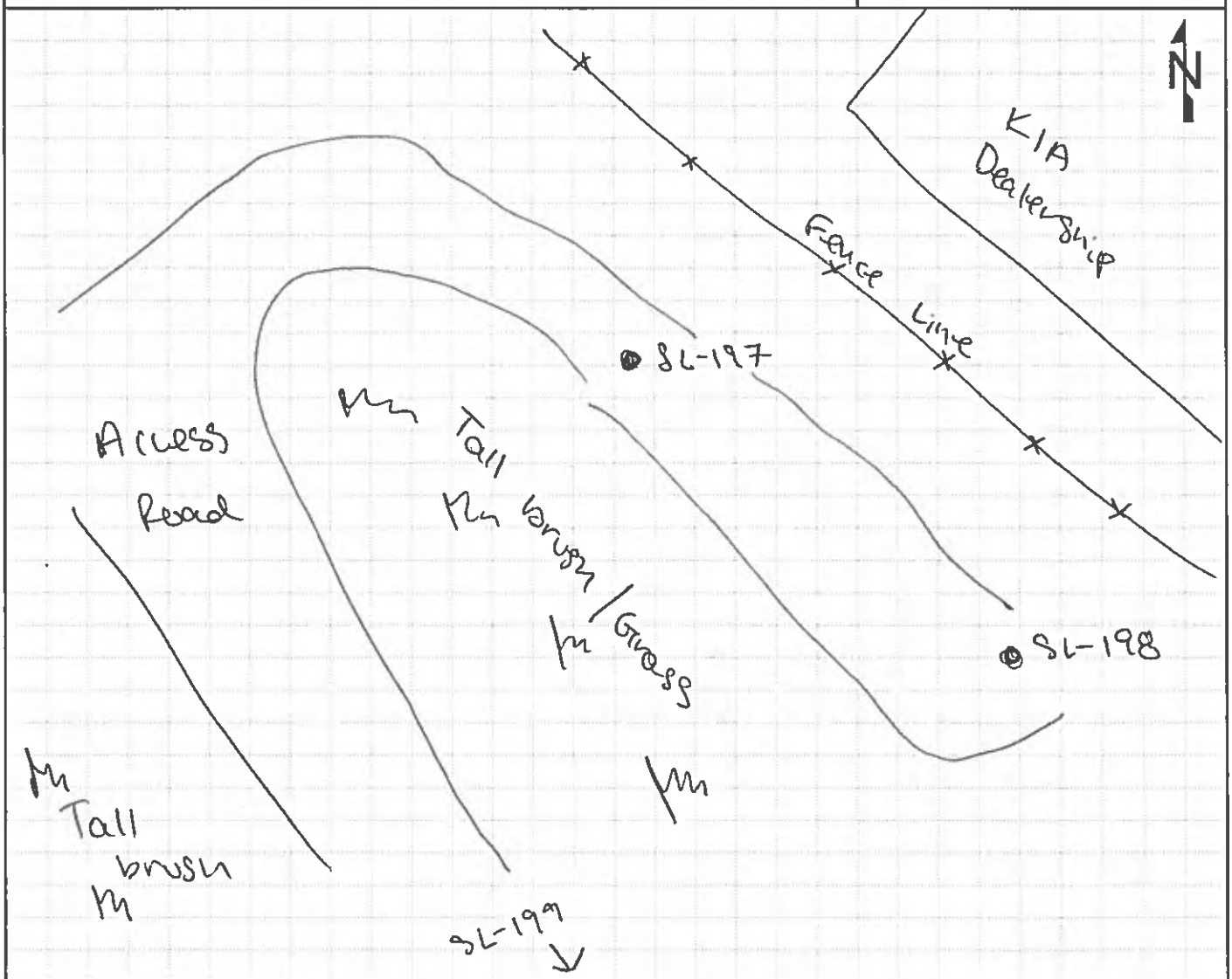
CLIENT: NASA	BOREHOLE NUMBER: SL-197	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liners (4')	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/30/19 / 1034	COMPLETED: 7/30/19 / 1038
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-197

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-197	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: ~~0941~~ 041982 JD 7/30/19 Colors from Munsell Soil Color Chart, 2009 Year Revised XRF for PD

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.3'	SM	Organic topsoil, SILT and some sand 10YR 2/2, fine sand, subrounded, damp, non-plastic, soft		180	Organic odor, Sample 0'-1' interval @1050 ECCLSL0215
	1	SM	SILT and sand (little), fine grained, subangular, 10YR 5/8, damp, non-plastic, soft to firm		10	No odor
	2	CL	Clay and sand, some silt, fine, sub angular, 10YR 5/8 and 10YR 5/1, damp	3.5/4		
	3	CL	Clay and sand, fine grained, sub-angular, 10YR 5/8 mottled w/ 10YR 5/1, ~~damp~~ moist, low plasticity, soft JD 7/30/19		20	
	3.1'	SH	weathered SHALE, 10YR 2/1, highly fragmented. JD 7/30/19	X	20	
	4					
	5		BOH			
	6					
	7					
	8		JD 7/30/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-197

HTRW DRILLING LOG

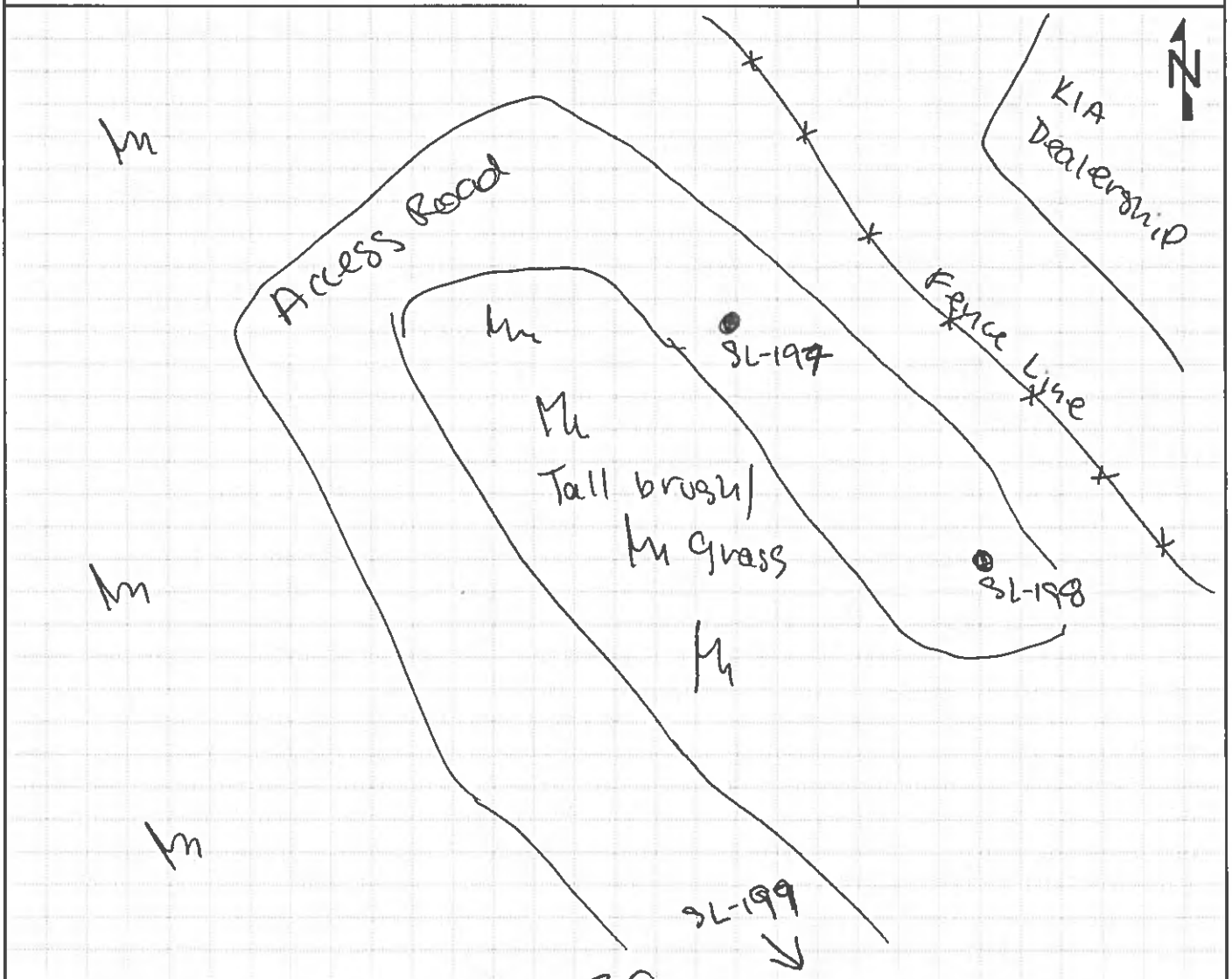
CLIENT: NASA	BOREHOLE NUMBER: SL-198	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: 7 Skeet Range	
	9. DRILL DATE/TIME: STARTED: 7/30/19 | 1008 COMPLETED: 7/30/19 | 1014	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 3.7'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0.3'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-198

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-198	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic rich topsoil, SILT and some sand, fine grained, sub-angular, soft, damp, non-plastic 10YR2/2, dry		260	No odor organic Sample 0'-1' interval 1020 ECCLSL021
	1	ML	SILT with little sand and clay, fine grained, subangular, 10YR4/6, damp, soft, non-plastic damp to moist, low plasticity	3.4/4	20	No odor
	2				50	
	3	SH	weathered bedrock, some silt and clay, 10YR 2/2, moist, non-plastic		30	Root traces/ organics organic odor
	3.8' 4	SH	SHALE, 10YR 2/1, dry, ~~tightly~~ DS 7/30/19			
	4		BOH			
	5					
	6					
	7					
	8		DS 7/30/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-198

HTRW DRILLING LOG

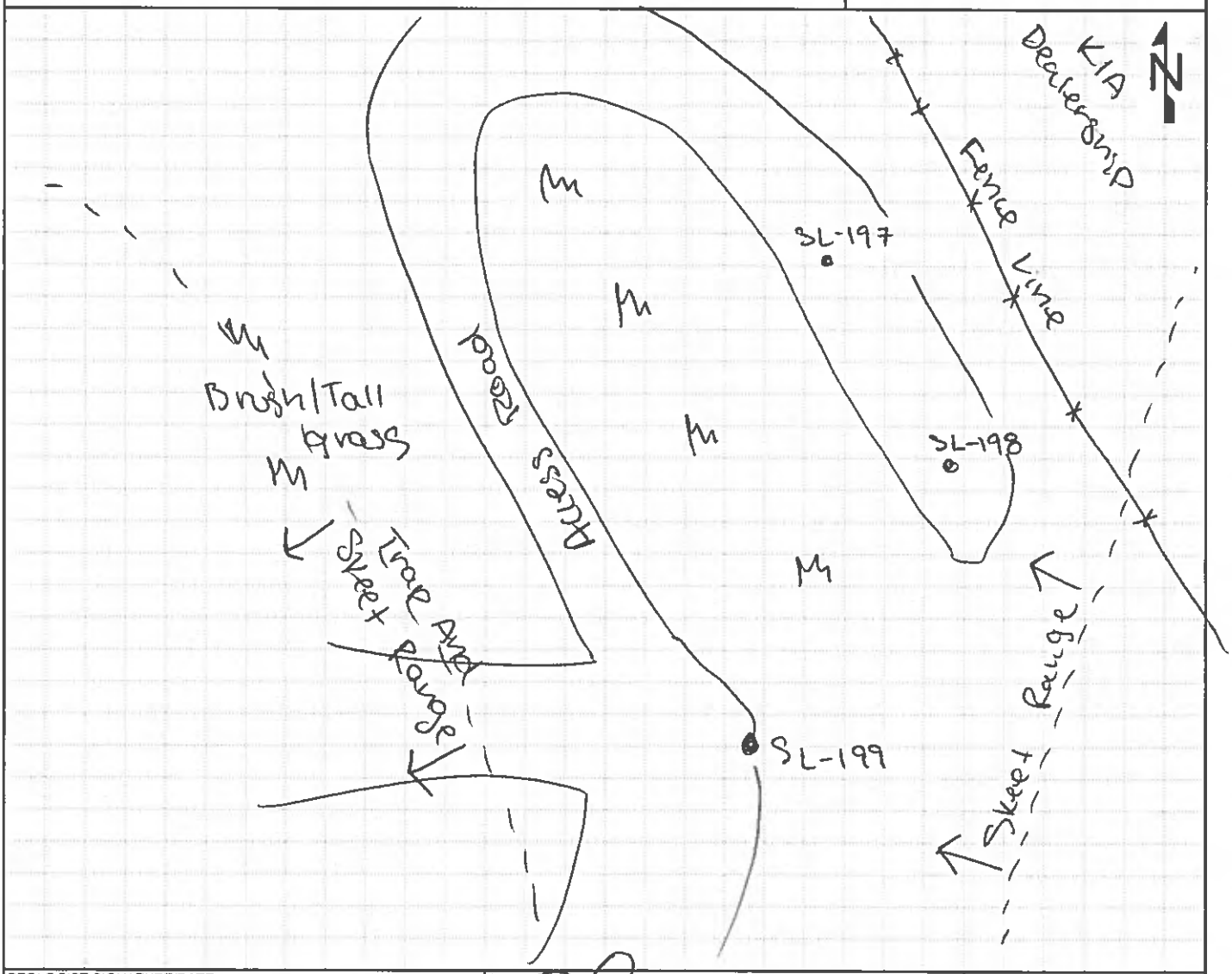
CLIENT: NASA	BOREHOLE NUMBER: SL-199	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4')	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/30/19 / 0915 COMPLETED: 7/30/19 / 0922	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 7/30/19	QA/QC SIGNATURE/DATE: 7/31/19	BOREHOLE NUMBER: SL-199

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-199	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic rich topsoil, silt and some fine sand, 10YR 2/2, soft, dry, non plastic		1300	No odors
	1	SC	SAND and some clay, 10YR 4/6, fine sand, subangular, soft, damp, non plastic		1200	ECCLSL0217 @ 1240 (0.5'-1') Duplicate @ 0.5'-1' → ECCLSL0225
			10YR 2/1 mottled with 10YR 4/6 and 10YR 5/1	3.6/4	60	ECCLSL0218 @ 1245 (1'-1.5')
	2	CL	Clay and some sand, 10YR 4/6 mottled with 10YR 5/1, soft, damp, non plastic		10	
	2.5				20	
	3	SH	weathered SHALE, 10YR 2/1, angular fragments with some silt, damp		30	
			Dry		30	
	4				30	Bedrock refusal
	5					
	6					
	7					
	8					
	9					
	10					

MS 7/30/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/30/19	SL-199

HTRW DRILLING LOG

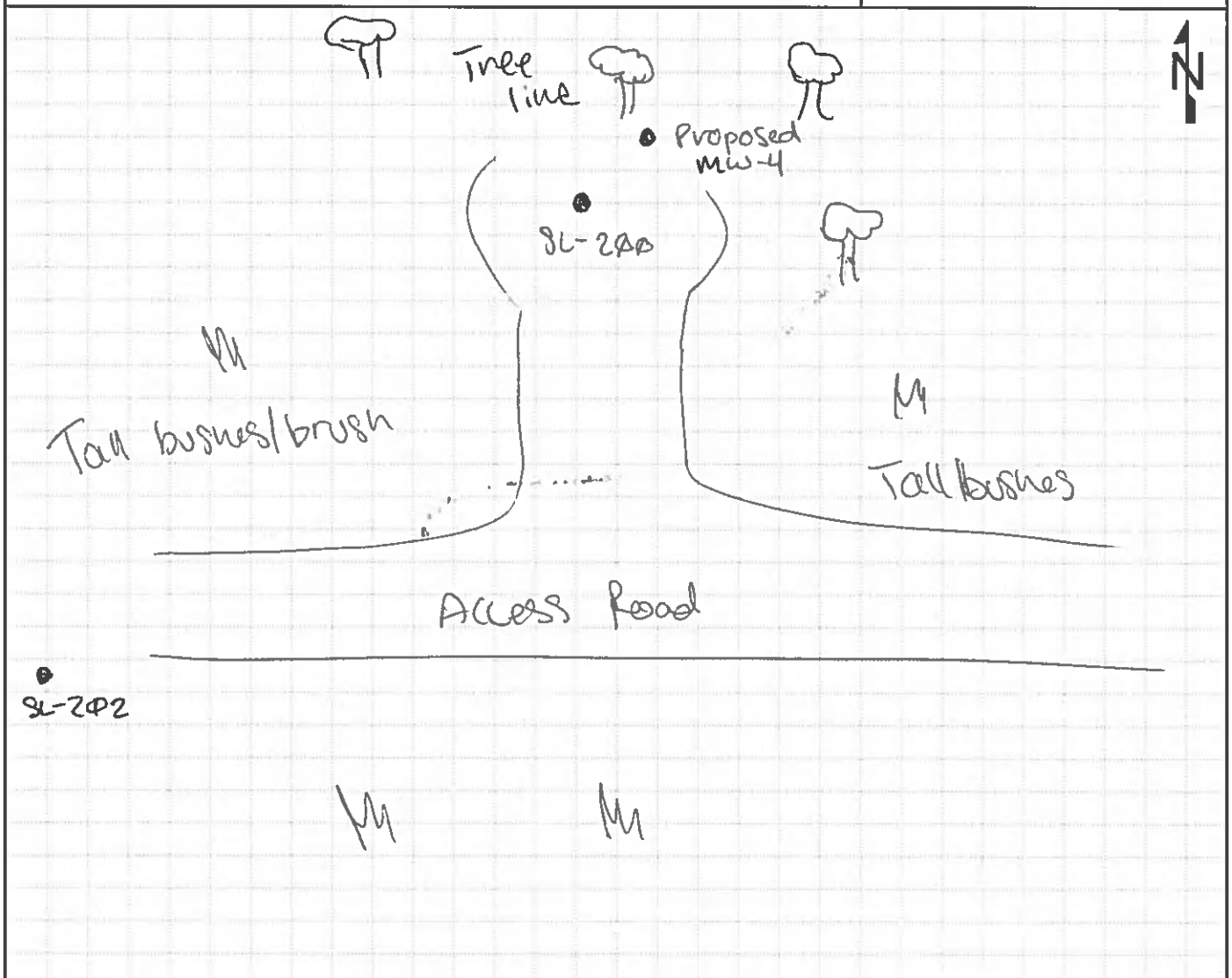
CLIENT: NASA	BOREHOLE NUMBER: SL-200	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/30/19 / 1518	COMPLETED: 7/31/19 ~~7/30/19~~ / 1022
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 3.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 3.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	8/2/19	SL-200

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-200

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING ~~XRF~~ Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	Sand and some silt, very fine sand, 10YR 2/2, dry, soft, non-plastic 10YR 7/6	3.2/3.5	4270 4830 40 20	JD 7/30/19 AVO Organic odor ECCLS0205 @ 1020 (0.5'-1') No odor JD 7/30/19 ~~ECCLS0206~~ @ 1025 (1.0'-1.5') ECCLS0206 Duplicate 1.0'-1.5' @ 1025 ECCLS9002
	2	CL	Clay with little fine sand, 10YR 6/6 mottled with 10YR 5/1, non-plastic, damp, soft		20 40	
	3 3.2	SH	Weathered SHALE, fissle, fragmented, 10YR 2/1		20	Bedrock refusal
	3.5'					
	4		BOH			
	5					
	6					
	7					
	8		JD 7/30/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	8/2/19	SL-200

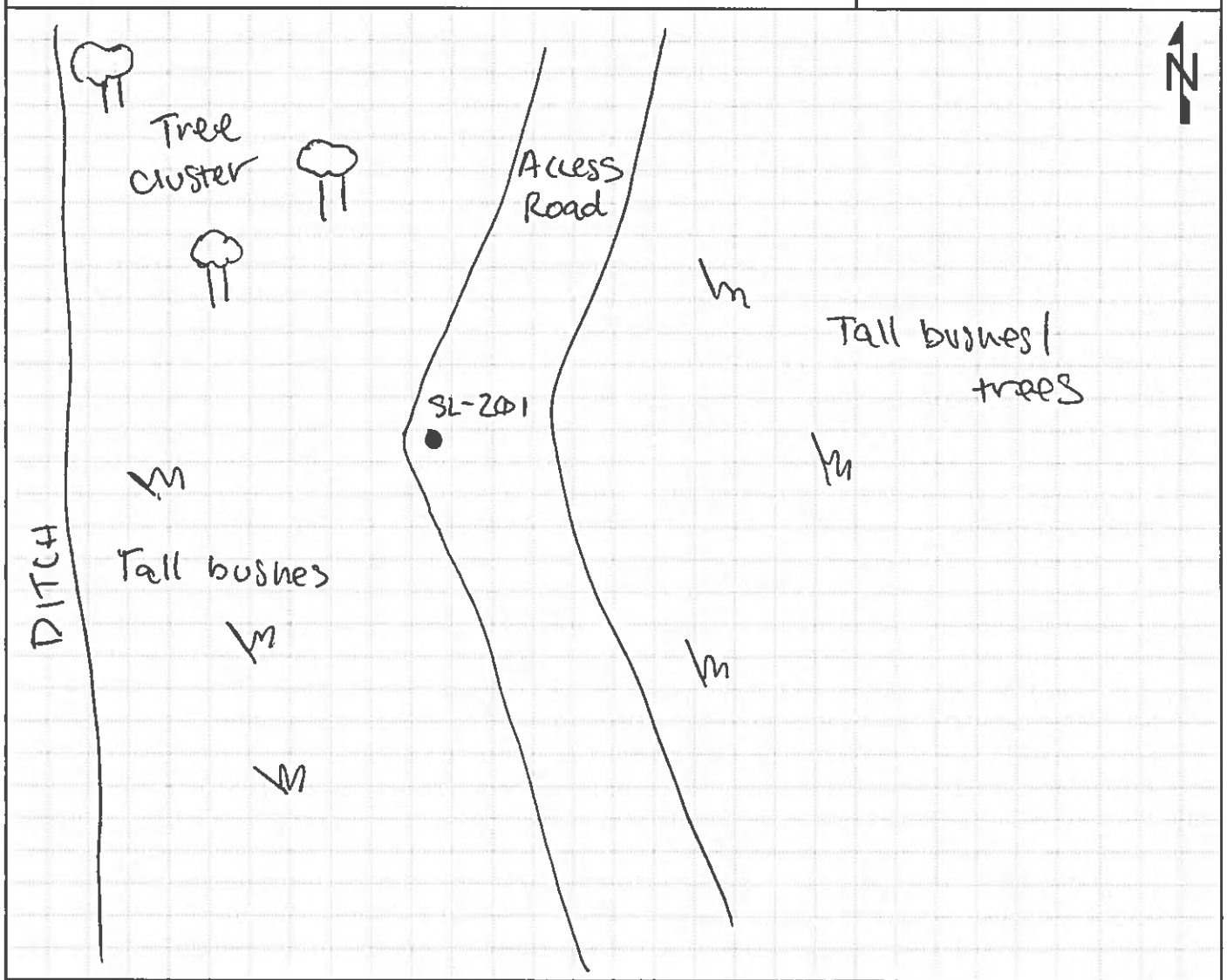
HTRW DRILLING LOG

CLIENT	NASA
BOREHOLE NUMBER	SL-201
1. COMPANY NAME	Leidos
2. DRILLING SUBCONTRACTOR	Geo-Environmental Drilling
SHEET	1 OF 2
3. PROJECT	ECCL Firing Range Removal Site Evaluation
4. LOCATION	NASA Plum Brook Station, Sandusky, Ohio
5. NAME OF DRILLER	Gregg Shellhammer
6. MAKE/MODEL OF DRILL	Geoprobe 7730 DT
7. SIZES AND TYPES OF SAMPLING EQUIPMENT	Acetate liner (4')
8. BOREHOLE LOCATION	Trap and Skeet Range
9. DRILL DATE/TIME STARTED	7/31/19 / 1045
COMPLETED	7/31/19 / 1410
10. DEPTH GROUNDWATER ENCOUNTERED	N/A
11. OVERBURDEN THICKNESS	4'
12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION	N/A
13. DEPTH DRILLED INTO BEDROCK	0'
14. CHEMICAL SAMPLES (circle)	VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb
15. TOTAL DEPTH OF BOREHOLE	4'
16. DISPOSITION OF BOREHOLE	
BACKFILL TYPE	GROUT, BENTONITE
SEMI-TEMPORARY MONITORING WELL	
WELL ID	N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19	8/2/19	SL-201

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-201	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and little sand, fine, subangular, 10YR 2/2 soft, damp, non-plastic	4/4	1060	Organic odor
	1				220	ECCLSL0207 @ 1410 (0-0.5') 902 *Duplicate: ECCLSL0202
	1.4'	SM	Sand and trace clay, fine, subangular, 10YR 6/6 mottled with 10YR 7/2, iron rich nodules, soft, damp non plastic		20	No odor Iron nodules and staining
	2	CL	Clay and some sand, fine, no color change, soft damp low plasticity		30	ECCLSL0208 @1415
					10	no iron nodules, iron staining remains
	3				30	No odor
		SH	weathered SHALE, fissile, 10YR 2/1, iron staining		40	
	4				30	Bedrock Refusal
	5		BOH			
	6					
	7					
	8					
	9					
	10					

SS 7/31/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/31/19		SL-201

HTRW DRILLING LOG

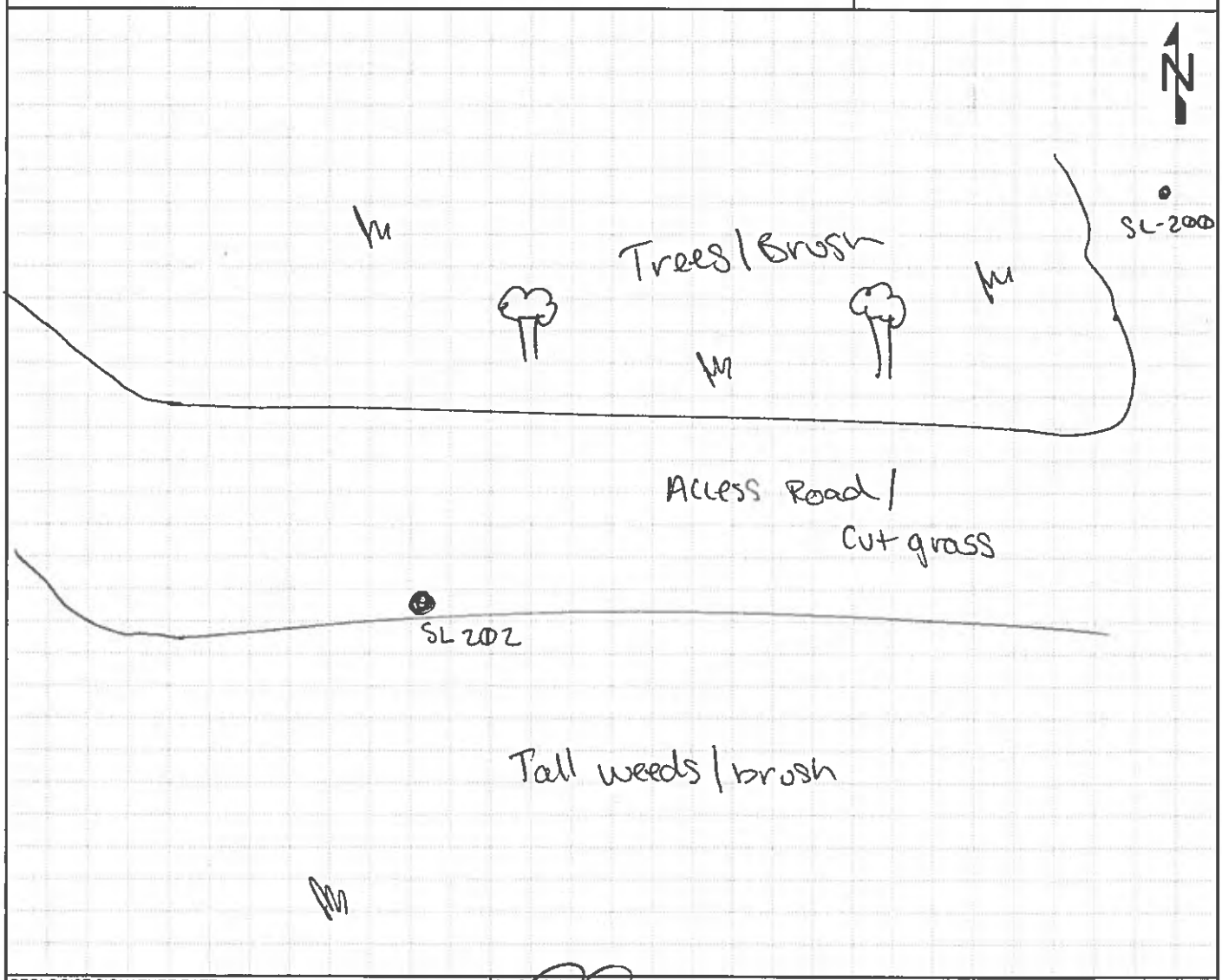
CLIENT: NASA	BOREHOLE NUMBER: SL-202	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Yard	
	9. DRILL DATE/TIME STARTED: 7/30/19 / 1544	COMPLETED: 7/30/19 / 1555
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 5.3'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 5.3'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
[signature]	[signature] 7/31/19	SL-202

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-202

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	topsoil, silt and some fine sand, subrounded, damp, non-plastic, 10YR 2/2		SVOCs + PAH	organic odor clay pigeons in top 1.5
	2	SM	10YR 6/6, SAND with trace silt, fine, subrounded, damp, soft non-plastic	3.0 / 4	SAMPLES no pb SCREENING REQUIRED	No odor, pigeons no longer in soil @ 1.5 Sample 1'-2' interval @ 1600 ECCLSL0209 Sample 2'-3' interval @ 1605 ECCLSL0210 Sample 3'-4' interval @ 1610 ECCLSL0291
	3					
	4	CL	CLAY and some sand, mottled 10YR 6/6 and 10YR 5/1			
	5	SH	weathered SHALE, angular frags, fissile, 10YR 2/1, iron staining	1.3 / 1.3		Bedrock refusal 5.3'
	5.3'		BOH.			
	6					
	7					
	8					
	9					
	10					

DJ 7/30/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-202

HTRW DRILLING LOG

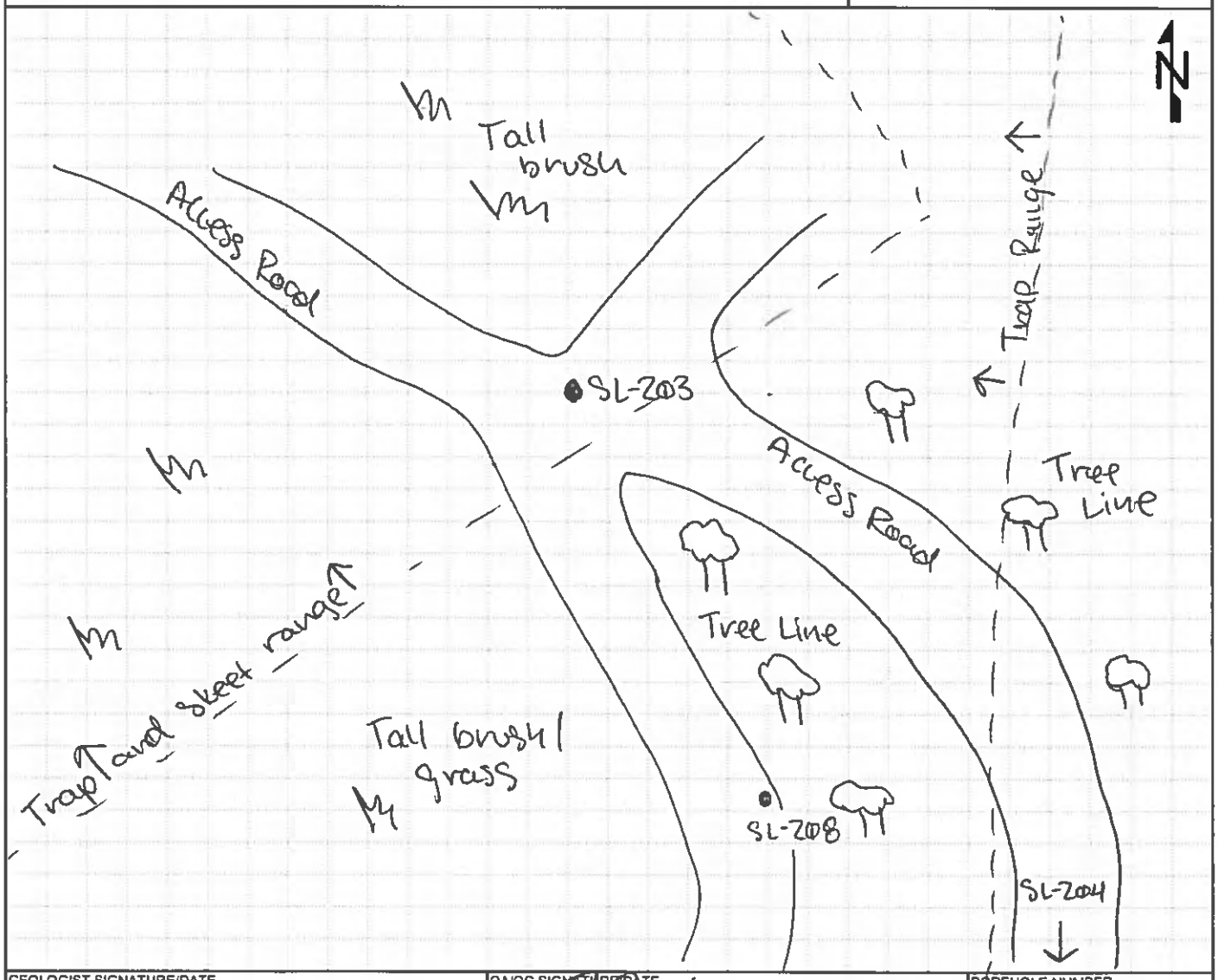
CLIENT: NASA	BOREHOLE NUMBER: SL-203	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Snellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Yard	
	9. DRILL DATE/TIME: STARTED: 7/30/19 0856; COMPLETED: 7/30/19 1255 ~~0905~~ 7/30/19	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: NA	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-203

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-203	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041987 AD 7/30/19 Colors from Munsell Soil Color Chart, 2009 Year Revised XRF Cor, Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	Organic rich topsoil, silt and some sand, fine grained, sub-rounded, dry, soft/wet chunks of firm/hard soil, 10YR 3/2	4/4	3470	No odor
					3880	Sample ECCLSL021 @1300 (0.5'-1')
		SC	SAND and little clay, 10YR 5/6, fine grained, sub angular dry w/ chunks of cohesive dry soil,		40	Sample ECCLSL0212 @1305 (1'-1.5')
	1.7' 2	CL	Clay and some sand, 10YR 5/2 mottled with 10YR 5/4, damp, firm, some angular bedrock fragments		140	*MS/MSD @ 1300 (0.5'-1')
					20	
	2.9' 3	SH	Weathered bedrock SHALE, angular fragments, damp		20	
					20	
	4				30	Bedrock Refusal @4.0'
	5		BOH			
	6					
	7					
	8		AD 7/30/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-203

HTRW DRILLING LOG

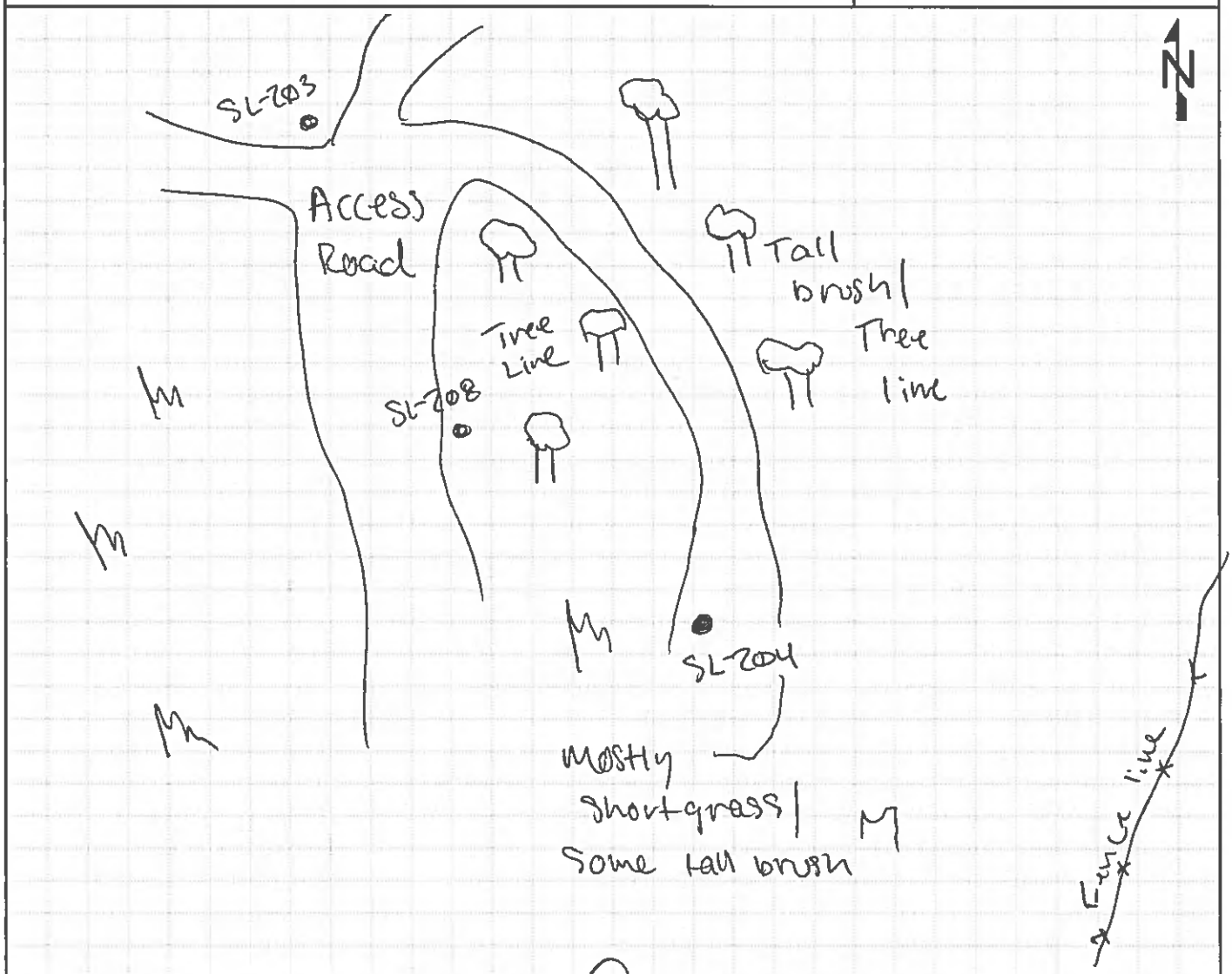
CLIENT: NASA	BOREHOLE NUMBER: SL-204	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4')	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/30/19 | 1135 COMPLETED: 7/30/19 | 1145	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 2'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 2'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-204

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-204	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SILT and little sand, 10YR6/2, fine sand, subangular, firm, dry, non-plastic	JDS 7/30/19	270	No odors Sample 0'-1' interval @ 1205 ECCLSL0219
	2	SH	weathered SHALE, fissile, 10YR6/2 and 10YR 2/2, angular fragments and some silt	3.6/4	n/d 20 40	No odors
	3		10YR 2/2, more consolidated rock/SHALE		20	
	4				40	
	5		BOH			
	6					
	7					
	8		JDS 7/30/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-204

HTRW DRILLING LOG

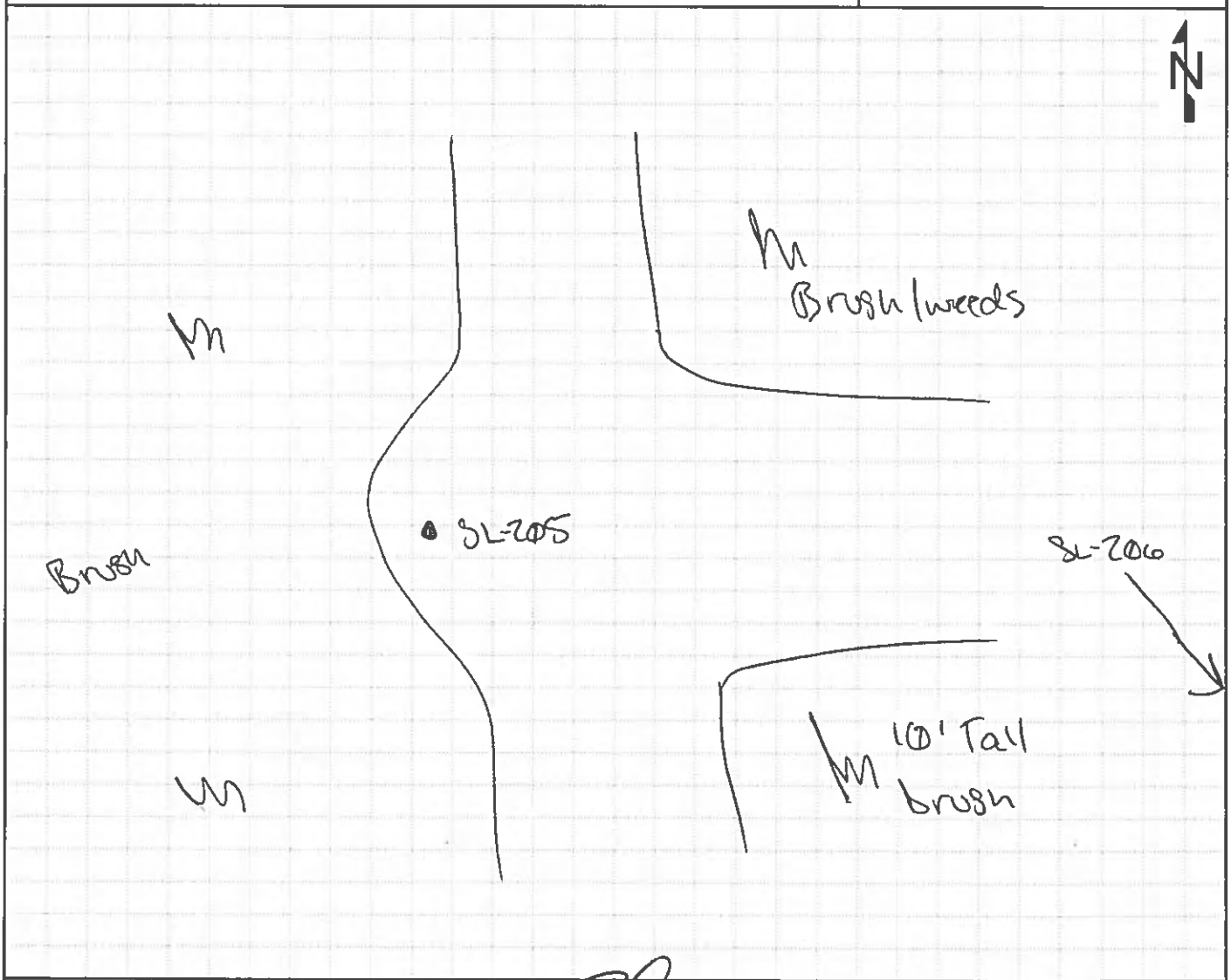
CLIENT: NASA	BOREHOLE NUMBER: SL-205	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4')	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/30/19 | 1352	COMPLETED: 7/30/19 | 1359
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.2'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb (Carbazole only)	
15. TOTAL DEPTH OF BOREHOLE: 4.2'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-205

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-205	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for PD

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.6'	OL	Organic rich topsoil, silt with little sand, fine grained, 10YR 2/2, moist, non-plastic, soft		NA	Organic odor
	1		sand and some clay, 10YR 4/6, fine subangular sand, damp, non-plastic, firm to soft		PAH+	No odor
		SC			SVOC SAMPLE	ECCLSL0220 @ 1400 (1'-2') * MS/MSD
	2		Clay and trace sand, 10YR 4/6 mottled with 10YR 6/1, fine sand, damp, non-plastic, soft	4/4	No pb	
	2.3		weathered bedrock, SHALE, fissile, fragmented, 10YR 2/1, iron staining		SCREENING	ECCLSL0221 @ 1405 ~~(2'-3')~~ (2'-2.3') * Bedrock @ 2.3' BGS
	3	SH	more cohesive rock, SHALE, fissile, fragmented, 10YR 2/1			
	4					Refusal @ 4.2'
	4.2		BOH			
	5					
	6					
	7					
	8					
	9					
	10					

DD 7/30/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-205

HTRW DRILLING LOG

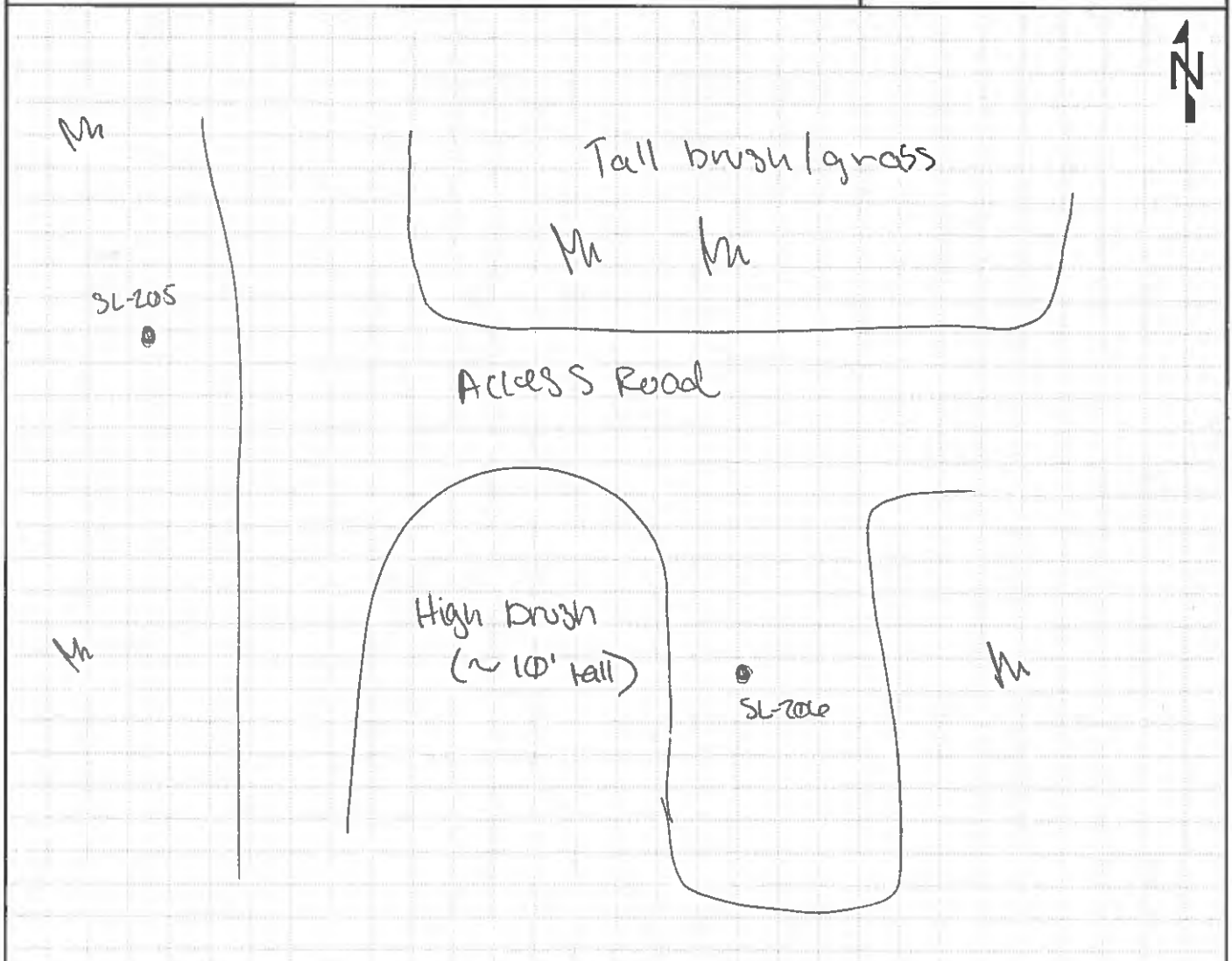
CLIENT: NASA	BOREHOLE NUMBER: SL-2006	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/30/19 1421	COMPLETED: 7/30/19 1440
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-2006

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-206	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, silt and some fine sand, subangular, dry, non-plastic, soft, 10YR 2/2		N/A PAHs ~~ONLY~~	Organic odor to 0.5' 0.5' no odor ECCLSL0222@ 1430 (0'-1')
	2	CL	Clay and silt with trace sand, 10YR 2/1, fine, subangular sand, firm, damp, non-plastic	4/4	No Pb	
	3		Change to 10YR 5/6		SCREENING	
	3.5 / 4	SH	weathered bedrock, SHALE, very fragmented/broken, fissile 10YR 2/1			
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

JS 7/30/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-206

HTRW DRILLING LOG

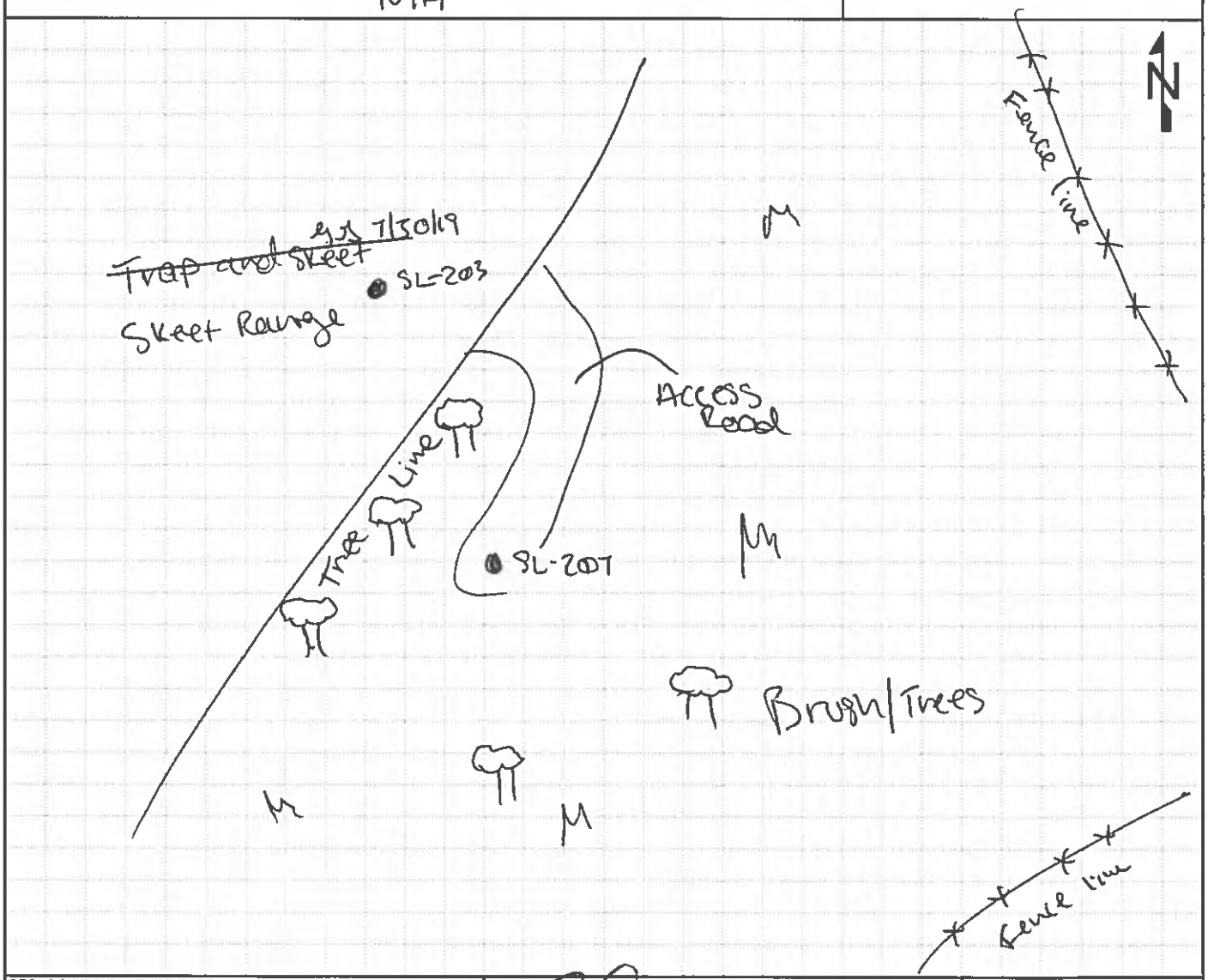
CLIENT: NASA	BOREHOLE NUMBER: SL-207	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME STARTED: 7/30/19 | 1209 COMPLETED: 7/30/19 | 1215	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-207

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-207	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	SILT and trace sand, fine, 10YR4/2, dry, soft, non-plastic		520	No odor Sample 0'-1' interval @ 1230. ECCLSL0223
	2	SH	weathered SHALE, fissle and crumbly, 10YR5/6, dry	3.7/4	40	No odor
	3				20	
	4	SH	more consolidated material, SHALE, fissle, fragmented, 10YR 2/2	JS 7/30/17	40	
	5		BOH			
	6					
	7					
	8		JS 7/30/17			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/17	7/31/17	SL-207

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-208	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: ~~Trap and Skeet Yard~~ Skeet Range JJY 7/30/19	
	9. DRILL DATE/TIME STARTED: 7/30/19 / 0845	COMPLETED: 7/30/19 / ~~0905~~ 1130 JJY 30L
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4'		

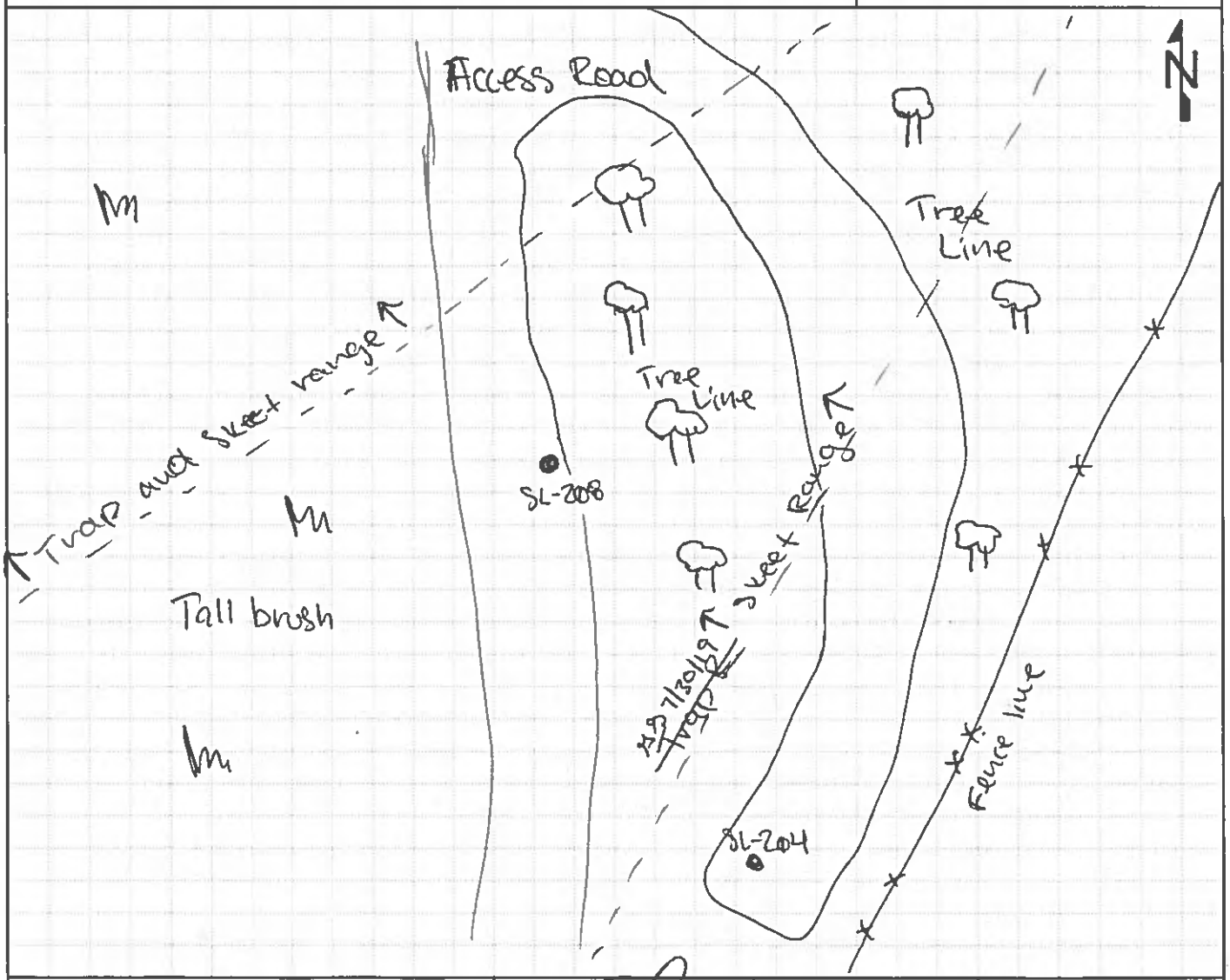
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background — BGS: Below Ground Surface — PPM: Parts per Million

▽ : First Water Encountered — ▼ : Static Water Level — NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-208

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-208	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: ~~0941~~ SS 7/30/19 Colors from Munsell Soil Color Chart, 2009 Year Revised
041982 XRF for Pb,

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic rich topsoil, silt and sand, fine sand, sub angular, dry, soft, non plastic, 10YR 4/2		810	Organic odor ECCLSL0224 @ 0-0.5 (1138)
	1				90	
		ML	Silt and little fine sand, sub-angular, 10YR , dry, soft, nonplastic, few fine pebbles, 10YR 5/6		40	No odor ECCLSL0225 @ 1140 -0.5'-1'
	2				30	
			Some clay, 10YR 4/2 mottled w/ 10YR 5/6 SS 7/30/19	4/4	30	
	3				20	
		SH	Sandy lens, fine sand, sub-angular weathered bedrock, SHALE, sand and silt, fines, subangular sand mixed with angular shale fragments		20	
	4				30	Bedrock Refusal 4.5'
	4.5				SS 7/30/19 N/A	
	5		BOH		180	
	6					
	7					
	8		SS 7/30/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
7/30/19	7/31/19	SL-208

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-209	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/5/19 / 1230	COMPLETED: 8/5/19 / 1238
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 0.7'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 0.7'		

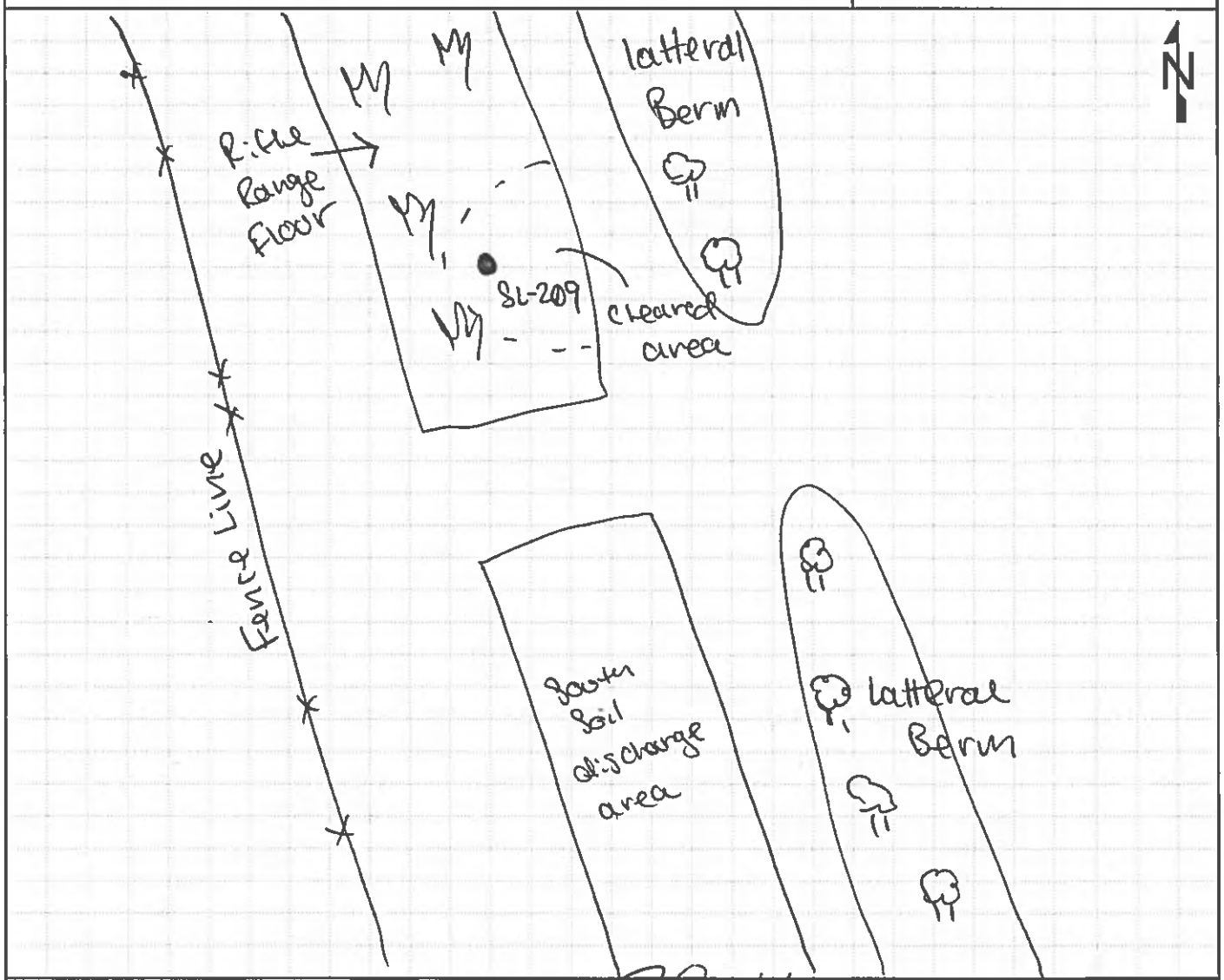
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background — BGS: Below Ground Surface — PPM: Parts per Million

▽ : First Water Encountered — ▼ : Static Water Level — NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-209

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-209	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RL 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.7'	SH	Weathered bedrock, SHALE, angular fragments, (0.10" to 2"), 10YR4/3, SILT and little Sand, fine ~~sand~~, to medium sand between rock layers, dry DS 8/5/19	1/1	50	Organic color Shale Rock BOH 0.7'
DS 8/5/19	1	DS 8/5/19				Bedrock Refusal Sample sand / Silt between Rock fragments ECCLSL0226 @ 1240 (0'-0.7') XRF SCREENING <360 ppm SAMPLE NOT SENT TO LAB RL 8/6/19
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

DS 8/5/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-209

HTRW DRILLING LOG

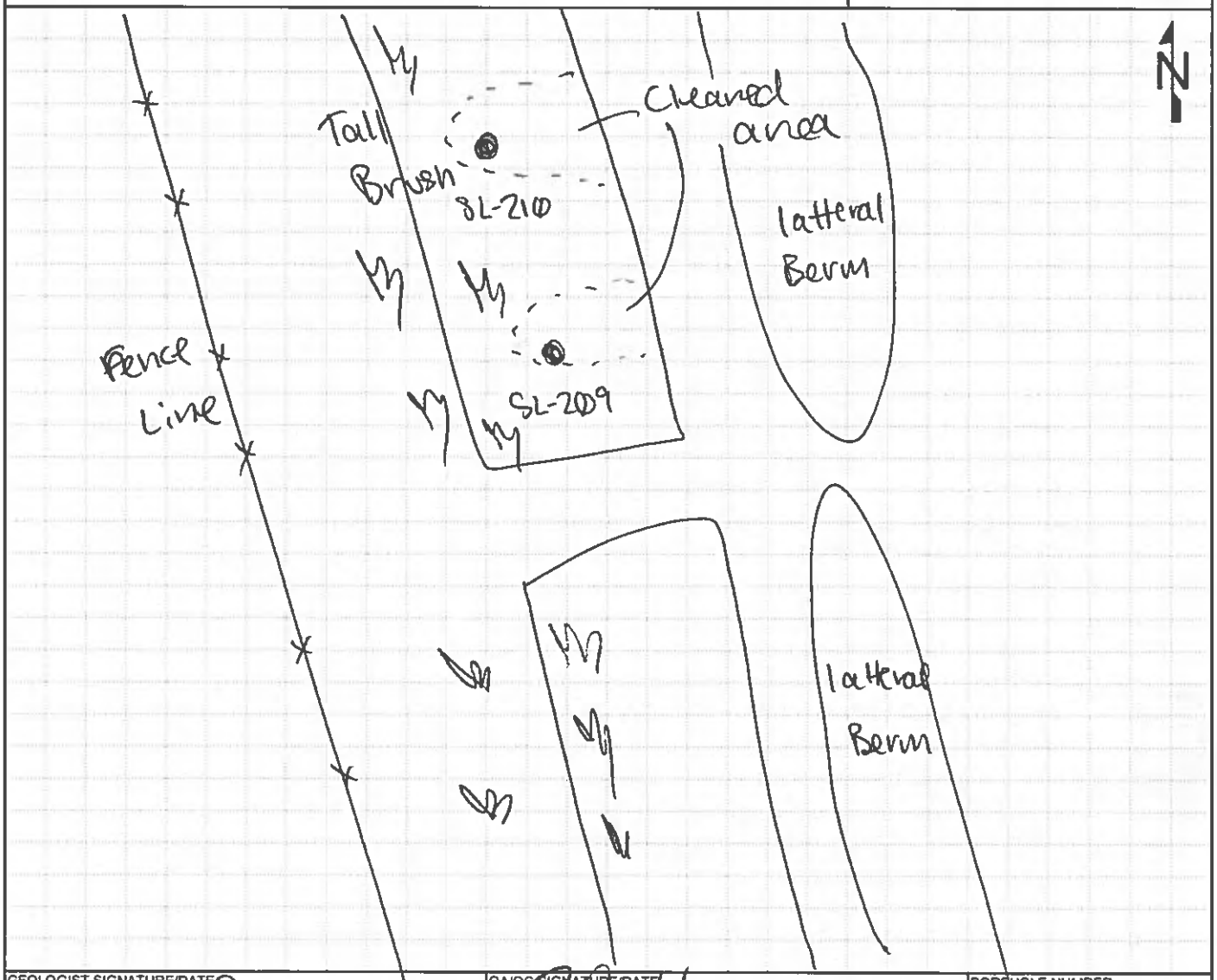
CLIENT: NASA	BOREHOLE NUMBER: ~~SL-208~~ SL-210	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Stellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/5/19 / 1255	COMPLETED: 8/5/19 / 1203
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 0.7'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 0.7'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-210

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-210

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb TL 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.7'	SH	weathered SHALE, 10YR 3/2 and 10YR 4/2, SILT and SAND between shale layers, broken frags (0.1" to 3"), dry	0.7 / 0.7	ND	Organic color, shale frags ECCLSL0227 @ 1305 (0'-0.7') (Bedrock Refusal @ 0.7')
	1		B04			
	2					
	3					XRF < 360 ppm SAMPLE NOT SENT TO LAB TL 8/6/19
	4					
	5					
	6					
	7					
	8					
	9					
	10					

BJ 8/5/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-210

HTRW DRILLING LOG

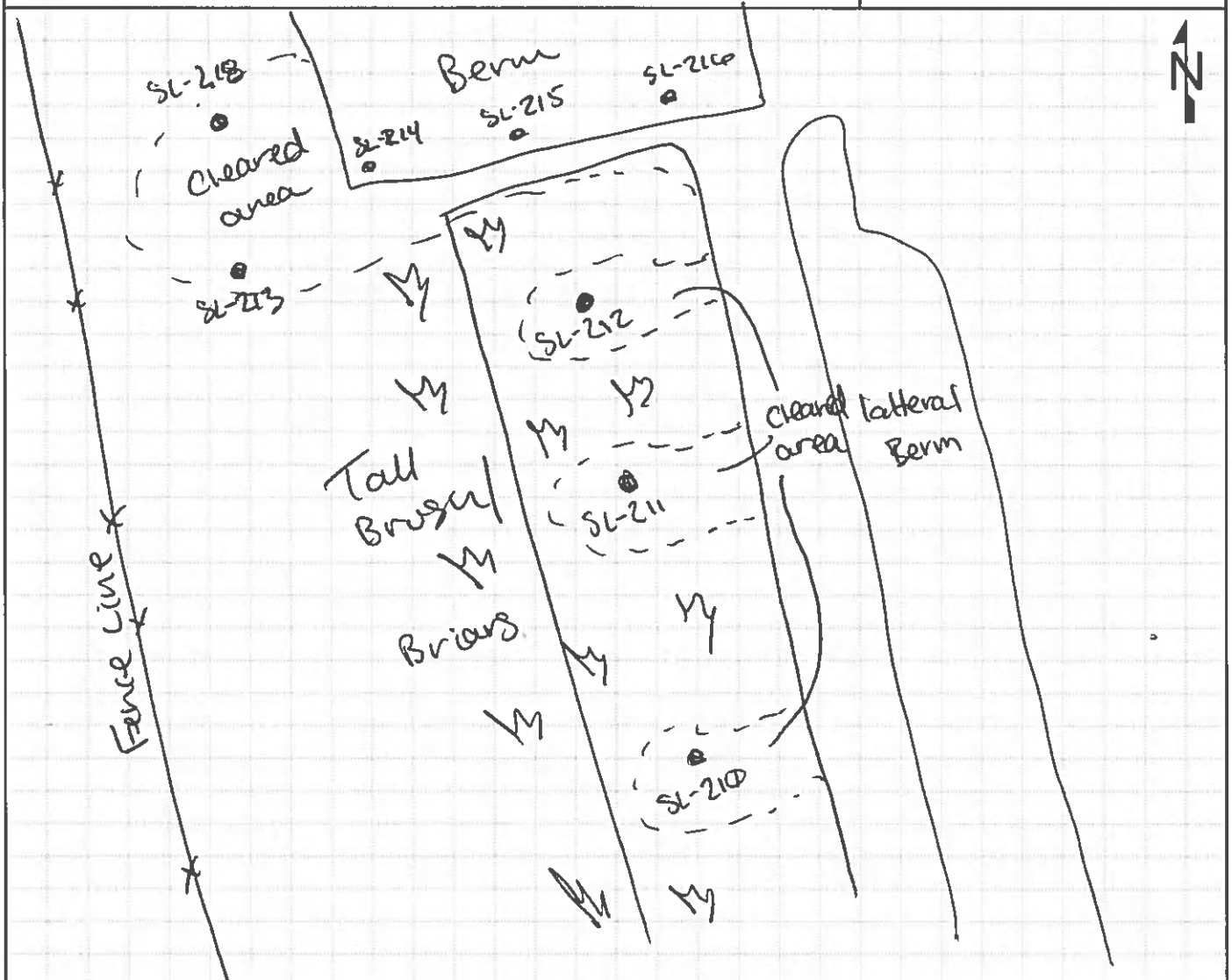
CLIENT: NASA	BOREHOLE NUMBER: SL-211	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Hand Auger (SS; 3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/5/19 / 1330 COMPLETED: 8/5/19 / 1335	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 0.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 0.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-211

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-211	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RL 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	SILT and some sand and little clay, fine to medium sand, 10YR 4/3, angular shale fragments, (0.10" to 2"), damp.	0.5 / 0.5	140	organic odor ECCLSL0228 @ 1335 (0'-0.5')
	1		BOH			Bedrock Refusal @ 0.5'
	2					
	3					XRF < 360 ppm SAMPLE NOT SENT TO LAB
	4					
	5					
	6					
	7					
	8					
	9					
	10					

MM 8/5/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-211

HTRW DRILLING LOG

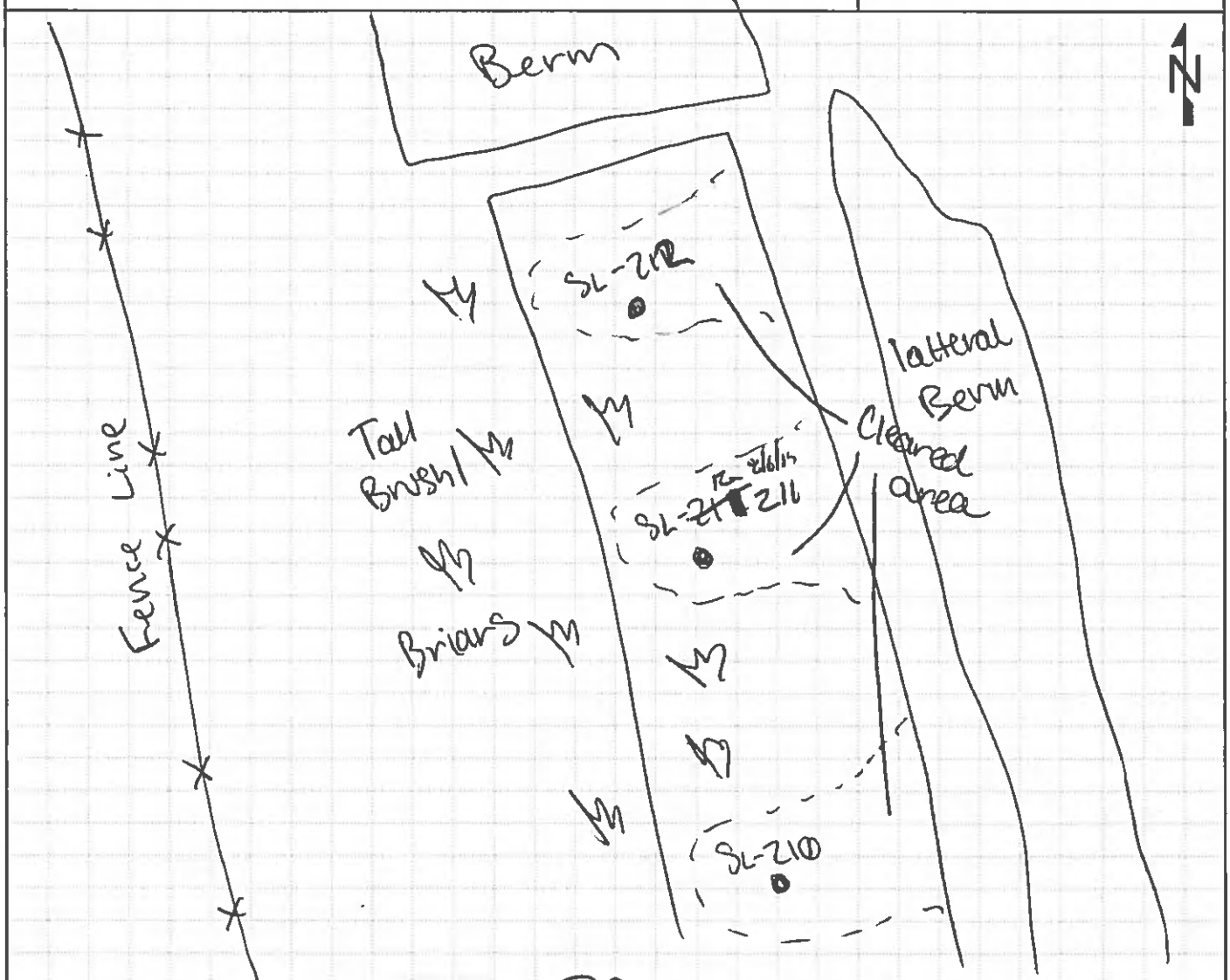
CLIENT: NASA	BOREHOLE NUMBER: SL-212	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/5/19 | 1340 COMPLETED: 8/5/19 | 1345	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 0.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 0.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/5/19	QA/QC SIGNATURE/DATE: 8/6/19	BOREHOLE NUMBER: SL-212

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-212	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb Re 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.5'	SH	Weathered SHALE, Silt and fine to medium sand between fragmented rock, damp to dry, angular frags of shale (0.10" to 2.5") 10YR4/3	0.5/0.5	210	organic odor ECCLS0229 @ 1345 (0'-0.5') Bedrock Refusal @ 0.5'
	1					
	2					
	3					XRF < 360 ppm SAMPLE NOT SENT TO LAB
	4					
	5					
	6					
	7					
	8					
	9					
	10					

AS 8/5/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-212

HTRW DRILLING LOG

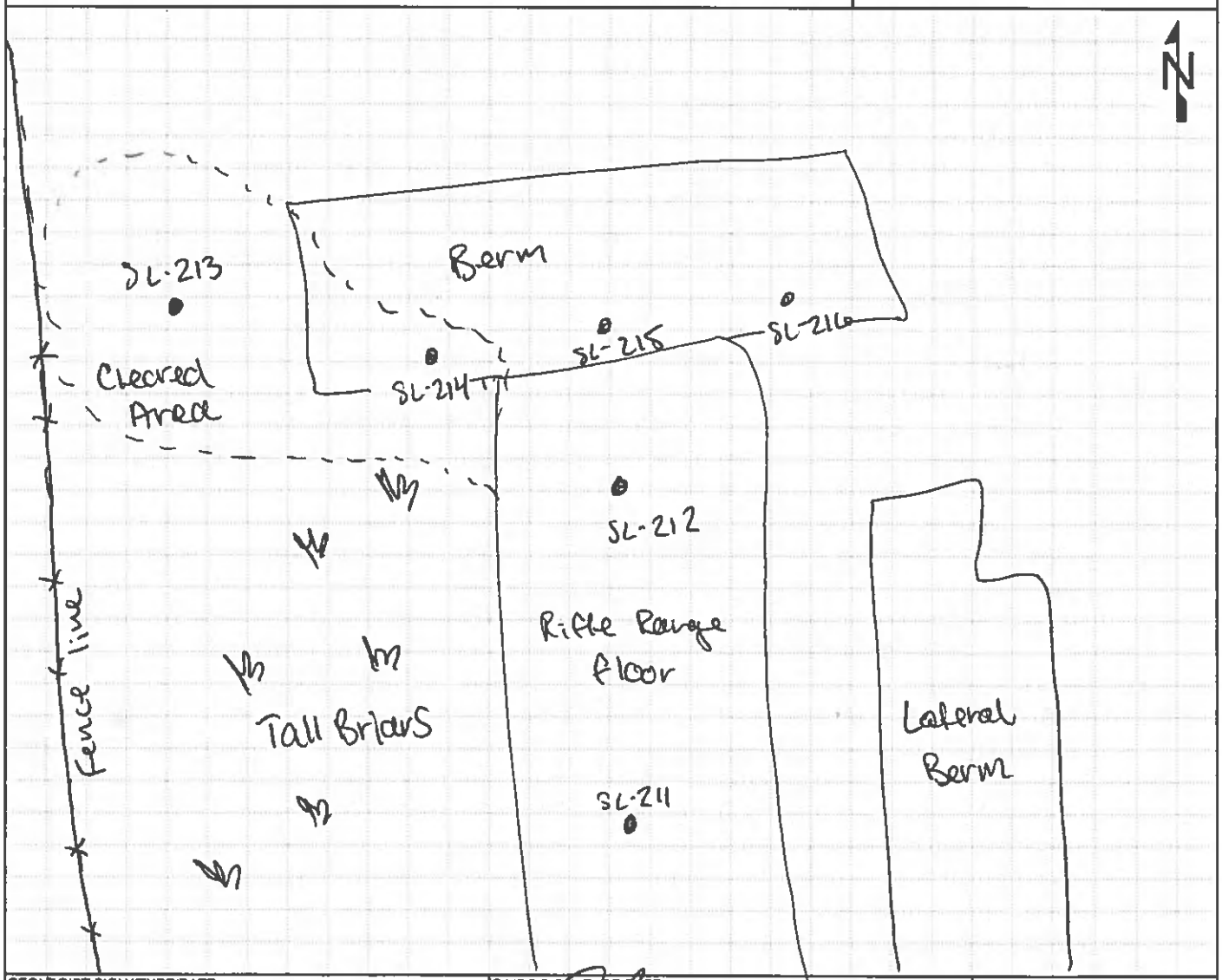
CLIENT: NASA	BOREHOLE NUMBER: SL-213	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Stellhammer	6. MAKE/MODEL OF DRILL: ~~N/A~~ N/A 8/6/19 Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3") Bring Geoprobe over to get XRF data below 1' BGS - Acetate liner	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/5/19 1530 COMPLETED: 8/6/19 0815	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/7/19	SL-213

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-213	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for PD

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SILT and some sand and little clay, 10YR3/2, fine sand, soft, damp to wet, non-plastic -10YR5/8 and 10YR4/1 mottling	3.1/4	50	Organic odor ECCLSL0230 @ 1540 (0-1)
	2	CL	CLAY and SAND, fine sand, sub-rounded, 10YR5/8 and 10YR4/1 and 10YR7/1 mottled, soft, wet, non-plastic		10	NO odor
	3				20	BZ @ Geoprobe 0.031 mg/m3
		CL	CLAY and little SAND, fine, 10YR5/8, 4/1, and 7/1 mottled, low plasticity wet		20	
	4	SH	weathered SHALE, fissile, crumbled silt and sand between rock, dry			
			SAA	0.5/0.5		Redrock Refusal @4.5' BGS
	5		BOH			
	6					
	7					
	8					
	9					
	10					

DS 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-213

HTRW DRILLING LOG

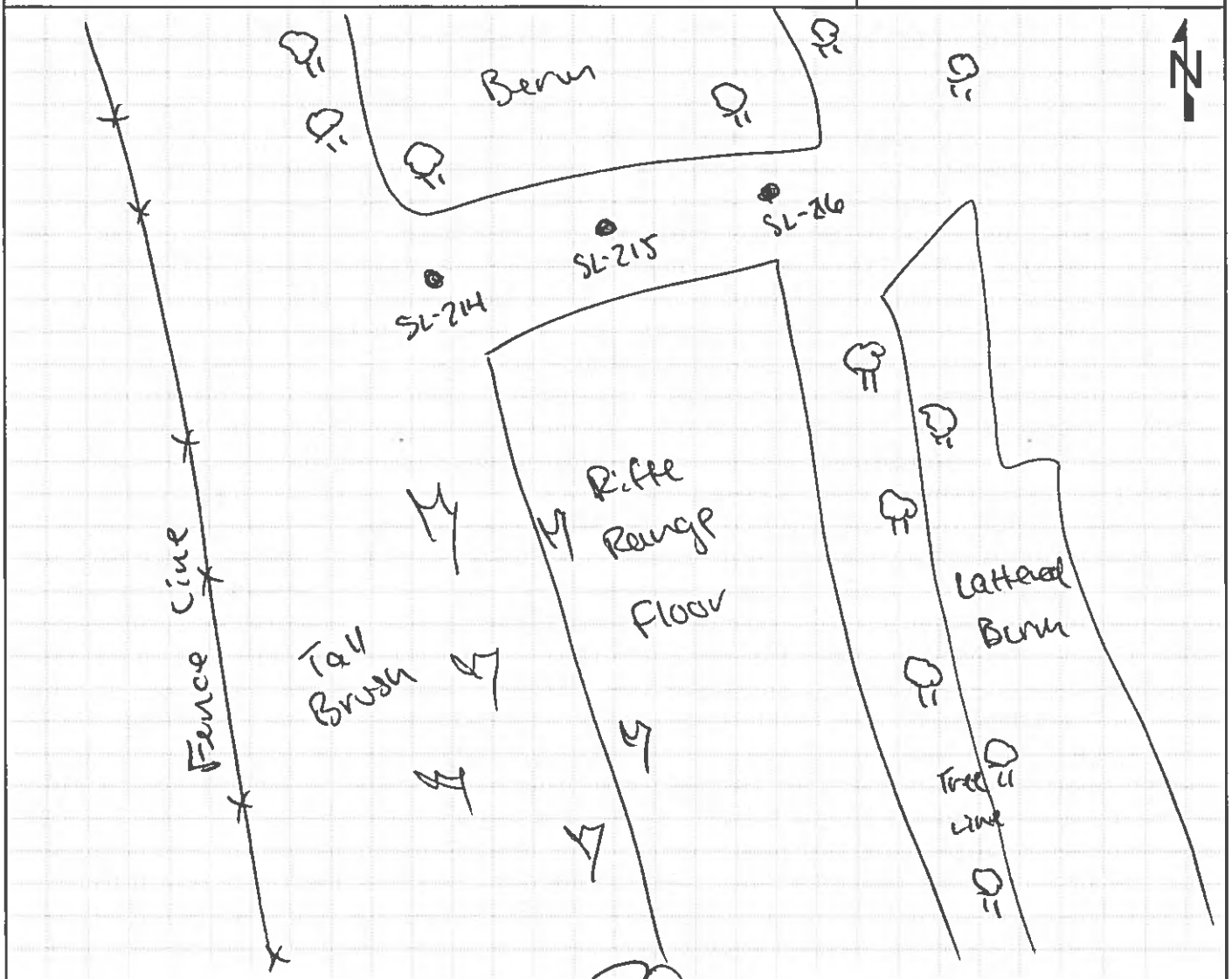
CLIENT: NASA	BOREHOLE NUMBER: SL-214	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/6/19 0906	COMPLETED: 8/8/19 ~~0918~~ 0958 8/8/19
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.7'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.7'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/15/19	SL-214

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-214	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		SM	SAND and silt, fine to medium, 10YR4/4, poorly sorted, sub-angular dry, shale fragments, 0.10" to 0.5"		760	Organic odor, ECCLSL0231 @ 1000 (1'-1.5')
	1	CL	CLAY and little SAND and trace, SHALE frags (0.10" to 0.5"), fine to coarse sand, 10YR 3/3, damp, soft		1410	
					950	NO odor ECCLSL0232 @ 1005 (1.5'-2')
	2	CL	CLAY and little fine sand, 10YR 2/2, soft to firm, non-plastic, damp -10YR4/4	4/4	80	
					60	BZ 0.032 mg/m3 @ 0930 8/6/19 @ sample table
	2.0' 3	CL	CLAY and some SILT and little fine sand, 10YR7/1 and 10YR5/8, low plasticity, damp, soft.		90	
					20	
	4				30	
	4.7'	SH	weathered SHALE, damp, 10YR2/2 dry @ 4.2'	0.7'/0.7'	30 / 20	Bedrock Refusal @ 4.7'
	5		BOH @4.7'			
	6					
	7					
	8		JSB 8/6/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/14/19	2 SL-214 8/14/19

HTRW DRILLING LOG

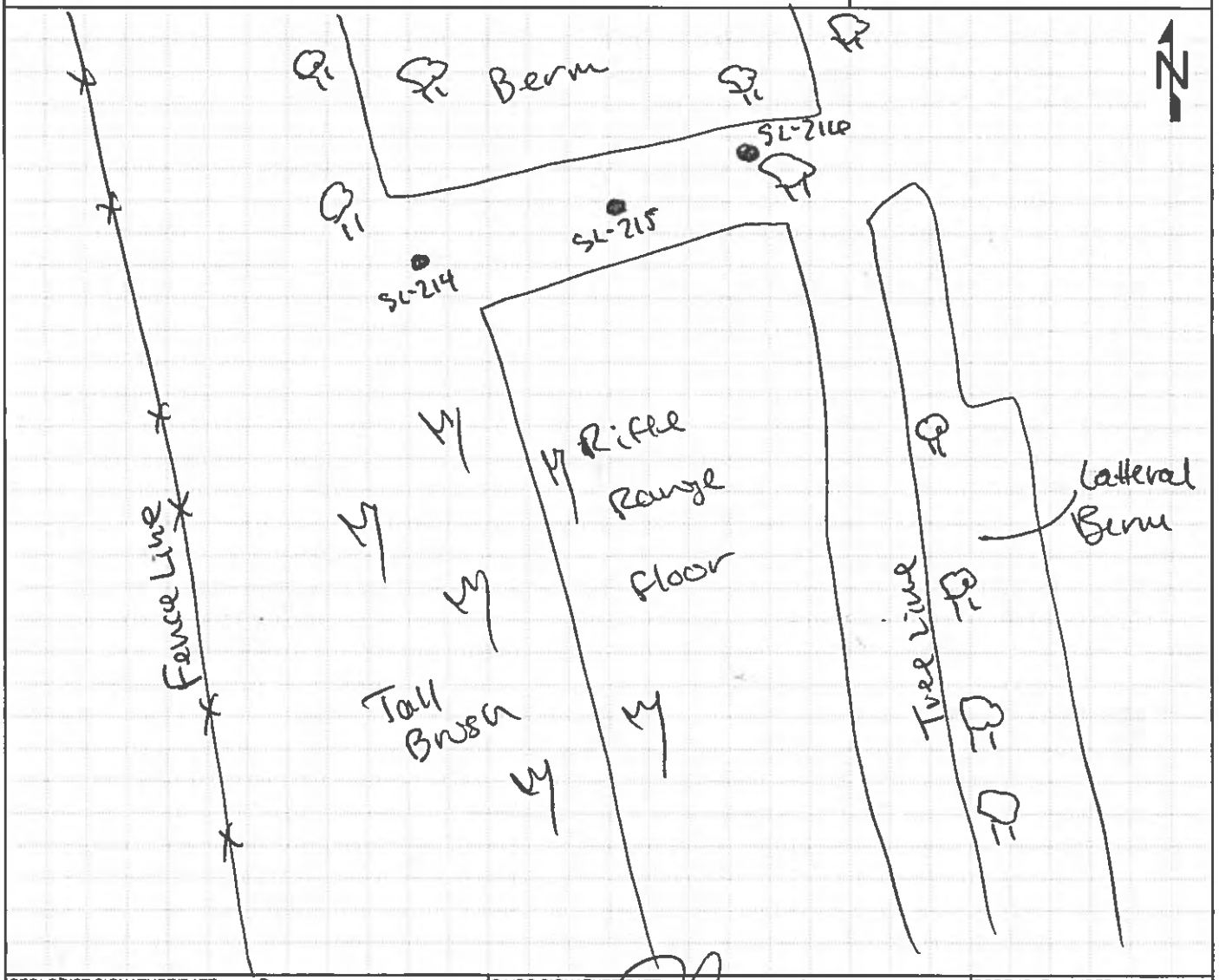
CLIENT: NASA		BOREHOLE NUMBER: SL-215
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/6/19 0940; COMPLETED: 8/8/19 0940	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/14/19	SL-215

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-215	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		SM	SAND and little silt and trace SHALE fragments, 10YR 4/4, sand medium to fine, shale 0.10" to 0.3", damp		6600	organic odor ECCLSL0233 @ 0945 (1-1.5')
	1				440	
		CL	CLAY and little silt and trace fine sand, 10YR 5/8 mottled with 10YR 4/3 and 10YR 6/1, Firm to hard, damp		400	No Odor ECCLSL0234 @09 (1.5'-2')
	1.7'			2.4'	~~400~~ AS 8/6/19	
	2		more sand (~25%) AS 8/6/19	4'	30	
					20	
		CL	- wet, 10YR 5/6, soft, crumbled material,		~~400~~ AS 8/6/19	B2 @ Geoprobe 0.028 mg/m3 @ 0945
	3				30	
					30	
		SH	weathered SHALE, wet to moist, shale fragments and sand (medium to coarse, 10YR 5/6 and 10YR 2/2		20	
	4					
		SH	dry, more consolidated rock w/ sand between layers, 10YR 2/2	0.5 / 0.5	20	Bedrock refusal @ 4.5'
	4.5'					
			BOH			
	5					
	6					
	7					
	8		AS 8/6/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/19/19	SL-215

HTRW DRILLING LOG

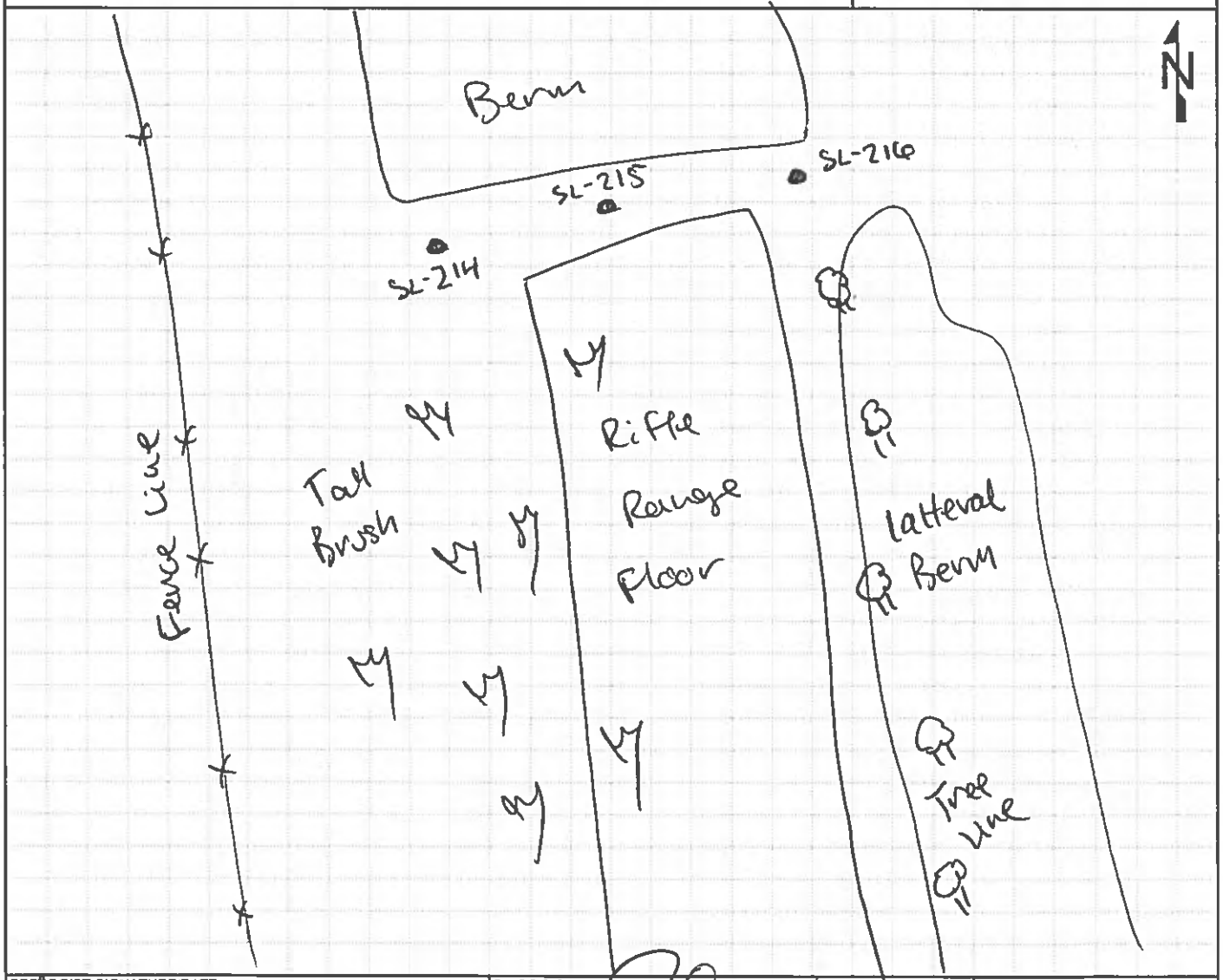
CLIENT: NASA		BOREHOLE NUMBER: SL-216
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Snellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/6/19 | 0957	COMPLETED: 8/8/19 | ~~1005~~ 0930 8/8/19
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS NA — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/6/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: SL-216

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-216

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and SILT and some SHALE fragments (0.10" to 1.5"), medium to fine sand, poorly sorted, 10YR 2/2, wet to saturated, soft		2320	Organic odor ECCLSL0235 @ 09:[illegible] (0.5'-1')
					1180	
		CL	CLAY and fine sand (trace), 10YR 2/1, damp, nonplastic, firm		180	No odor ECCLSL0236 @ 0935 (1.0'-1.5')
	1.8' 2		Some sand, 10YR 5/6 and 10YR 6/1 mottled	3.8/4	180	BZ 0.012 mg/m3 @ Geoprobe
					20	
	3				20	
		SH	weathered SHALE. clay and shale fragments, wet to moist, 10YR 5/8 and 10YR 2/1,		20	
	4		more consolidated material, dry, shale fragments, 10YR 2/1 and 10YR 5/1		20	
				None	20	Bedrock Refusal @ 4.5'
	5		BOH @ 4.5'			
	6			rock fellout of ~~casing~~ liner		
	7					
	8					
	9					
	10					

8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/19/19	SL-216

HTRW DRILLING LOG

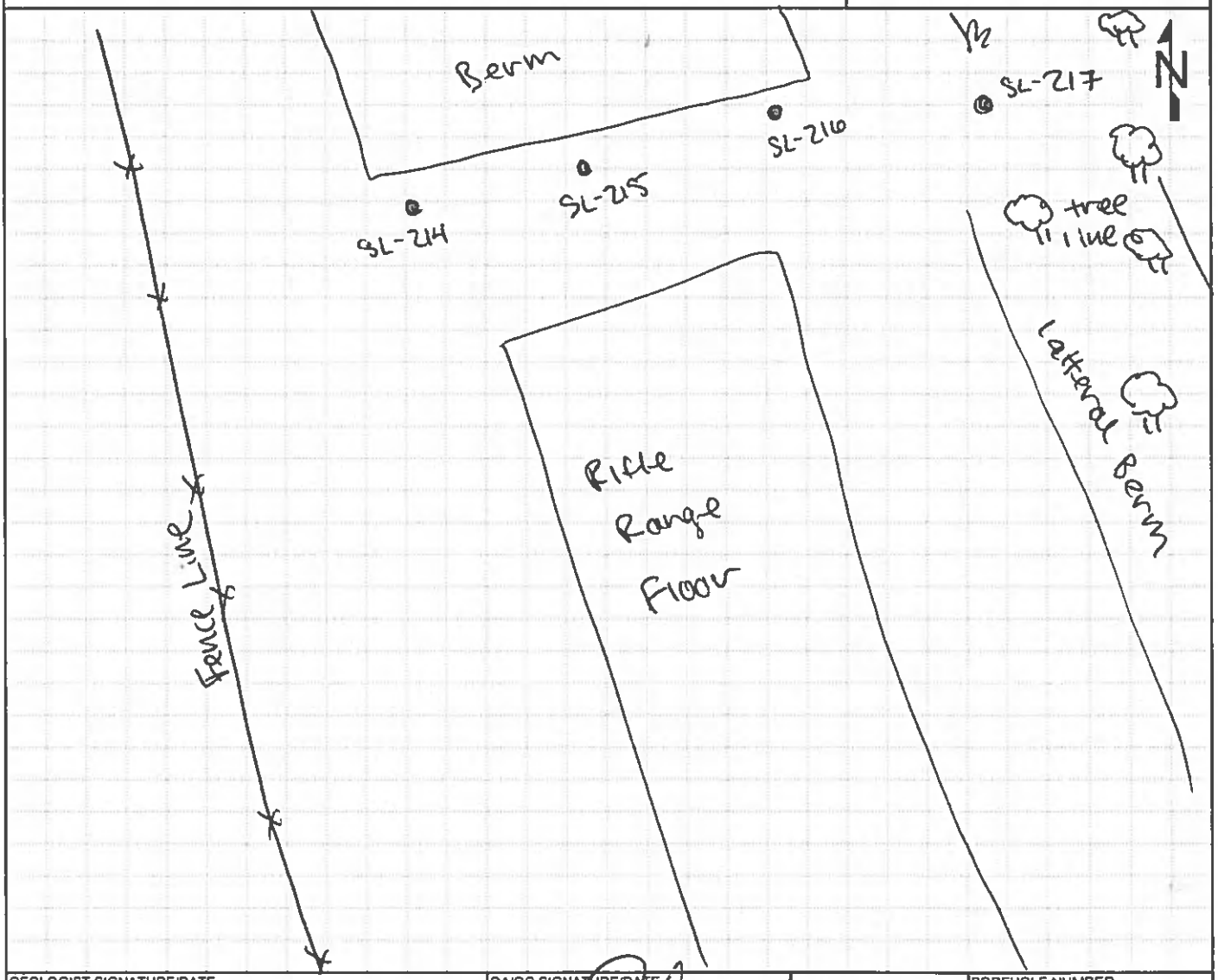
CLIENT: NASA	BOREHOLE NUMBER: SL-217	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 4' Acetate liner	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/6/19 1050	COMPLETED: 8/6/19 1058
	10. DEPTH GROUNDWATER ENCOUNTERED: ~~N/A~~ 8/6/19 3.5'	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/8/19	SL-217

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-217	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	0.7'	~~SM~~ GM	SAND and SILT and trace Shale fragments (0.10" to 1"), coarse to fine sand, poorly sorted, 10YR4/4		10	organic odor
	1	CL	Tight clay and some fine sand, sub-rounded, 10YR5/6, damp, firm			ECCLSL0237 @ 1100 (0'-1')
	1.4'		CLAY and trace SAND, 10YR6/1 and 10YR5/8 mottled, fine, firm, non plastic	4/4	ND	no odor
	2					
		CL	moist, low plasticity		10	
	3					
	3.5'					
	▽ 4	SH	Top of weathered bedrock, highly weathered shale and poorly sorted sand, 10YR4/4, saturated		60	groundwater
	5		BOH			leave hole open to determine if groundwater collects over 2 days.
	6					Bentonite to surface 8/8/17 @ 1410 - Location not ideal for well based on contamin level and XRF data
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/15/19	SL-217

HTRW DRILLING LOG

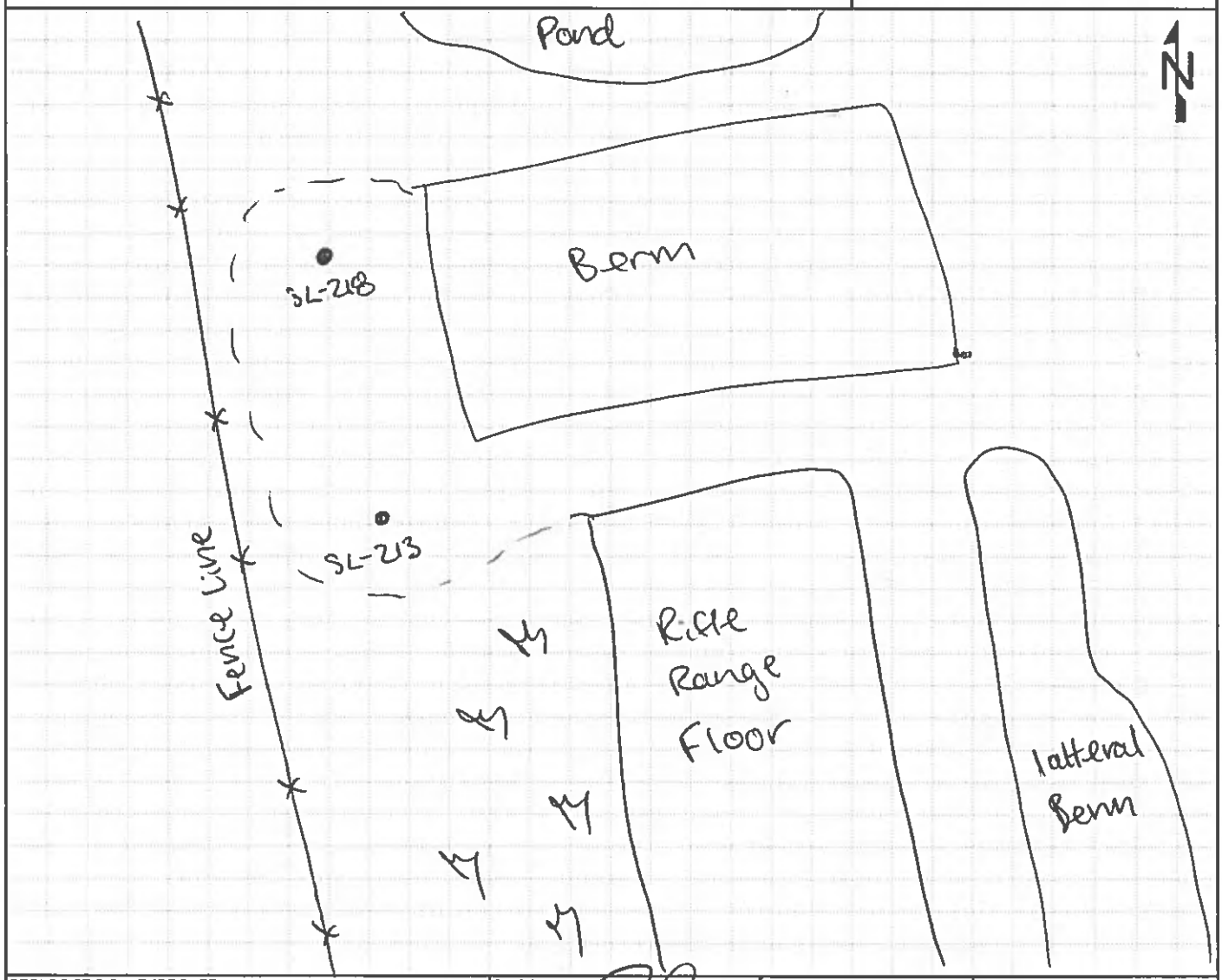
CLIENT: NASA	BOREHOLE NUMBER: SL-218	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shollhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/6/19 / 0851	COMPLETED: 8/6/19 / 0853
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-218

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-218	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.7'	SM	SAND and some Silt, 10YR4/4, fine to medium, trace gravel, (0.10" to 0.5") dry to damp non-plastic	3.5/4	120	organic odor ECCLSL0238@ 0910 (0'-1')
	1	CL	Clay and trace sand, fine 10YR2/2			No odor
	1.7'	CL	Sand and little clay, fine, sub-rounded, 10YR5/8, soft, non-plastic, damp		10	
	2	CL	CLAY 10YR5/8 and 10YR4/4, soft to firm, non-plastic, damp		50	
	3	CL	Clay and trace sand and some SHALE fragments, fine sand, shale is 0.5" to 0.10", 10YR4/4 and 10YR 4/6, damp, soft, non-plastic		90	
	4					
	5		Bolt			
	6					
	7					
	8		8/12/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/10/19	8/7/19	SL-218

HTRW TRENCH LOG

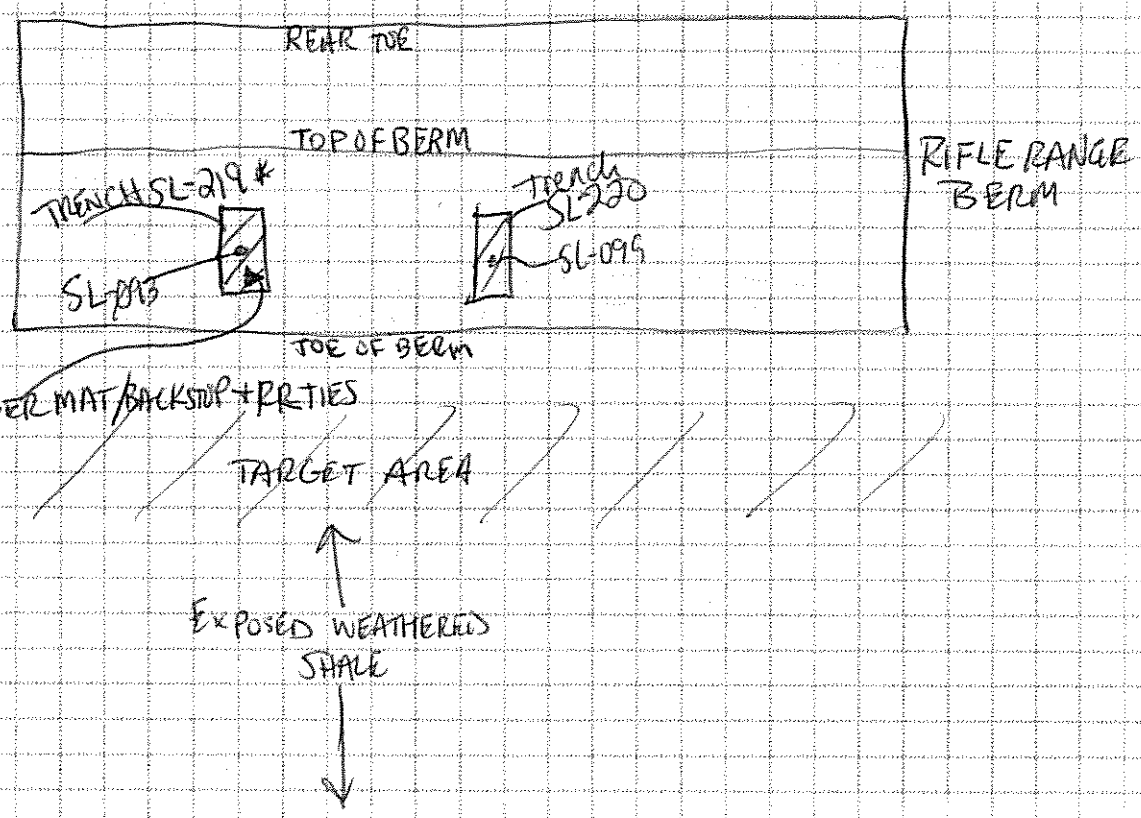
CLIENT: NASA		TRENCH NUMBER: ECCL-SL-219
1. COMPANY NAME: Leidos	2. TRENCHING SUBCONTRACTOR: N/A	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF OPERATOR: Dana Winslow	6. MAKE/MODEL OF EXCAVATOR: Link-Belt 145X4	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Excavator Bucket	8. TRENCH LOCATION: RIFLE RANGE (BERM)	
	9. DATE/TIME STARTED: 8/1/19 0945	COMPLETED:
	10. DUST MONITOR: S/N: 26146	
11. OVERBURDEN THICKNESS: >5.5 ft	CALIBRATION DATE: 8/1/19	
12. DEPTH BEDROCK ENCOUNTERED: NA	13. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
14. TOTAL DEPTH OF TRENCH: 5.5 ft		

15. NOTES
PPM: PARTS PER MILLION
NA: Not Applicable

ECCLSL0239 4.0-4.5 8/1/19 @ 1040
ECCLSL0240 4.5-5.0 8/1/19 @ 1055

LOCATION SKETCH/COMMENTS — SCALE: None

Encountered 2 RR ties + large Rubber Mat (Bullet 'catch') in bottom of top 2' Removal of trench.
Few Bullet fragments + casings in 2-2.5', 2.5-3' intervals, 3.5-4'



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/2/19	8/7/19	ECCL-SL-219

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: ECCL-SL-219	
1. COMPANY NAME: Leidos	2. OPERATOR: DANA WINDLOW	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION OF TRENCH:	
5. NOTES: XRF MAKE/MODEL: NITON XL3T GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised: XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
			0'-2' Shale fragments gravel to cobble size		NO SCREENING	$DUST_{BZ}$ = 0.0027 mg/m³
	1					
	2		2'-3' Silt; little Clay & gravel 10YR 4/2 Dark grayish brown; very soft; dry to damp	100%	10200	RUBBER MAT/RR TIES; Few Bullets $DUST_{BZ}$ = 0.097 mg/m³
					5050	Few Bullets $DUST_{BZ}$ = 0.009 mg/m³
	3	ML	3'-4' S.A.A. increased Clay content; damp		3850	$DUST_{BZ}$ = 0.009 mg/m³ 1 casing
					3580	$DUST_{BZ}$ = 0.017 mg/m³ 2 Bullets
	4		4'-5' Clay; some silt little gravel 10YR 4/3 Brown; very soft; damp shale fragments present		1030	ECCLSL0239 8/1/19 @ 1040 4.0-4.5 ft.
					20	ECCLSL0240 8/1/19 @ 1055 4.5-5.0 ft. $DUST_{EACBZ}$ = 0.069 mg/m³
	5	CL	5'-5.5' S.A.A. moist		40	
	6		END OF TRENCH AT 5.5 ft. BACKFILLED TRENCH.			
	7					
	8					
	9					
	10					

8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
Chris A. [illegible] 8/2/19	[illegible] 8/7/19	ECCL-SL-219

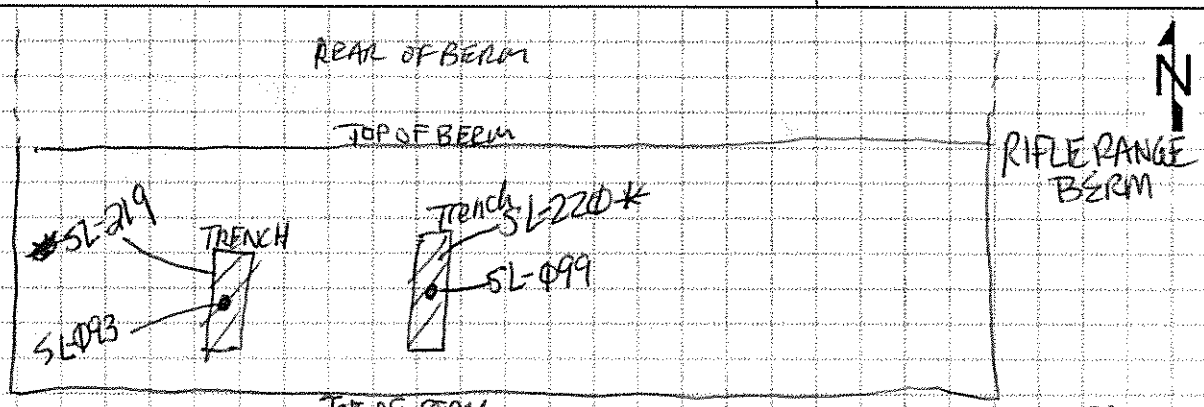
HTRW TRENCH LOG

CLIENT: NASA		TRENCH NUMBER: ECCL-SL-220
1. COMPANY NAME: Leidos	2. TRENCHING SUBCONTRACTOR: N/A	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF OPERATOR: Dana Winslow	6. MAKE/MODEL OF EXCAVATOR: LinkBelt 145X4	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Excavator Bucket	8. TRENCH LOCATION: RIFLE RANGE BERM	
	9. DATE/TIME: 8/1/19 STARTED: 1225 COMPLETED: 1350	
	10. DUST MONITOR: S/N: 26146	
11. OVERBURDEN THICKNESS: >6.5 Ft.	CALIBRATION DATE: 8/1/19	
12. DEPTH BEDROCK ENCOUNTERED: No	13. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
14. TOTAL DEPTH OF TRENCH: 6.5 ft.		

15. NOTES
PPM: PARTS PER MILLION
NA: Not Applicable

ECCLSL0241 5.5-6.0 Ft 8/1/19 @ 1340
ECCLSL0242 6.0-6.5 Ft. 8/1/19 @ 1350

LOCATION SKETCH/COMMENTS SCALE: None



1 of 2 trenches on Rifle Impact Berm. This trench located in central portion of Berm colocated with previous ECCL-SL-099. Upper 2 ft removed prior to collecting XRF + Lab Samples. Some bullets in 3.5-4 + 4.5-5' intervals

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/2/19	8/2/19	ECCL-SL-220

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: ECCL-SL-220	
1. COMPANY NAME: Leidos	2. OPERATOR: DANA WILLOW	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION OF TRENCH:	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised: XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1		0'-2' Shale fragments gravel to cobble sized		ND SCREEN	
	2		2'-3' Fine Sand, Silt, & Gravel 10YR 4/3 Brown dry	100%	7260	DUST$_{B2}$ = 0.016 mg/m^3
	3		3'-4' S.A.A. shale fragments & roots present 3.5-4' few Bullets		4460	
					5280	DUST(Exc B2) = 0.0009 mg/m^3
	4	SM	4'-5' S.A.A.		2170	
			4.5-5' some Bullets, damp		1170	DUST$_{B2}$ = 0.0041 mg/m^3
	5		5'-6' S.A.A. decreasing gravel content damp		4180	DUST$_{B2}$ = 0.026 mg/m^3
					5260	
	6				1590	ECCLSL0241 8/1/19 @ 1340 5.5-6.0 ft.
		CL	6'-6.5' Clay, Some Silt, little Gravel 10YR 4/3 Brown very soft; damp		170	ECCLSL0242 8/1/19 @ 1350 6.0-6.5 ft.
	7		TRENCH END AT 6.5 ft. BACKFILLED TRENCH.			
	8		JR 8/7/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/2/19	8/7/19	ECCL-SL-220

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-221	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Snellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/6/19 / 1109 COMPLETED: 8/6/19 / 1117	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

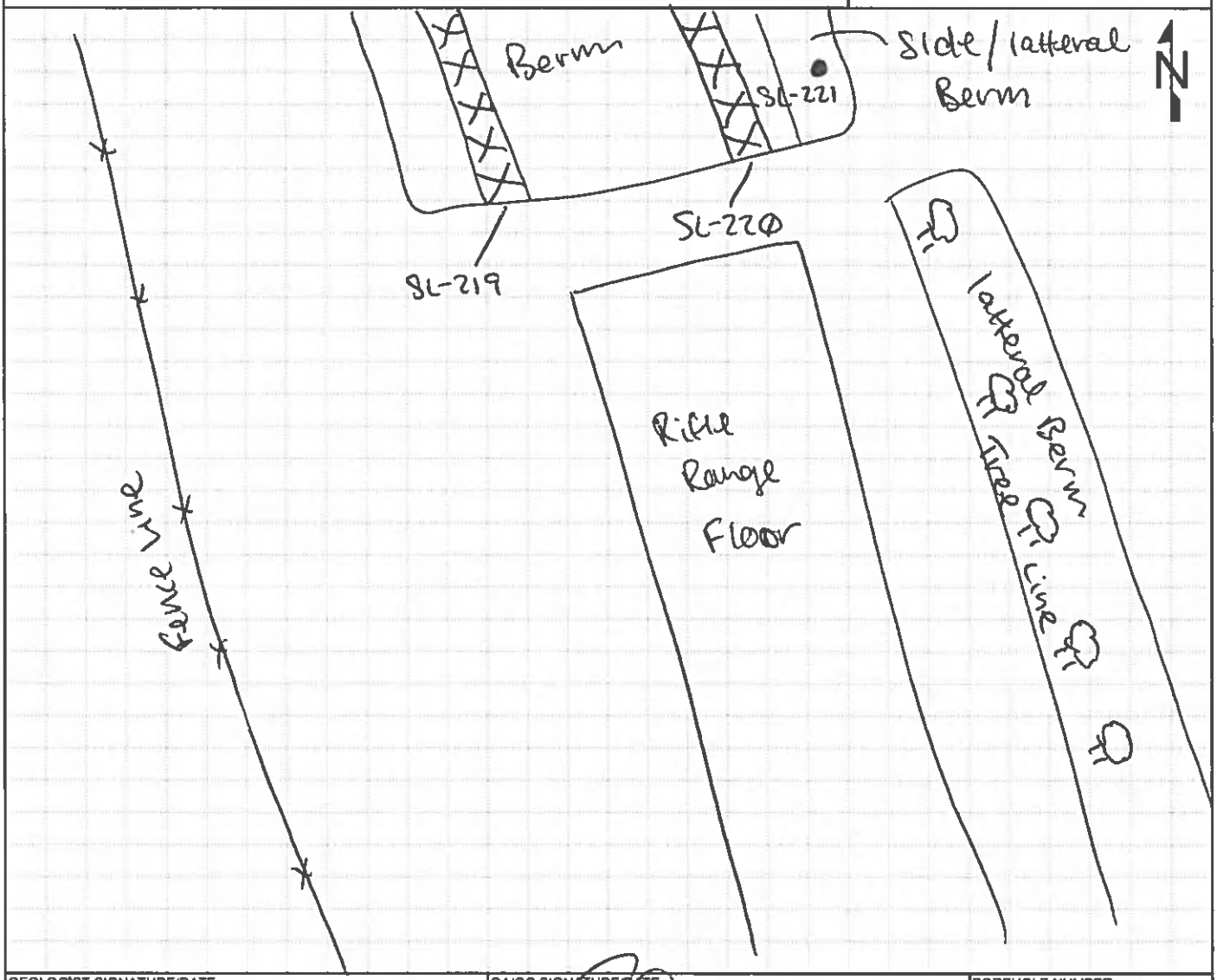
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A. SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-221

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-221

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	GM	SAND and some SILT and some SHALE, fine sand, shale (0.10" to ~~0.5"~~), 10YR 5/4, dry, soft 8/6/19	3" 1/1	70	organic odor ECCLSL0245 @ 1120 (0'-1')
	2		BOH			
	3					
	4					
	5					
	6					
	7		8/6/19			
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-221

HTRW DRILLING LOG

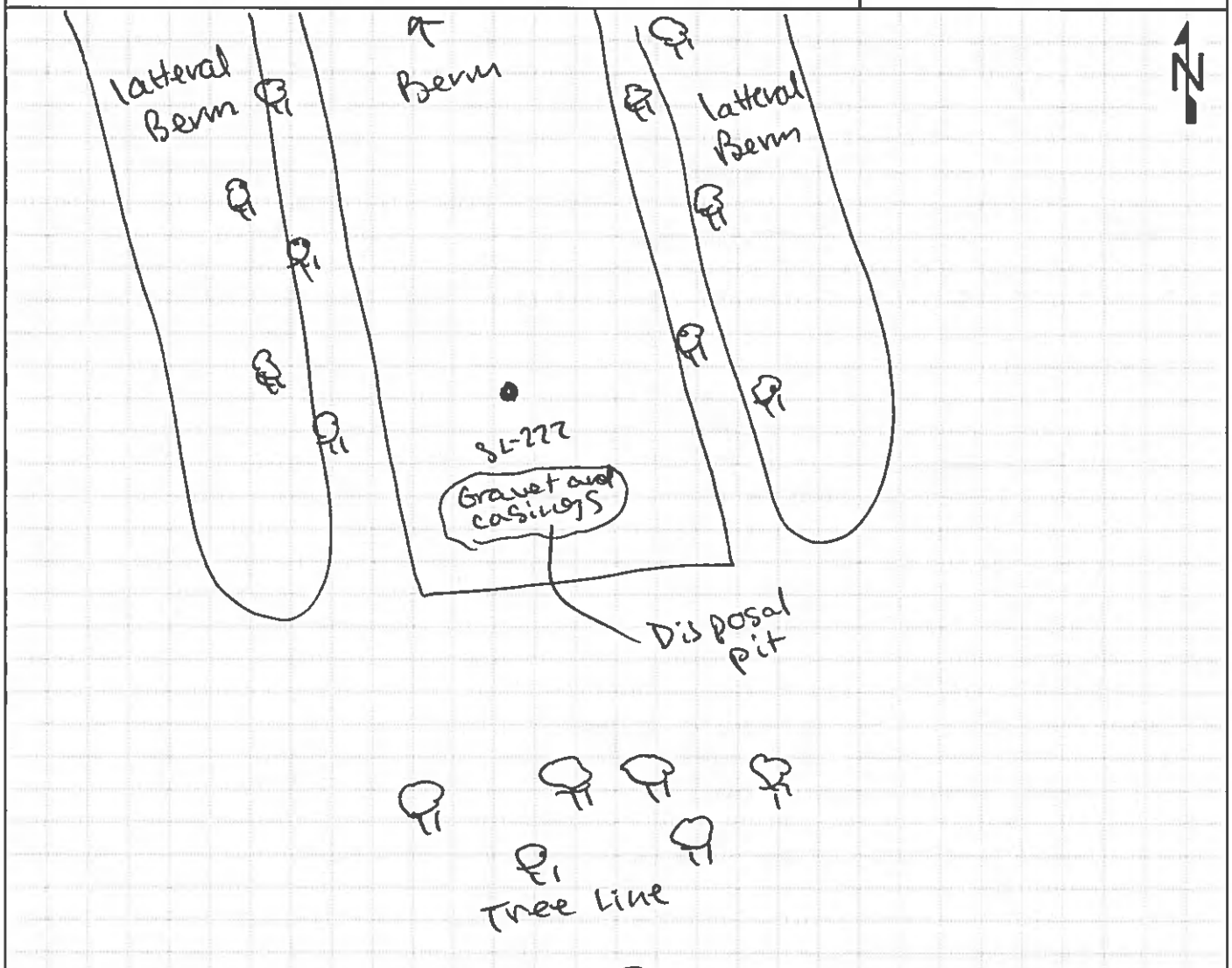
CLIENT: NASA	BOREHOLE NUMBER: SL-222	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Stalthammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (West)	
	9. DRILL DATE/TIME STARTED: 8/6/19 / 1550	COMPLETED: 8/6/19 / 1558
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-222

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-222

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF Corr'd

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.6'	OL	Organic topsoil, silt and little sand, fine sand, 10YR 2/2, wet, soft		280	organic odor ECCLSL0252 @ 1610 (0'-1')
	1	SM	SILT and little fine sand and little clay, 10YR 2/1, firm, nonplastic 24 8/6/19	3.8/4		NO odor
	2		10YR 4/6 and 10YR 2/2 mottled, clay and trace sand, fine, damp, non plastic, firm		20	
	3	CL	10YR 6/1 and 10YR 2/2, low plasticity		20	
	4	SH	weathered SHALE, 10YR 2/1, dry, fissile, crumbled rock and silt between layers of shale		40	iron staining
BOH	5		BOH			XRF <360 ppm NOT SENT TO LAB
	6					
	7					
	8					
	9					
	10					

8/6/19

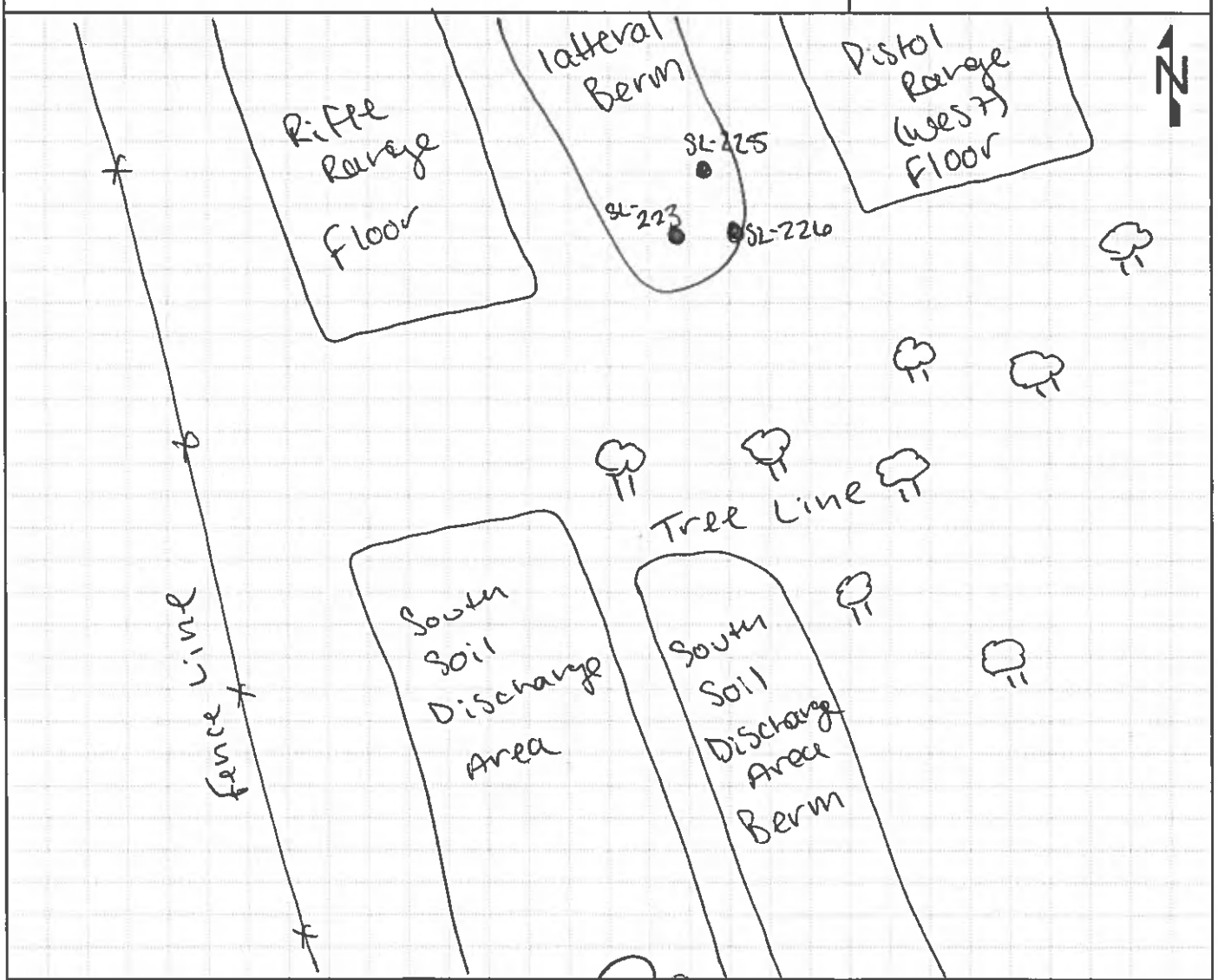
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-222

HTRW DRILLING LOG

CLIENT	NASA
BOREHOLE NUMBER	SL-223
1. COMPANY NAME	Leidos
2. DRILLING SUBCONTRACTOR	Geo-Environmental Drilling
SHEET	1 OF 2
3. PROJECT	ECCL Firing Range Removal Site Evaluation
4 LOCATION	NASA Plum Brook Station, Sandusky, Ohio
5. NAME OF DRILLER	Dan Brockhoff
6. MAKE/MODEL OF DRILL	N/A
7. SIZES AND TYPES OF SAMPLING EQUIPMENT	DS Hand Auger (3")
8 BOREHOLE LOCATION	Pistol Range (west)
9 DRILL DATE/TIME	STARTED: 8/8/19 | 1027 COMPLETED: 8/8/19 | 1034
10. DEPTH GROUNDWATER ENCOUNTERED	N/A
11. OVERBURDEN THICKNESS	1.0'
12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION	N/A
13. DEPTH DRILLED INTO BEDROCK	0.0'
14 CHEMICAL SAMPLES (circle)	VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb
15. TOTAL DEPTH OF BOREHOLE	1.0'
16. DISPOSITION OF BOREHOLE	
BACKFILL TYPE:	GROUT BENTONITE
SEMI-TEMPORARY MONITORING WELL	WELL ID: N/A
17. NOTES	BKG: Background BGS: Below Ground Surface PPM: Parts per Million ▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-223

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-223	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	GC	SILT and Some SAND and little CLAY and trace GRAVEL, 10YR 3/2, fine sand, gravel 0.25" to 1.5", damp, non-plastic, consolidated clay and sand pieces (~0.25")	1/1	60	organic odor ECCLSL0253 @ 10:21 (0'-1')
	2		BOH ~~No sample submitted to lab~~ ~~XRF <3600 ppm~~ BJ 8/9/19			
	3					
	4					
	5					
	6					
	7		BJ 8/8/19			
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/10/19	SL-223

HTRW DRILLING LOG

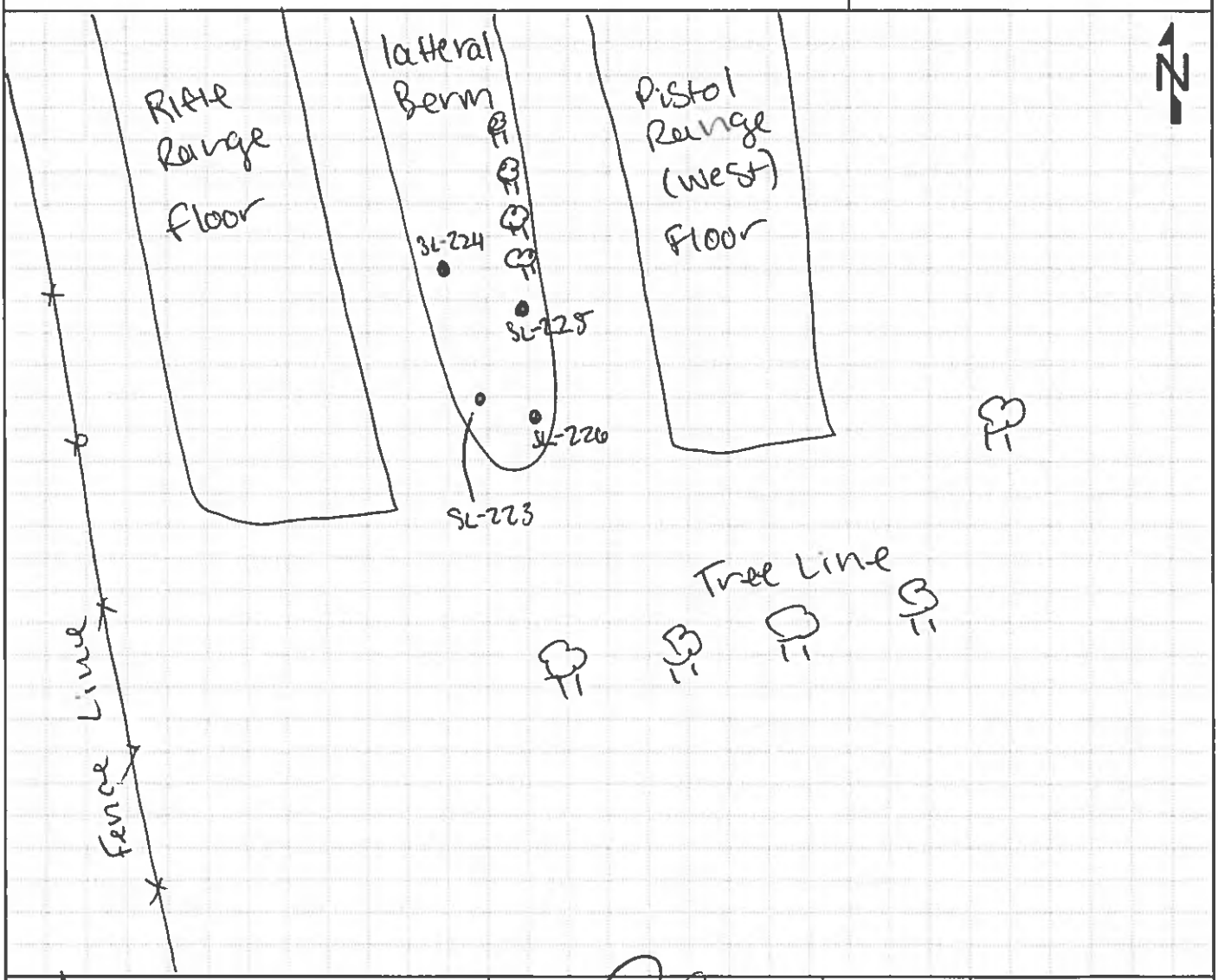
CLIENT: NASA		BOREHOLE NUMBER: SL-224
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS hand auger (3')	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME STARTED: 8/8/19 / 1055	COMPLETED: 8/8/19 / 1000
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-224

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-224

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	GC	SILT and SAND and little GRAVEL (0.25" to 2") 10YR 3/2, fine to medium sand, damp, non-plastic	1/1	110	Organic odor ECCLSL0254 @ 1055 (0'-1')
	2		BOH		~~No sample submitted~~ ~~XRF < 500 ppm~~ JG 8/19/19	
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

8/19/19 JG

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/19/19	8/19/19	SL-224

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-225	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brockhoff	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS hand auger (3")	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME: STARTED: 8/8/19 | 1013 COMPLETED: 8/8/19 | 1018	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, (PAHs), TAL Metals, Arsenic, (FR Metals), Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1.0'		

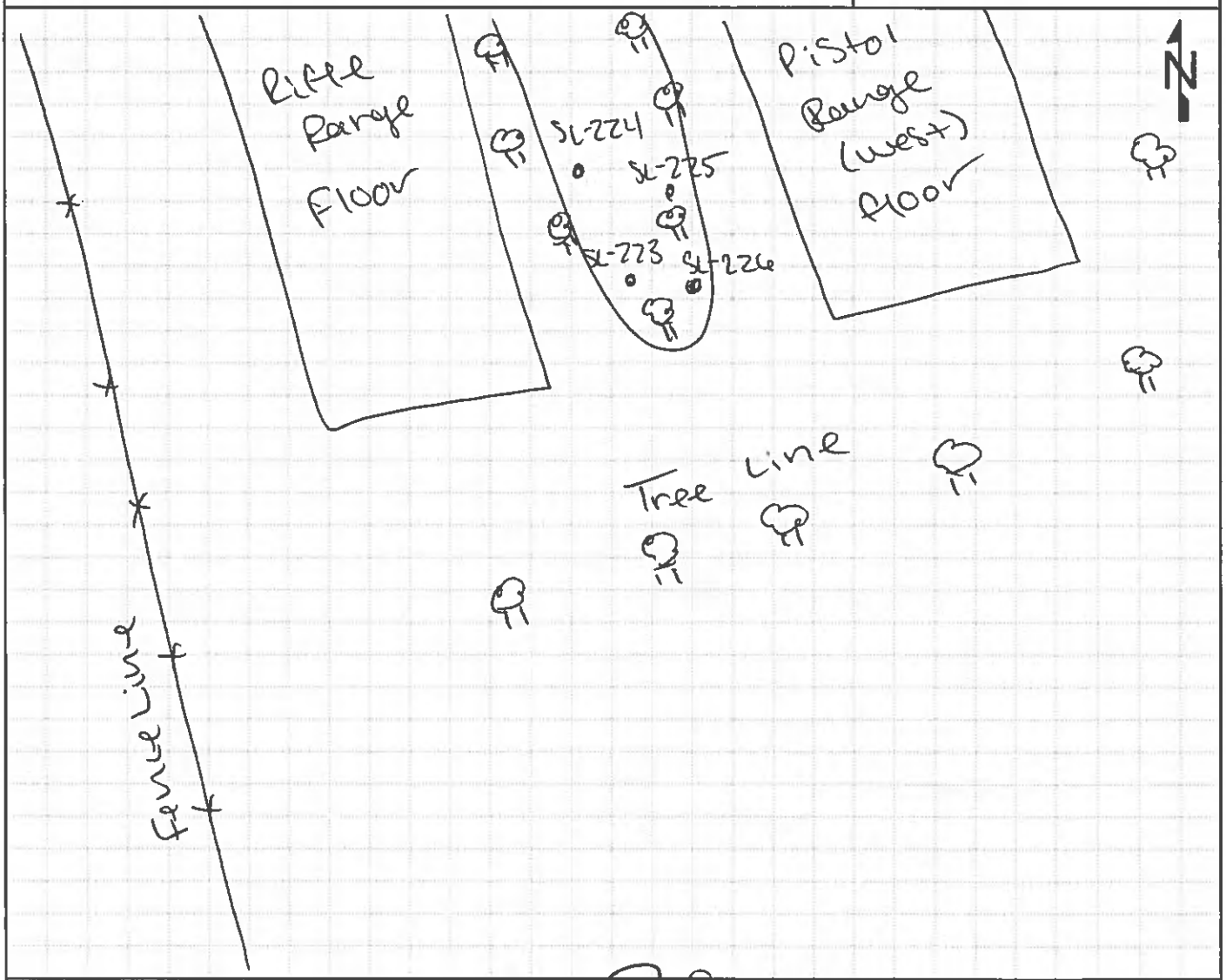
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/9/19	SL-225

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-225

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for P,D

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	GC	SILT and some sand and little Gravel (0.10" to 0.5"), fine to medium sand, 10YR4/3, dry	1/1	90	Organic odor ECCLSL0255 @ 1013 (0'-1')
	2		BOH			
	3					
	4					
	5					
	6					
	7		MS 8/8/19			
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-225

HTRW DRILLING LOG

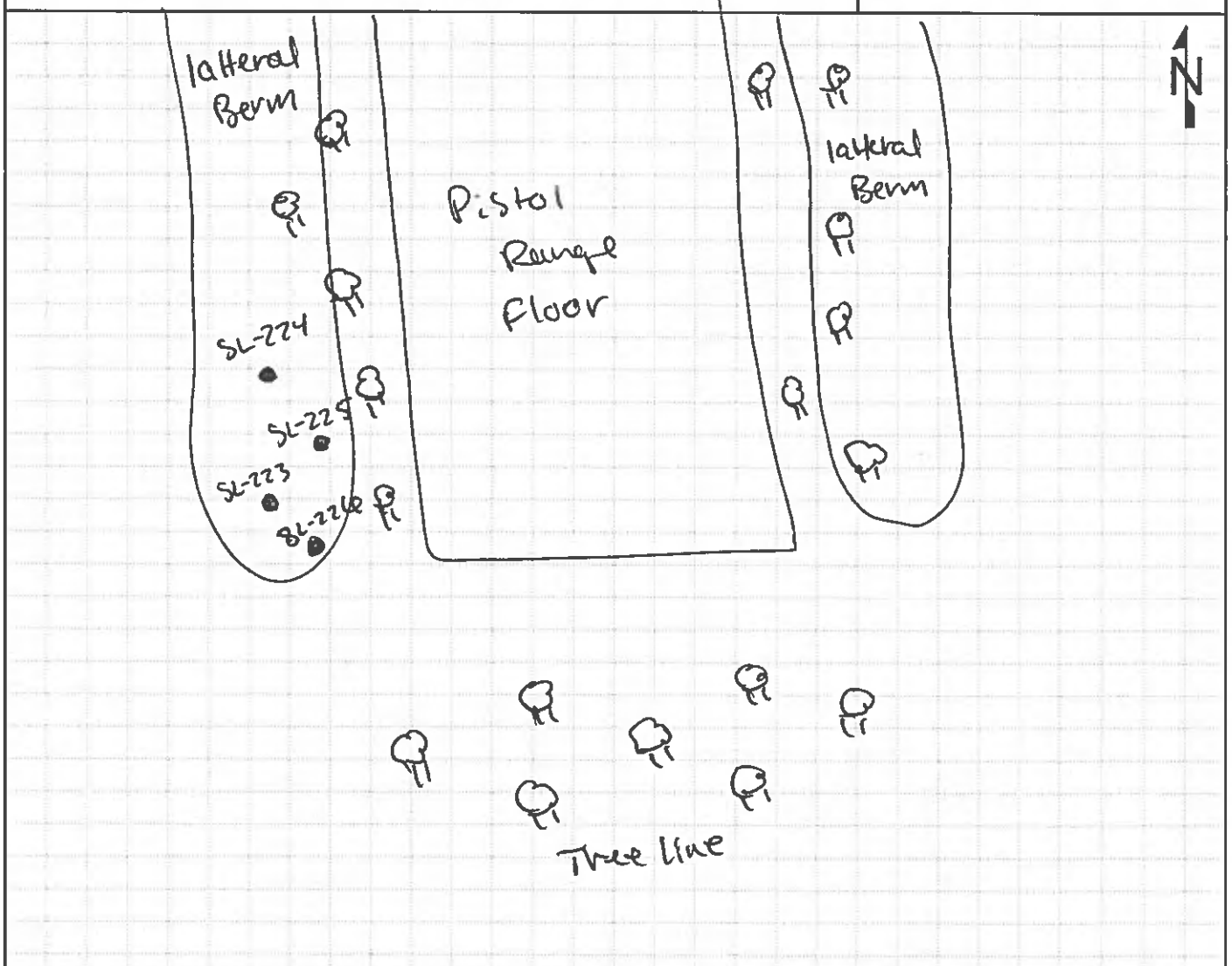
CLIENT: NASA	BOREHOLE NUMBER: SL-226	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shallhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger / 3" SS 8/16/19	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME: STARTED: 8/16/19 / 1541 COMPLETED: 8/16/19 / 1548	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/16/19	8/17/19	SL-226

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-226

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

PXF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	Sand and Silt, coarse to medium, little pebbles (0.10" to 2.5") 10YR4/3, damp, non-plastic, soft	1/1	20	Organic odor ECCLSL0256@ 1000 (0'-1') * MS/MSD Collected @ 0'-1'
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

JSG 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-226

HTRW DRILLING LOG

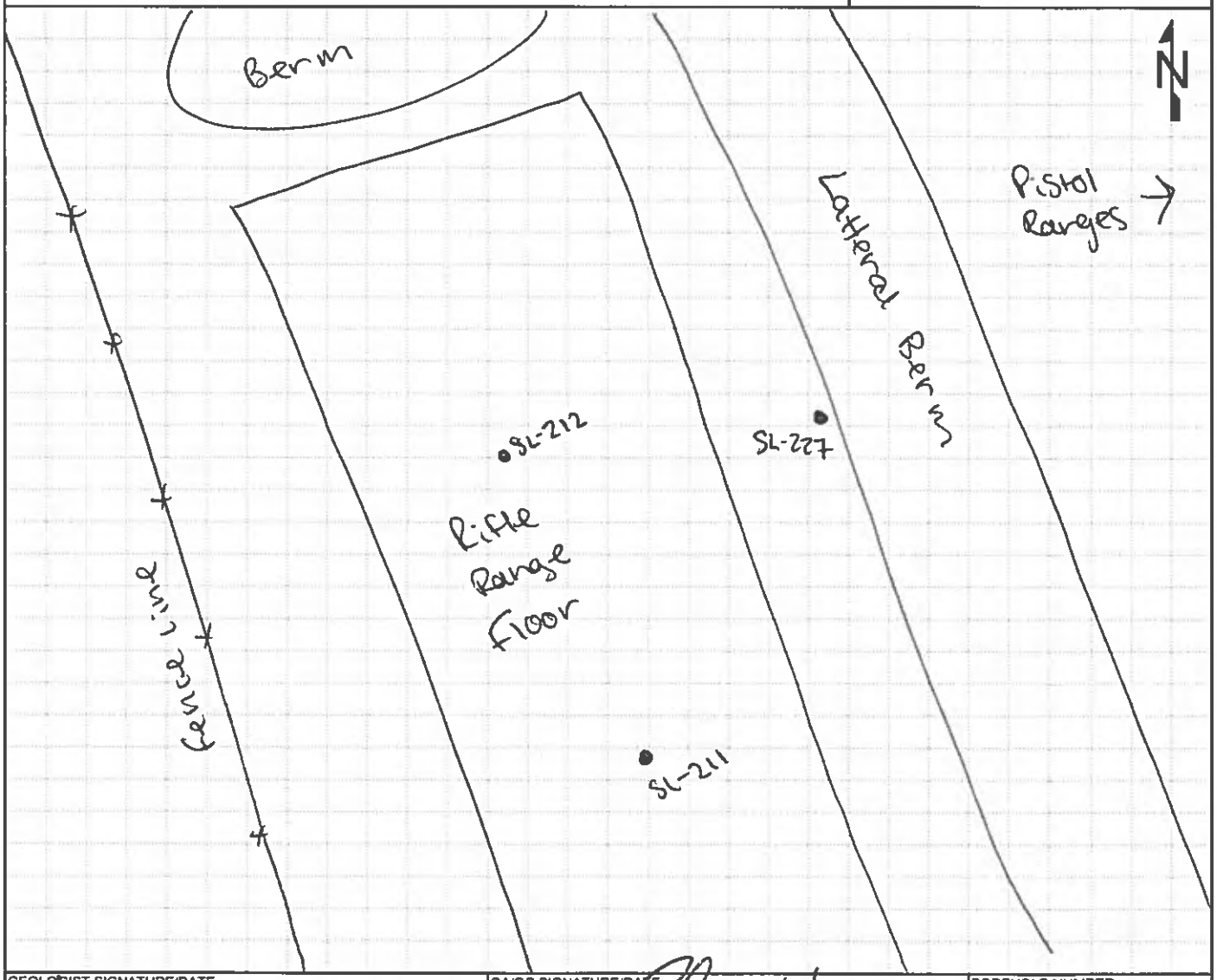
CLIENT: NASA	BOREHOLE NUMBER: SL-227	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED 8/8/19 / 0912; COMPLETED 8/8/19 / 0915	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: ~~3.8'~~ 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: ~~3.8'~~ 4.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/8/19	QA/QC SIGNATURE/DATE: 8/15/19	BOREHOLE NUMBER: SL-227

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-227	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLD+ XRF SERIAL#: 04R82 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.5'	GM	SHALE fragments, angular pieces of rock (0.5" to 1") 10YR 2/1, little silt and fine sand, dry		110	Organic odor SHALE @ surface
	0.9' 1	SM	SAND and SILT, fine, sub-angular, damp, 10YR 2/2, soft			ECCLSL0249 @ 0920 (0'-1')
	2	CL	CLAY and some SAND, fine, 10YR 7/1 and 10YR 5/8, firm, damp, non-plastic moist	3.7/4 (shale fell out of bottom of liner)	10	BZ @ Geoprobe 0.047 mg/m3
	3	SH	weathered SHALE, 10YR 2/2, iron staining, dry, fragmented rock and silt throughout		20	BZ @ sample table
	4				20	No odor
	5		BOH			
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE: 8/8/19

QA/QC SIGNATURE/DATE: 8/9/19

BOREHOLE NUMBER: SL-227

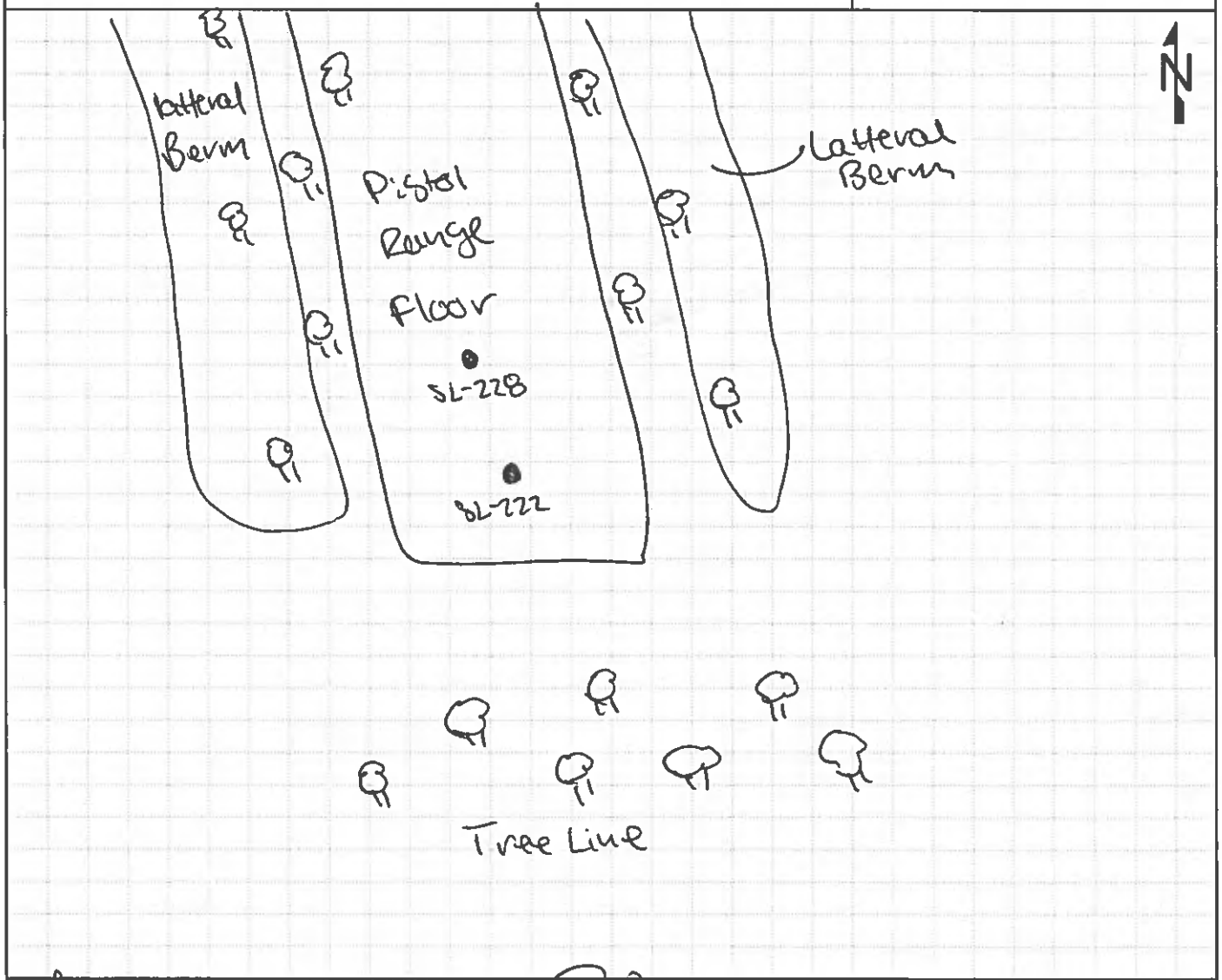
HTRW DRILLING LOG

CLIENT	NASA
BOREHOLE NUMBER	SL-228
1. COMPANY NAME	Leidos
2. DRILLING SUBCONTRACTOR	Geo-Environmental Drilling
SHEET	1 OF 2
3. PROJECT	ECCL Firing Range Removal Site Evaluation
4. LOCATION	NASA Plum Brook Station, Sandusky, Ohio
5. NAME OF DRILLER	Gregg Shellhammer
6. MAKE/MODEL OF DRILL	Geoprobe 7730 DT
7. SIZES AND TYPES OF SAMPLING EQUIPMENT	Acetate Liner (4')
8. BOREHOLE LOCATION	Pistol Range (West)
9. DRILL DATE/TIME STARTED:	8/6/19 / 1020
COMPLETED:	8/6/19 / 1025
10. DEPTH GROUNDWATER ENCOUNTERED	N/A
11. OVERBURDEN THICKNESS	4.0'
12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION	N/A
13. DEPTH DRILLED INTO BEDROCK	0'
14. CHEMICAL SAMPLES (circle)	VOC SVOCs (PAHs) TAL Metals Arsenic (FR Metals) Antimony Pb
15. TOTAL DEPTH OF BOREHOLE	4.0'
16. DISPOSITION OF BOREHOLE	
BACKFILL TYPE:	GROUT (BENTONITE)
SEMI-TEMPORARY MONITORING WELL	
WELL ID:	N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-228

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-228	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and little fine sand and little clay, 10YR 2/2, wet, non-plastic		50	Organic odor ECCLSL0257@ 1625 (0'-1')
	1	SM	SAND and SILT, fine sand, trace pebbles (0.10" to 0.25") 10YR 4/6, damp	3.3/4	40	No odor
	2		CLAY, and trace fine sand, 10YR 2/1, firm, damp to dry, non-plastic		10	
	3	CL				
			10YR 5/8 and 10YR 2/2 mottling		20	
	4		10YR 5/8 and 10YR 6/1 mottling			
			BOH			Re 8/1/19 XRF < 360 ppm NOT SENT TO LAB
	5					
	6					
	7					
	8					
	9					
	10					

SX 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-228

HTRW DRILLING LOG

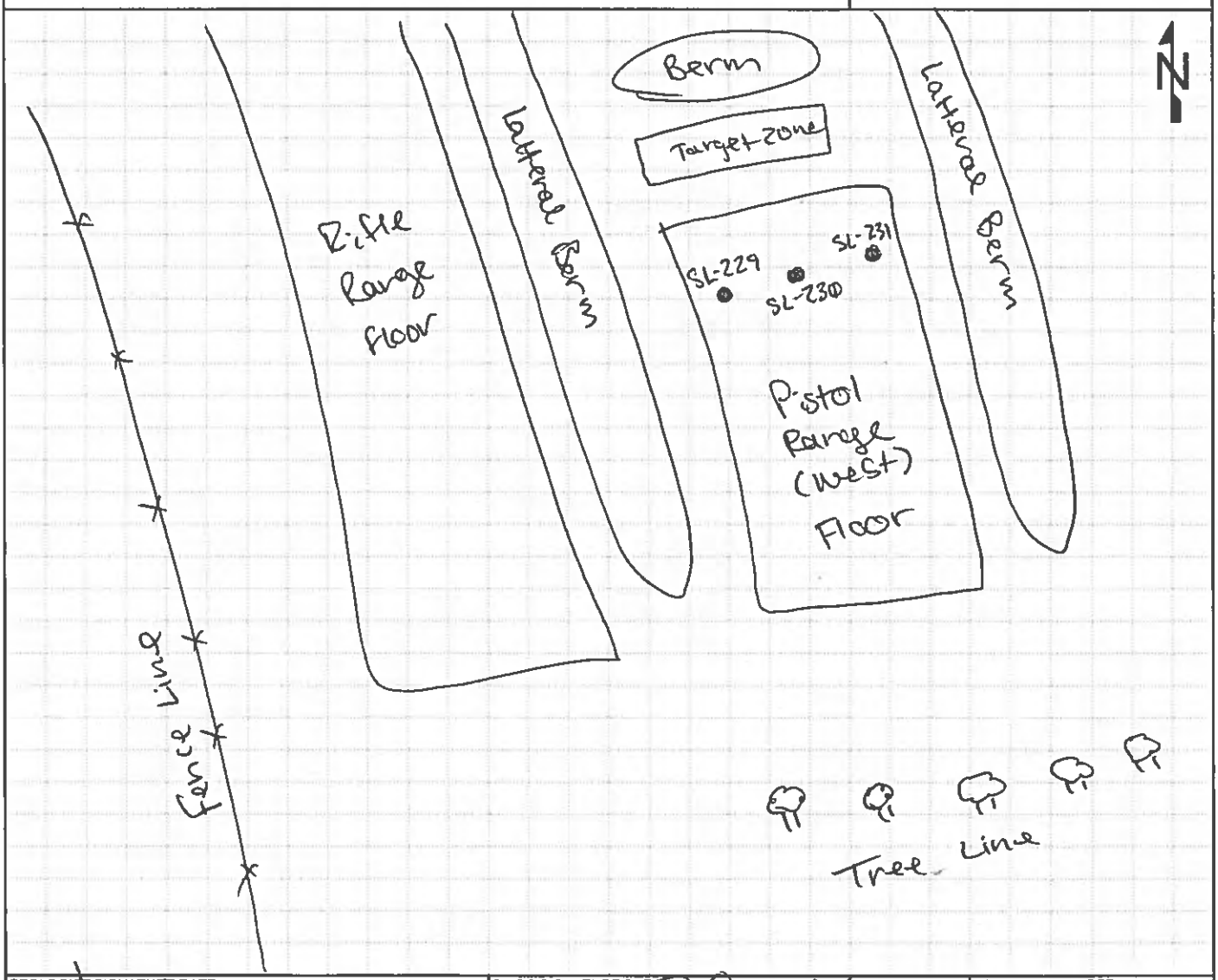
CLIENT: NASA	BOREHOLE NUMBER: SL-229	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4')	8. BOREHOLE LOCATION: Pistol Range (West)	
	9. DRILL DATE/TIME: STARTED: 8/7/19 1433 COMPLETED: 8/7/19 1440	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽ : First Water Encountered; ▼ : Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	SL-229

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-229	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: D41982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		SM	SILT and some SAND and ~~trace~~ trace CLAY, 10YR 2/2, soft, non-plastic, moist 8/7/19		400	organic odor ↓ No odor (ECCLSL0258 @ 1455 (0'-1') * Duplicate ID: ECCLSL9028
	1	CL	SAND and some CLAY, 10YR 2/2, 10YR 4/0, damp, non-plastic, soft		30	
	1.8' 2		CLAY and trace fine sand, 10YR 6/1 and 10YR 5/8 mottled, Hard, damp, non-plastic	3.9 / 4		
	3	CL	moist, ~~non-~~ low plasticity RS 8/7/19		20	
	3.6' 4	SH	weathered SHALE, 10YR 2/2, angular fragments and silt, iron staining dry		30	
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

RS 8/7/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	SL-229

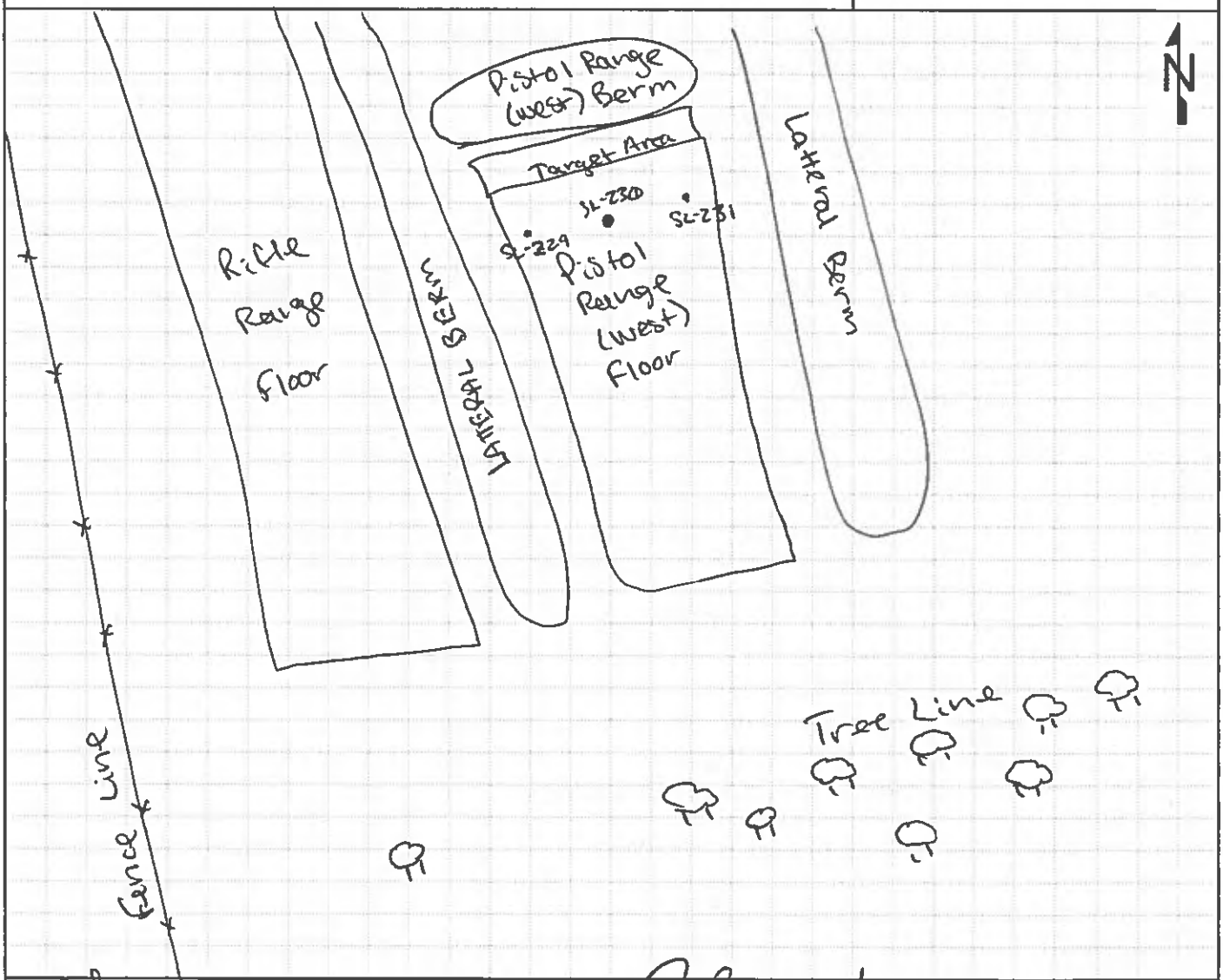
HTRW DRILLING LOG

CLIENT	NASA
BOREHOLE NUMBER	SL-230
1. COMPANY NAME	Leidos
2. DRILLING SUBCONTRACTOR	Geo-Environmental Drilling
SHEET	1 OF 2
3. PROJECT	ECCL Firing Range Removal Site Evaluation
4. LOCATION	NASA Plum Brook Station, Sandusky, Ohio
5. NAME OF DRILLER	Gregg Shellhammer
6. MAKE/MODEL OF DRILL	Geoprobe 7730 DT
7. SIZES AND TYPES OF SAMPLING EQUIPMENT	Acetate liner (4')
8. BOREHOLE LOCATION	Pistol Range (west)
9. DRILL DATE/TIME	STARTED: 8/7/19 | 1426 COMPLETED: 8/7/19 | 1430
10. DEPTH GROUNDWATER ENCOUNTERED	NA
11. OVERBURDEN THICKNESS	4.0'
12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION	NA
13. DEPTH DRILLED INTO BEDROCK	0'
14. CHEMICAL SAMPLES (circle)	VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb
15. TOTAL DEPTH OF BOREHOLE	4.0'
16. DISPOSITION OF BOREHOLE	
BACKFILL TYPE:	GROUT BENTONITE
SEMI-TEMPORARY MONITORING WELL	WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	SL-230

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-230

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		SM	SILT and SAND, fine, 10YR 3/2, damp, firm, non plastic		1600	organic odor shell casings
	1					
	1.2'	FILL	Gravel fill (0.5" to 1.5")			No odor
		CL	CLAY and trace fine sand, 10YR 2/2 and 10YR 4/6 mottled, hard, non plastic, damp	3.6/4	50	ECCLSL0259@ 1440 (0'-1')
	2					
			-10YR 6/1 and 10YR 5/8 mottled		10	
	3					
			moist, non plastic			
	3.6'	SH	weathered SHALE		30	
	4					
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

8/7/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	SL-230

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-231	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Stellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range ~~(west)~~ East 8/7/19	
	9. DRILL DATE/TIME: STARTED: 8/7/19 1502 COMPLETED: 8/7/19 1505	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

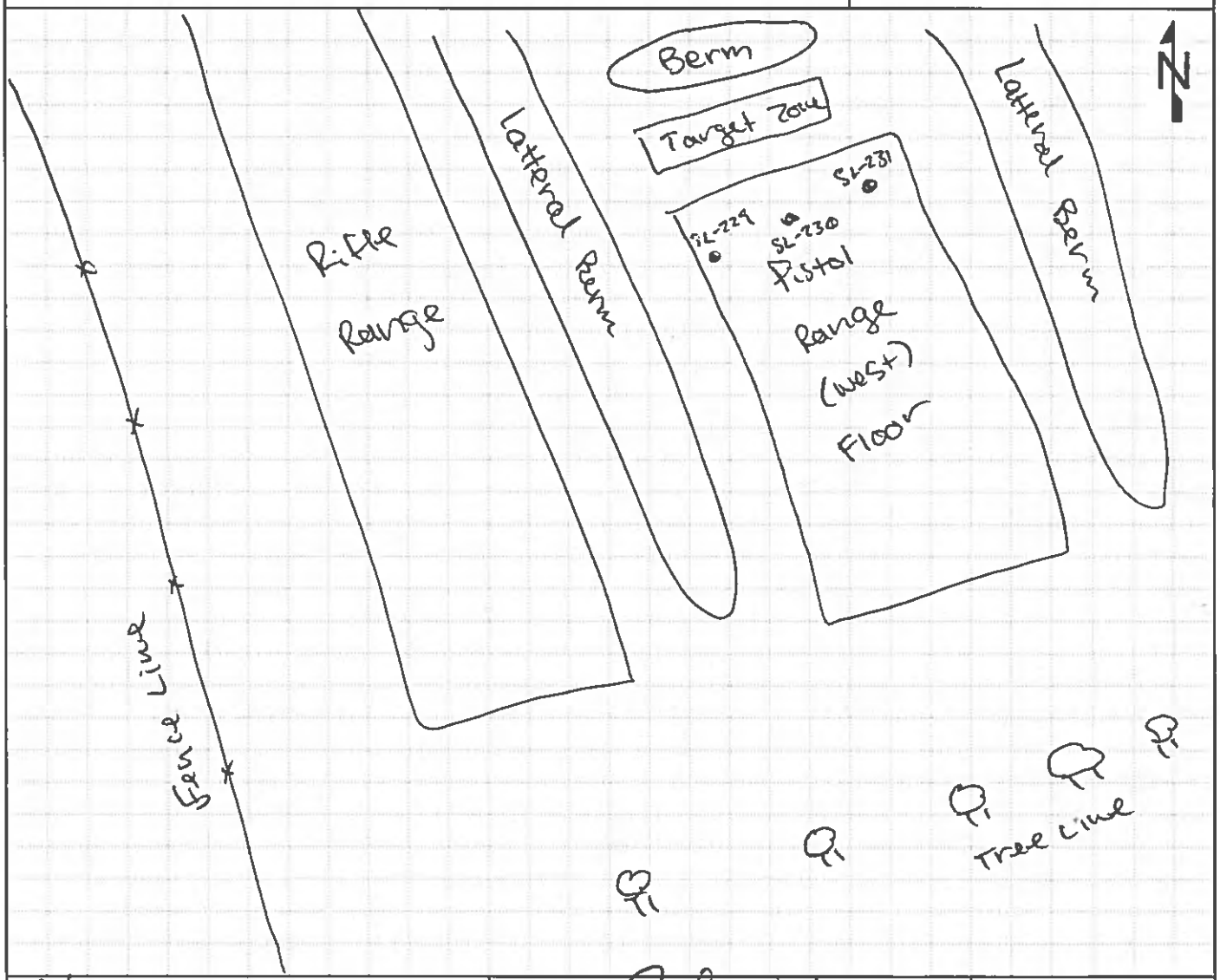
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/7/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: SL-231

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-231	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.6'	SM	SILT and little fine sand and little CLAY, 10YR 2/1, moist, soft, non-plastic		1910	organic odor
	1		CLAY and little fine sand, 10YR 2/1 mottled with 10YR 4/6, hard, damp non plastic			ECCLSL0275 @ 1520 (0'-1') No odor
	2	CL	10YR 6/1 mottled w/ 10YR 4/6	3.8/4	210	
			10YR 6/1 mottled w/ 10YR 5/8		10	
	3		@ 3' ↑ moist		20	
	4	SH	weathered SHALE, 10YR 2/2, iron staining, silt between broken rock			
			BOH			
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	SL-231

HTRW DRILLING LOG

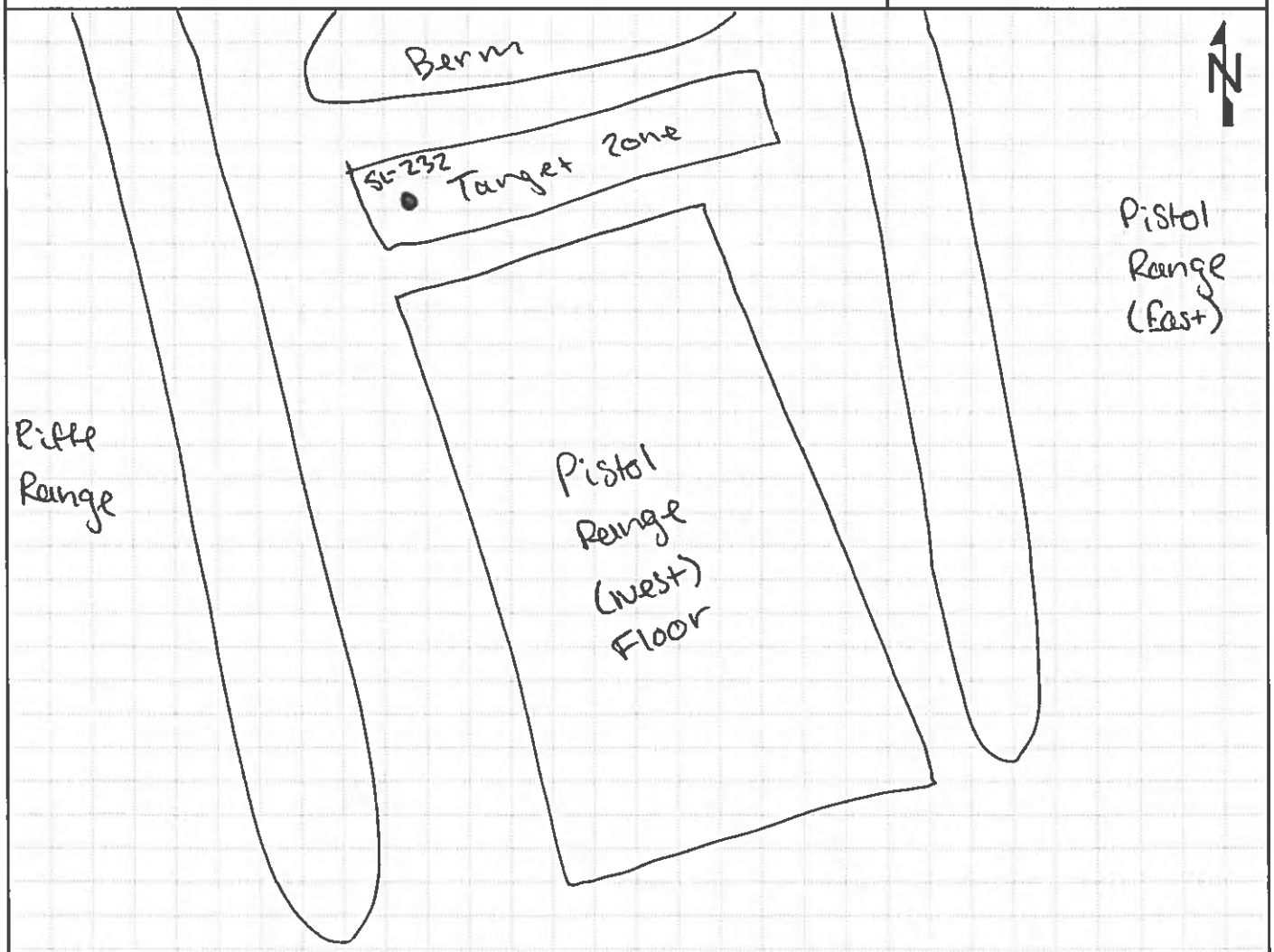
CLIENT: NASA	BOREHOLE NUMBER: SL-232	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (West)	
	9. DRILL DATE/TIME: STARTED 8/7/19 | 1612 COMPLETED 8/8/19 | 0820	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	SL-232

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-232	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		SM	SILT and little fine SAND, damp, non plastic, soft		9430	Organic odor
		FILL	SILT, SAND (coarse to medium) gravel, (0.10" to 0.5"), clay, poorly sorted fill material		20800	0815 sample ECCLSL0260 (1.0'-1.5
	1				50	0820 sample ECCLSL0261 (1.5'-2')
			Clay and trace fine sand, 10YR 4/1 and 10YR 5/8 mottled, firm non-plastic, damp			*Duplicate ECCLSL9002
	2			4/4	30	
		CL			20	
	3		moist		20	BZ @ sample table ~~table~~ 8/7/19
					100	0.000 mg/m³
	4	SH	weathered bedrock, SHALE, 10YR 3/2, iron staining, silt between broken, fragmented rock		80	
				0.5/0.5	30	Bedrock Refusal @ 4.5'
	5		BOH			
	6					
	7					
	8		AA 8/2/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	SL-232

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-233 / MW-10	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME STARTED: 8/7/19 / 0808	COMPLETED: 8/8/19 / 1354
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: 4.2' 8/8/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

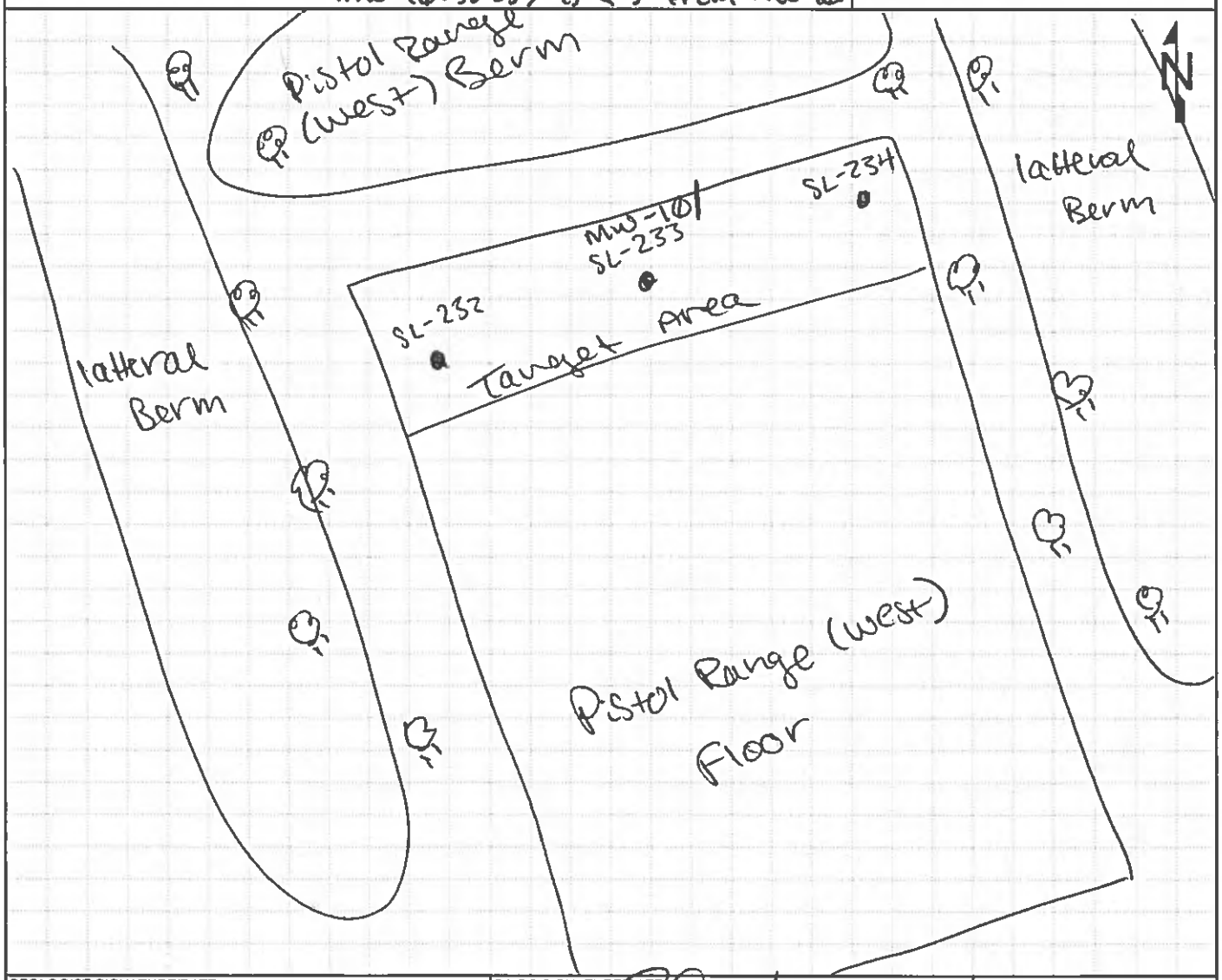
BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-10

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: Use SL-233 as pilot boring for MW-10. SL-233 is < 5' from MW-10

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	SL-233 / MW-10

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-233 / MW-10	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	0.1'	OL	Organic topsoil, silt and little fine sand, 10YR 2/1, wet		2800	organic odor
	1	FILL	Gravel 0/1, Gravel (0.10" to 1") and sand and some silt, fine to coarse, 10YR 7/1 and 10YR 3/2, poorly sorted, wet		3680	ECCLSL0262 @ 1600/8/7/19 (1'-1.5')
	1.9'	SM	SAND and some clay and trace gravel (0.10"-0.25"), fine sand, poorly sorted, 10YR 3/2, damp, firm to soft	4/4	980	ECCLSL0263 @ 1600 8/7/19 (1.5'-2')
	2.5'	CL	CLAY and sand, fine, 10YR 5/1 and 10YR 5/6 mottled, damp, firm, non plastic		90	
	3	CL	CLAY and trace sand, 10YR 5/1 and 10YR 5/6 mottled, damp, soft nonplastic		30	No odor
	4				170	
	4.5'	SH	Weathered SHALE, dry, fissile, angular pieces of rock, 10YR 2/1	0.5/0.5	30	
					90	
					20	Bedrock refusal @ 4.5'
	5		BOH			
	6					
	7					
	8					
	9					
	10					

XR 8/7/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/9/19	SL-233 / MW-10

HTRW DRILLING LOG

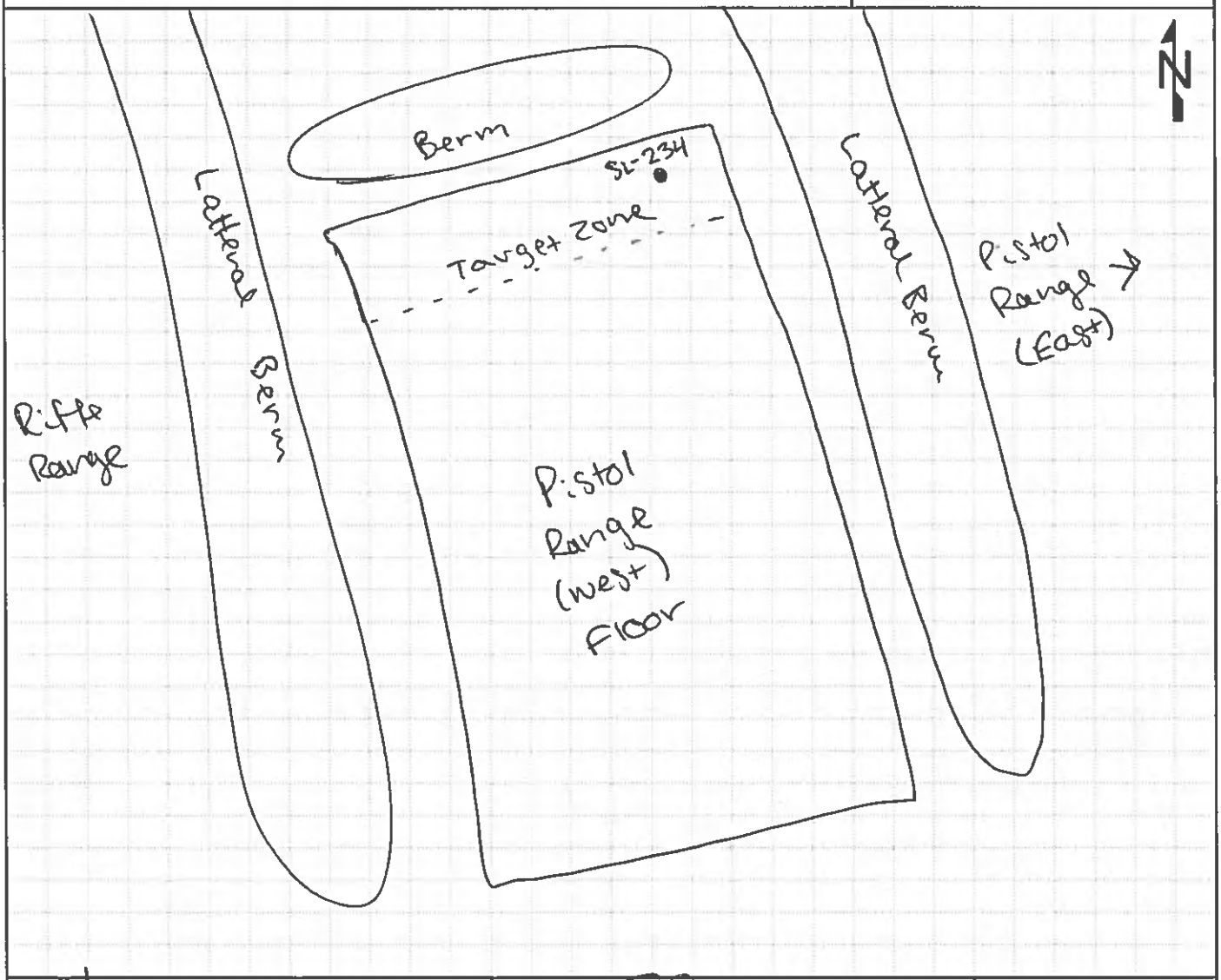
CLIENT: NASA	BOREHOLE NUMBER: SL-234	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME: STARTED: 8/7/19 | 1525 COMPLETED: 8/8/19 | ~~0851~~ 0851	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/15/19	SL-234

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-234	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		SM	SILT and little fine sand, 10YR 2/1, soft, non plastic, moist		0630	Organic odor ECCLSL0264 @ 0835 8/8/19 (0.5'-1')
	1	FILL	Gravel fill, gravel (0.10" - 0.5") sand (coarse to fine), silt, 10YR 7/1 and 10YR 3/2.		TB70 ~~0630~~ 35 8/8/19	No odor
	1.7'	CL	CLAY and little fine SAND, subangular, 10YR 2/2, Hard, non plastic, dry to damp	3.7/4	40	ECCLSL0265 @ 0840 8/8/19 (1'-1.5') * MS/MSD
	2	SC	SAND and some Clay, 10YR 5/8, and 10YR 6/1 mottled, soft, damp		20	
	2.5				20	
	3	CL	CLAY and some SAND, 10YR 5/8 mottled with 10YR 6/1, firm, damp		20	
	3.5				20	
	4	SH	weathered SHALE, 10YR 2/2, iron staining, dry, fissile, silt between rock fragments		20	
	4.5'			0.5/0.5	30	Bedrock refusal @ 4.5'
	5		BOH			
	6					
	7					
	8					
	9					
	10					

YJS 8/7/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/15/19	SL-234

HTRW TRENCH LOG

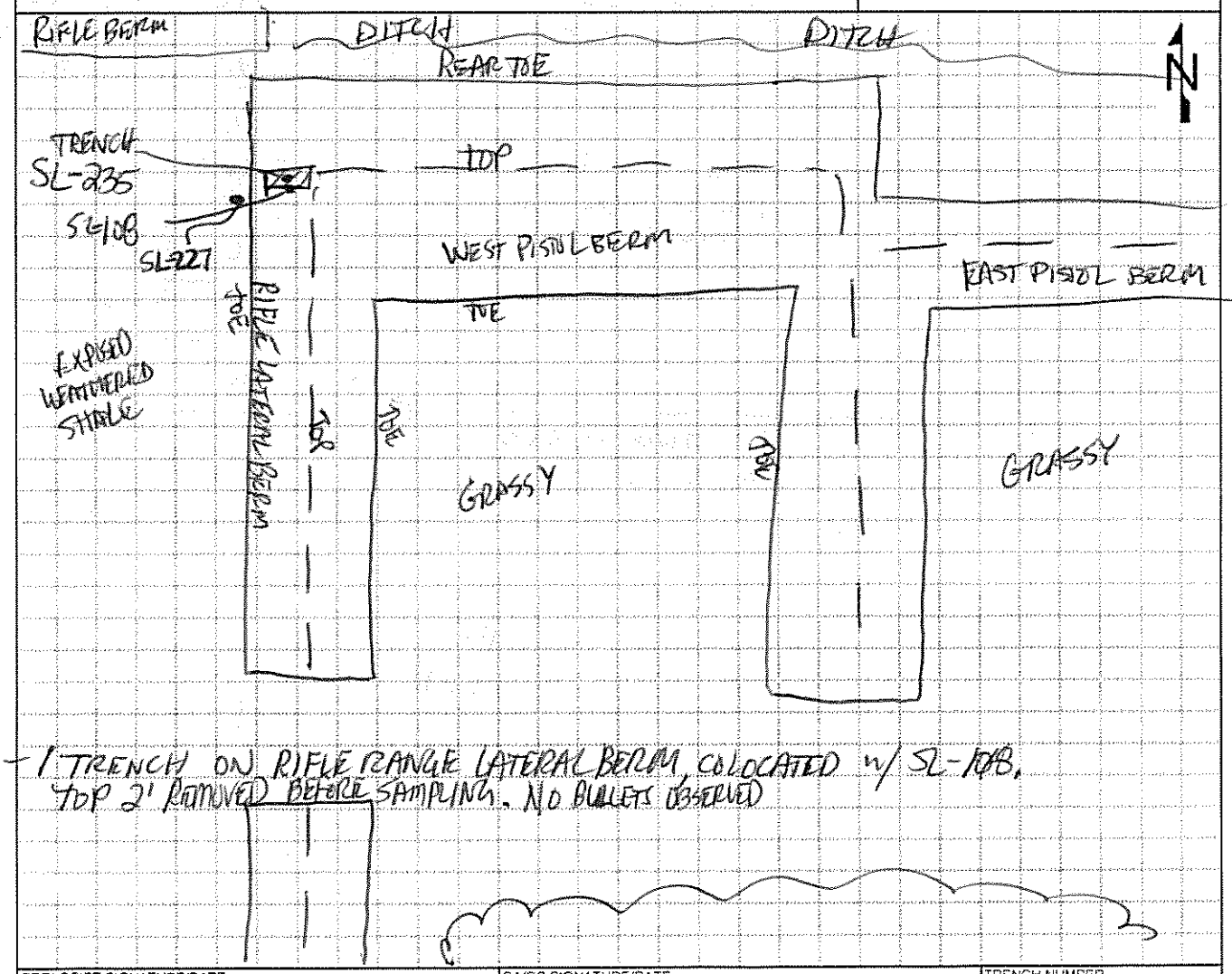
CLIENT: NASA		TRENCH NUMBER: ECCL-SL-235
1. COMPANY NAME: Leidos	2. TRENCHING SUBCONTRACTOR: N/A	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF OPERATOR: Dana Winslow	6. MAKE/MODEL OF EXCAVATOR: LINKBELT 145X4	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 2' bucket on excavator	8. TRENCH LOCATION: Pistol (East) Range	
	9. DATE/TIME: 8/2/19 STARTED: 0755	COMPLETED:
	10. DUST MONITOR: Dust S/N: 26146	
11. OVERBURDEN THICKNESS: >5.5 ft	Track DRX CALIBRATION DATE: 8/2/19	
12. DEPTH BEDROCK ENCOUNTERED: N/A	13. CHEMICAL SAMPLES (circle): VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
14. TOTAL DEPTH OF TRENCH: 5.5 ft.		

15. NOTES
PPM: PARTS PER MILLION
NA: Not Applicable

ECCLSL0250 @ 0810 8/2/19 2.0-2.5 ft.
ECCL SL0251 @ 0825 8/2/19 2.5-3.0 ft

LOCATION SKETCH/COMMENTS: N/A

SCALE: None



1 TRENCH ON RIFLE RANGE LATERAL BERM, COLOCATED w/ SL-108. TOP 2' REMOVED BEFORE SAMPLING. NO BULLETS OBSERVED

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/5/19	8/7/19	SL-235

8/7/19

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: SL-235	
1. COMPANY NAME: Leidos	2. OPERATOR: Dana Winslow	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION OF TRENCH: Pistol (East) Range	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF Scr pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0		SILT and some sand and little clay, fine sand, 10YR 3/2, dry to damp, firm, shale fragments (1"-0.1")		NO SCREENING	organic odor, shale fragments; $DUST_{BZ}$ = 0.084 mg/m³ (Exc)
	1					
	2				500	ECCLSL0250 8/2/19 @ 0810 2.0-2.5 ft; $DUST_{BZ}$ = 0.029 mg/m³
		SM	- CHANGE IN COLOR TO 10YR 4/2 DARK GRAYISH BROWN.	100%	40	ECCLSL0251 8/2/19 @ 0825 2.5-3.0 ft; $DUST_{EXC\ BZ}$ = 0.018 mg/m³
	3				140	
			- CHANGE COLOR BACK TO 10YR 3/2 VERY DARK GRAYISH BROWN.		170	
	4				110	$DUST_{BZ(EXC)}$ = 0.249 mg/m³
					80	$DUST_{BZ(CAB)}$ = 0.021 mg/m³
	5				50	
	6		END TRENCH AT 5.5 ft. BACKFILLED TRENCH.			
	7					
	8					
	9					
	10					

Re 8/7/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/7/19	8/9/19	SL-235

HTRW TRENCH LOG

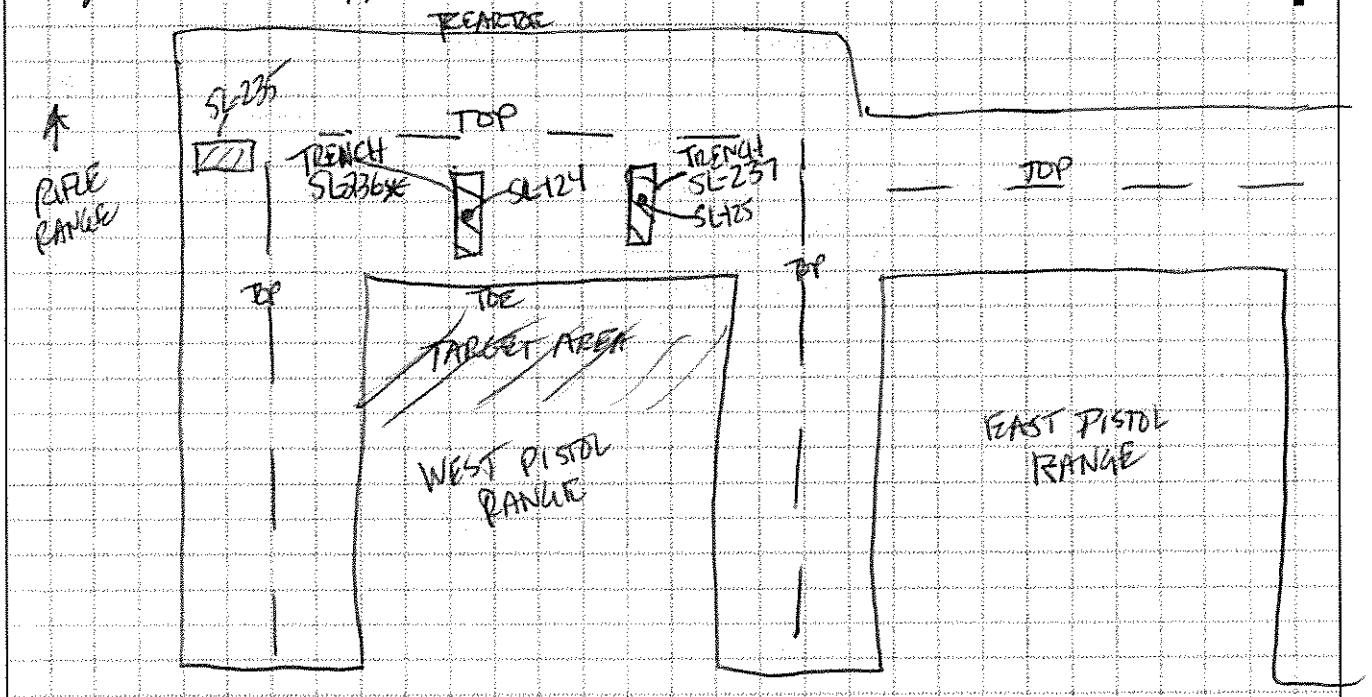
CLIENT: NASA	TRENCH NUMBER: ECCL-SL-236	
1. COMPANY NAME: Leidos	2. TRENCHING SUBCONTRACTOR: N/A	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF OPERATOR: Dana Winslow	6. MAKE/MODEL OF EXCAVATOR: LINKBELT HS X4	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Excavator Bucket, Disposable Foil Pan	8. TRENCH LOCATION: PISTOL RANGE (WEST)	
	9. DATE/TIME STARTED: 8/6/19 ~~1530~~ 1110	COMPLETED: 8/6/19 1115
	10. DUST MONITOR: S/N. 26146	
11. OVERBURDEN THICKNESS: >4.5'	CALIBRATION DATE: 8/6/19	
12. DEPTH BEDROCK ENCOUNTERED: NA	13. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
14. TOTAL DEPTH OF TRENCH: 4.5' (Not Bottom)		

15. NOTES
PPM: PARTS PER MILLION
NA: Not Applicable

ECCLSL0266 3.0-3.5 ft. 8/6/19 @ 1110
ECCLSL0267 3.5-4.0 ft. 8/6/19 @ 1115

LOCATION SKETCH/COMMENTS — SCALE: None

1 of 2 trenches on West Pistol Range Berm. This trench located on western/central portion of Berm, co-located with previous ECCL-SL-124 sample location. Upper 2ft Removed



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/7/19	8/9/19	SL-236

HTRW TRENCH LOG

CLIENT	TRENCH NUMBER
NASA	SL-236

1. COMPANY NAME	2. OPERATOR:	
Leidos	DANA WINSLOW	SHEET 2 OF 2

3. PROJECT: ECCL Firing Range Removal Site Evaluation

4. LOCATION OF TRENCH:

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: # 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1		SILT, SOME FINE TO MEDIUM SAND AND SHALE FRAGMENTS, ANGULAR TO SUB-ROUNDED, 10YR 3/2 VERY DARK BROWN, DAMP-MOIST, NON-PLASTIC, TRACE ORGANICS.	100%	NO SCREENING	
	2	SM	- 10YR 4/3 BROWN + SOME 10YR 5/6 YELLOWISH BROWN		3550	
	3		- TRACE CLAY		1850	ECCLSL0266 8/6/19 @ 1110 3.0-3.5ft DUST TB2=0.006 mg/m³
			- DECREASE IN SHALE FRAGMENTS		620	ECCLSL0267 8/6/19 @ 1115 3.5-4.0ft. DUST TB2=0.005 mg/m³
	4				60	
			- 10YR 3/1 VERY DARK GRAY TRACE 10YR 4/6 DARK YELLOWISH BROWN		50	
	5		END OF TRENCH AT 4.5ft. BACKFILLED TRENCH			
	6					
	7					
	8					
	9					
	10					

TLW 8/7/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/7/19	RS 8/9/19	SL-236

HTRW TRENCH LOG

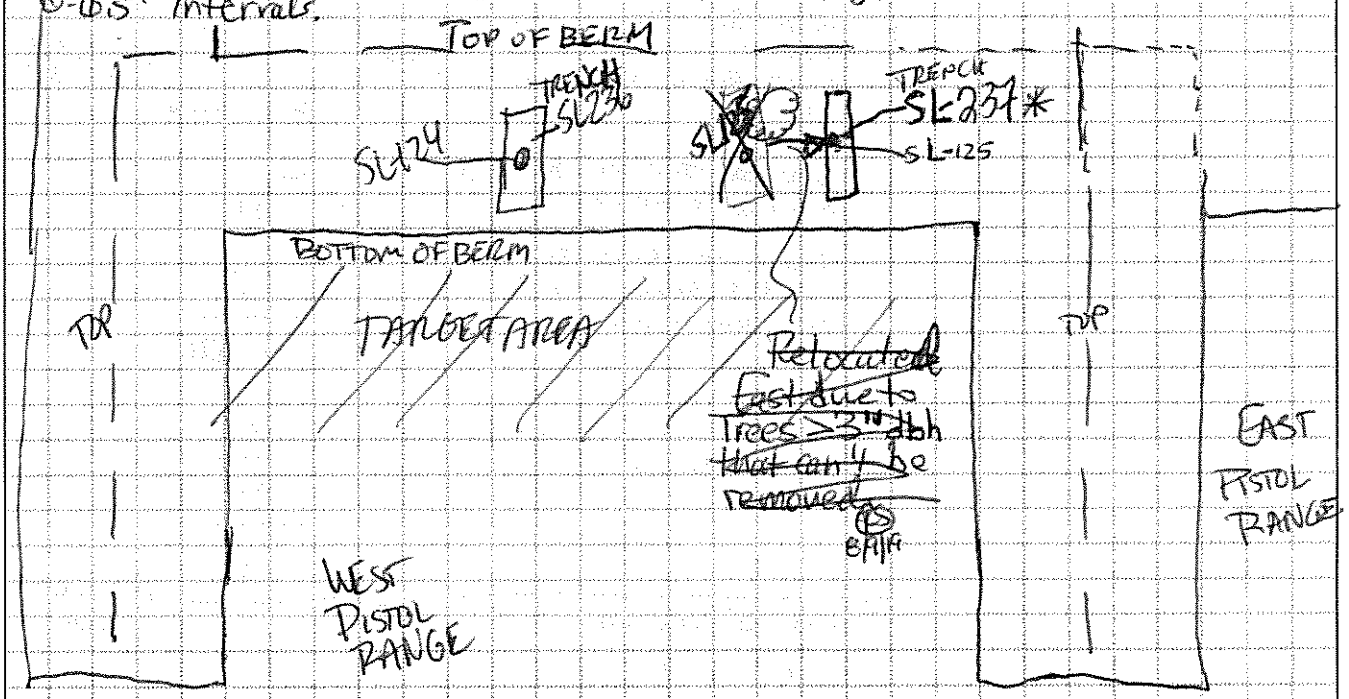
CLIENT: NASA	TRENCH NUMBER: ECCL-SL-237	
1. COMPANY NAME: Leidos	2. TRENCHING SUBCONTRACTOR: N/A	SHEET 1 OF
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF OPERATOR: Dana Winslow	6. MAKE/MODEL OF EXCAVATOR: Linkbelt 145X4	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Excavator Bucket, Disposable Foil Pans	8. TRENCH LOCATION: PISTOL RANGE (WEST)	
	9. DATE/TIME: 8/5/19 STARTED: 1530 COMPLETED: 8/6/19 0955	
	10. DUST MONITOR: S/N: 261146	
11. OVERBURDEN THICKNESS: 7.5 ft	CALIBRATION DATE: 8/5/19 + 8/6/19	
12. DEPTH BEDROCK ENCOUNTERED: N/A	13. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
14. TOTAL DEPTH OF TRENCH: 7.5 ft		

15. NOTES
PPM: PARTS PER MILLION
NA: Not Applicable

ECCLSL 0268 3.0-3.5 ft 8/6/19 @ 0950
ECCLSL 0269 3.5-4.0 ft 8/6/19 @ 0955

LOCATION SKETCH/COMMENTS — SCALE: None

1 of 2 trenches on West Pistol Range Berm. This trench located on Eastern half of Berm, co-located with previous ECCL-SL-125 sample location. Upper 2 ft removed prior to collecting XRF samples in 0-0.5' intervals.



GEOLOGIST SIGNATURE/DATE: 8/7/19	QA/QC SIGNATURE/DATE: RS 8/9/19	TRENCH NUMBER: SL-237

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: ECCL-SL-237	
1. COMPANY NAME: Leidos	2. OPERATOR: DANA WINSLOW	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION OF TRENCH: PISTOL RANGE (W)	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLD+ II	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised; XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SHALE FRAGMENTS AND SILT w/ TRACE FINE-MEDIUM SAND, ANGULAR - SUB-ROUNDED, 10YR 3/2 VERY DARK GRAYISH BROWN, ~~DAMP~~ DAMP, NON-PLASTIC		NO SCREENING	DUST BZ=0.061 mg/m³
	2		— CHANGE IN COLOR TO 10YR 4/2 DARK GRAYISH BROWN.		2650	
	3				1960	DUST BZ=0.029 mg/m³ ECCLSL0268 8/6/19 @ 0950 3.0-3.5
	4	SM	SAND w/ LITTLE SILT + TRACE SHALE FRAGMENTS. SAND FINE TO MEDIUM SUB-ANGULAR TO SUB-ROUNDED. 10YR 4/3 BROWN, SOFT, DAMP NON-PLASTIC.	100%	1890	ECCLSL0269 8/6/19 @ 0955 3.0-3.5 ft.
			— DECREASE IN SHALE FRAGMENTS. MOISTURE DAMP - MOIST.		20	
	5		— CHANGE IN COLOR TO 10YR 4/3 BROWN + 10YR 4/6 DARK YELLOWISH BROWN.		10	
	6		— ADDITION OF 10YR 4/2 DARK GRAYISH BROWN		30	
	7				150	
					NON-DETECT	
					20	
					80	
					190	APPROXIMATE BOTTOM OF BERM
	8		END OF TRENCH BACKFILLED TRENCH			
	9		TRC 8/7/19			
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/7/19	RS 8/9/19	SL-237

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: ECCL-SL-238	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3.25" hand auger	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME: 8/7/19 STARTED: 1450 COMPLETED: 1455	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: N/A	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 12"		

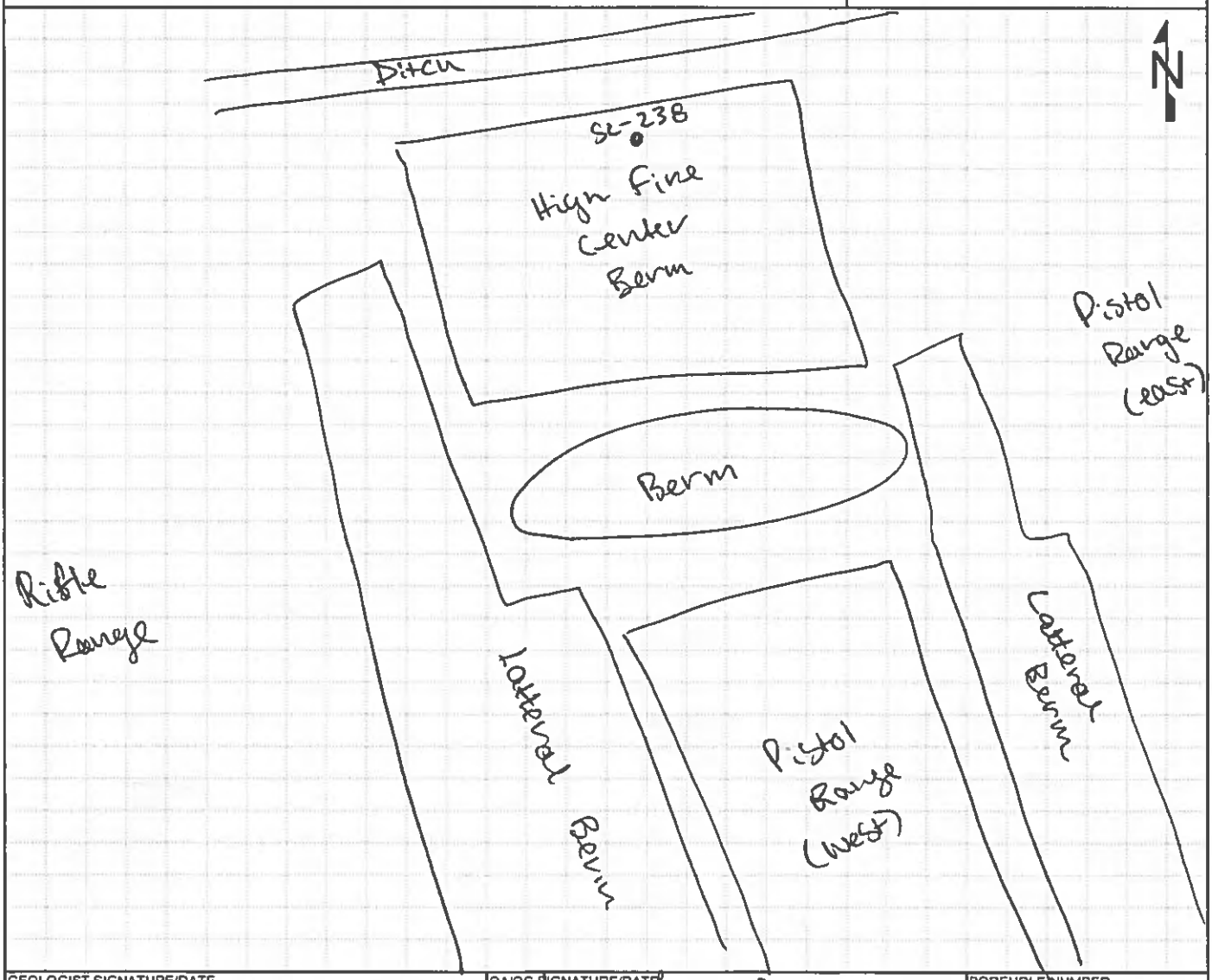
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	ECCL-SL-238

8/8/19

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	ECCL-SL-238

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT: ECCL Firing Range Removal Site Evaluation

4. DIRECTION OF BOREHOLE: VERTICAL

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		GM	0-1" Pine needles & organics 1"-12" Silt, some Clay some Gravel (shale fragments) little organics 10YR4/3 Brown; very soft; damp; roots present non-plastic	1/1	1800	ECCLSL0270 @ 1455 (0'-1') XRF > 3600 ppm — sample submitted to lab
	1					
	2					
	3		Boring terminated @ 1' BGS			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

MS 8/19/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
[signature] 8/7/19	[signature] 8/8/19	ECCL-SL-238

HTRW DRILLING LOG

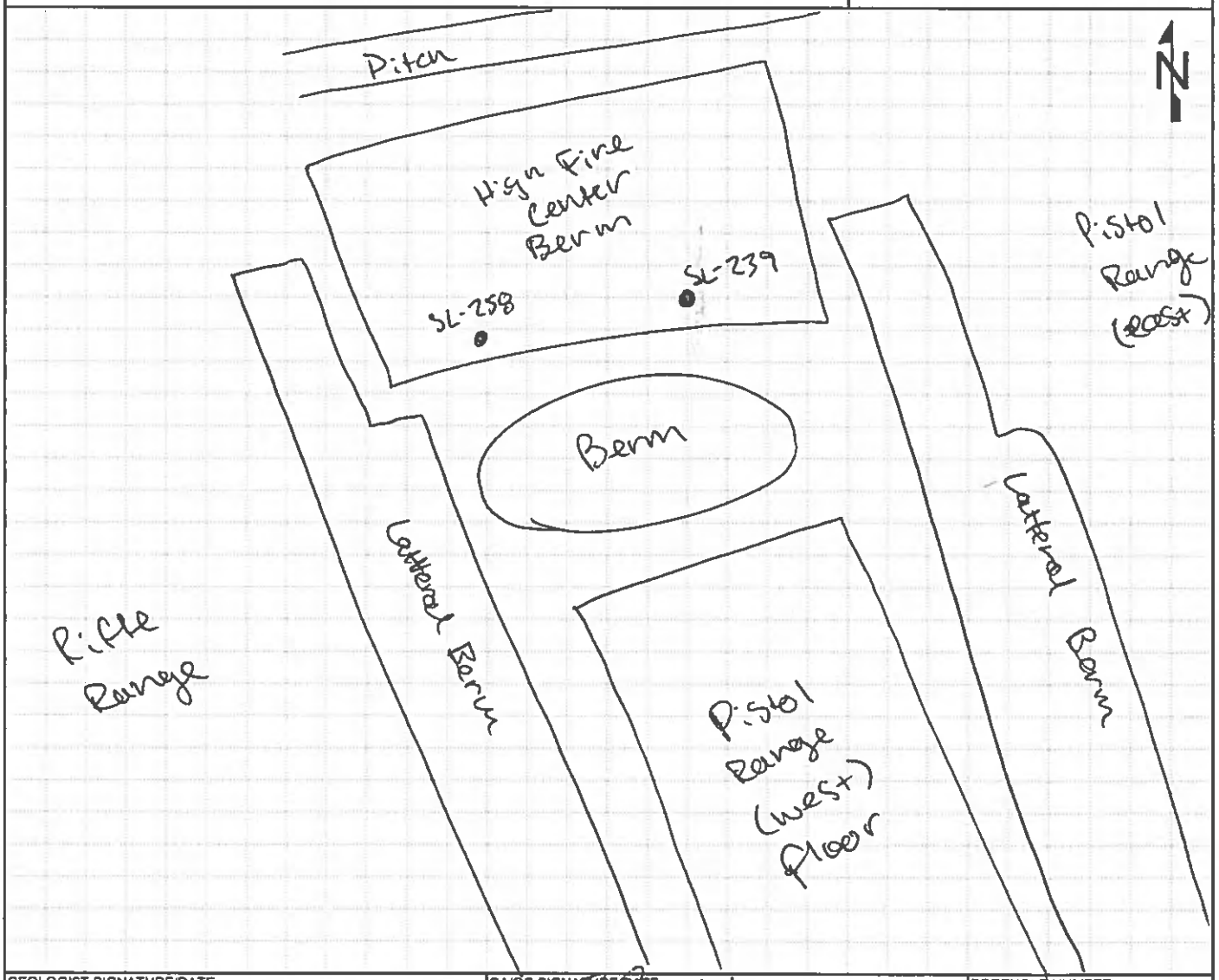
CLIENT: NASA	BOREHOLE NUMBER: ECCL-SL-239	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3.25" hand auger	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME: 8/7/19 STARTED: 1519 COMPLETED: 1524	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: N/A	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 12"		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/7/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: ECCL-SL-239

HTRW DRILLING LOG

CLIENT: NASA		BOREHOLE NUMBER: ECCL-SL-239
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) (XRF for Pb)	REMARKS (Sample IDs/Depths/Etc.)
	1	GM	0-1" Pine needles + organics 1"-12" Silt + Clay Some Gravel (shale fragments) 10YR 4/2 Dark grayish brown; very soft; moist roots present non-plastic	1/1	5010	ECCLSL0271 @ 1524 (0'-1')
	2				XRF >3600 ppm - Sample submitted to lab	
	3		boring terminated @ 1' BGS			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

MJS 8/19/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/9/19	ECCL-SL-239

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: ECCL-SL-240	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3.25" hand auger	8. BOREHOLE LOCATION: Pistol Range (west) 8/19/19	
	9. DRILL DATE/TIME: 8/7/19 STARTED: 1456 COMPLETED: 1501	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: N/A	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): 8/19/19 VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 12"		

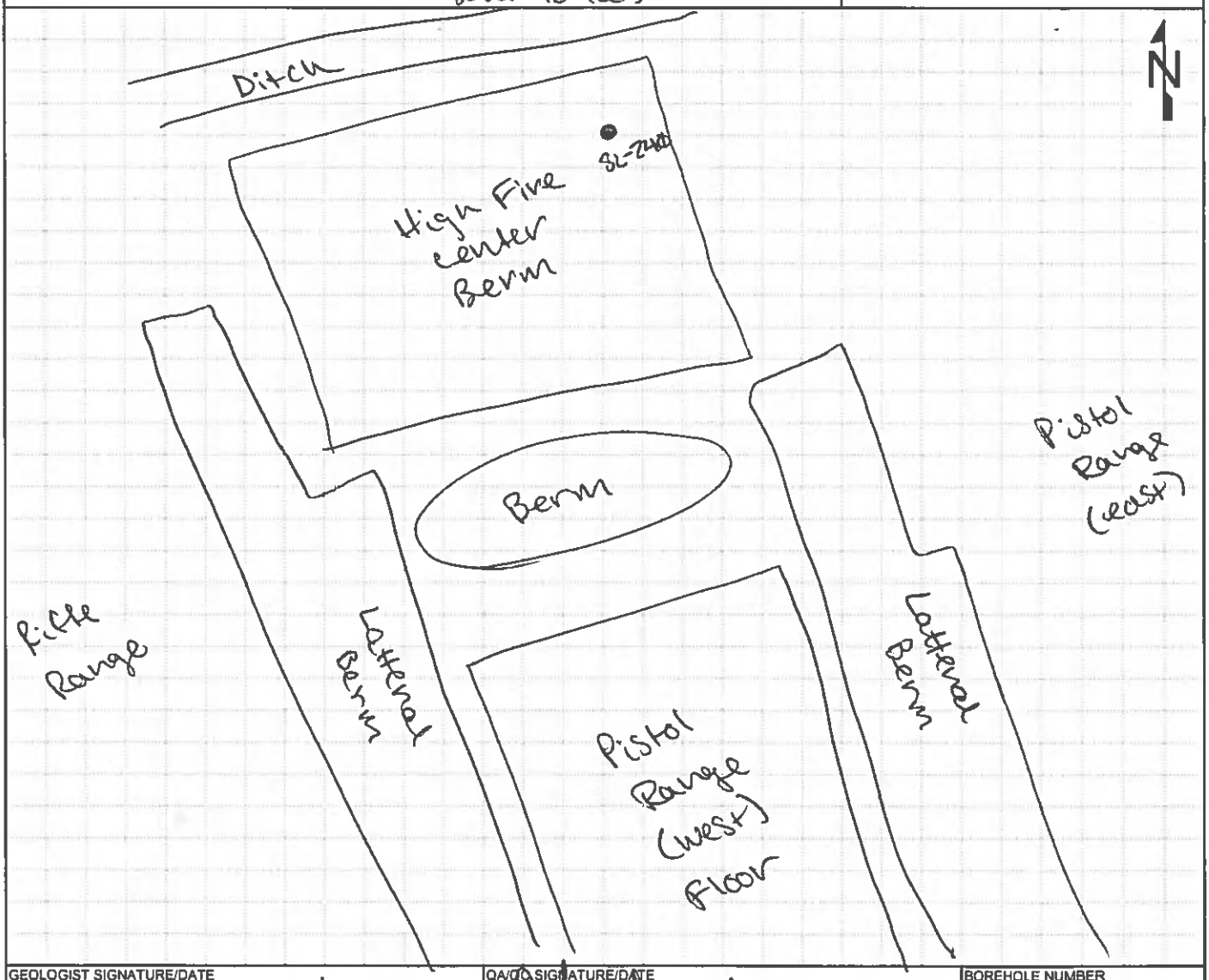
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: XRF < 3600 ppm – no sample sent to lab

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	ECCL-SL-240

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: ECCL-SL-240	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 011982	Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	GM	0-1" Pine needles & organics 1"-12" Silt, Some Clay Some Gravel (shale fragments) little organics; very soft; damp; roots present 10YR4/3 Brown non plastic	1/1	220	XRF <3600 ppm No sample SS 8/19/19 Sent to lab
	2					
	3		Boring terminated @ 1' BGS			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

SS 8/19/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	ECCL-SL-240

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-241	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Pistol Range (West)	
	9. DRILL DATE/TIME STARTED: 8/6/19 / 1507	COMPLETED: 8/6/19 / 1515
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

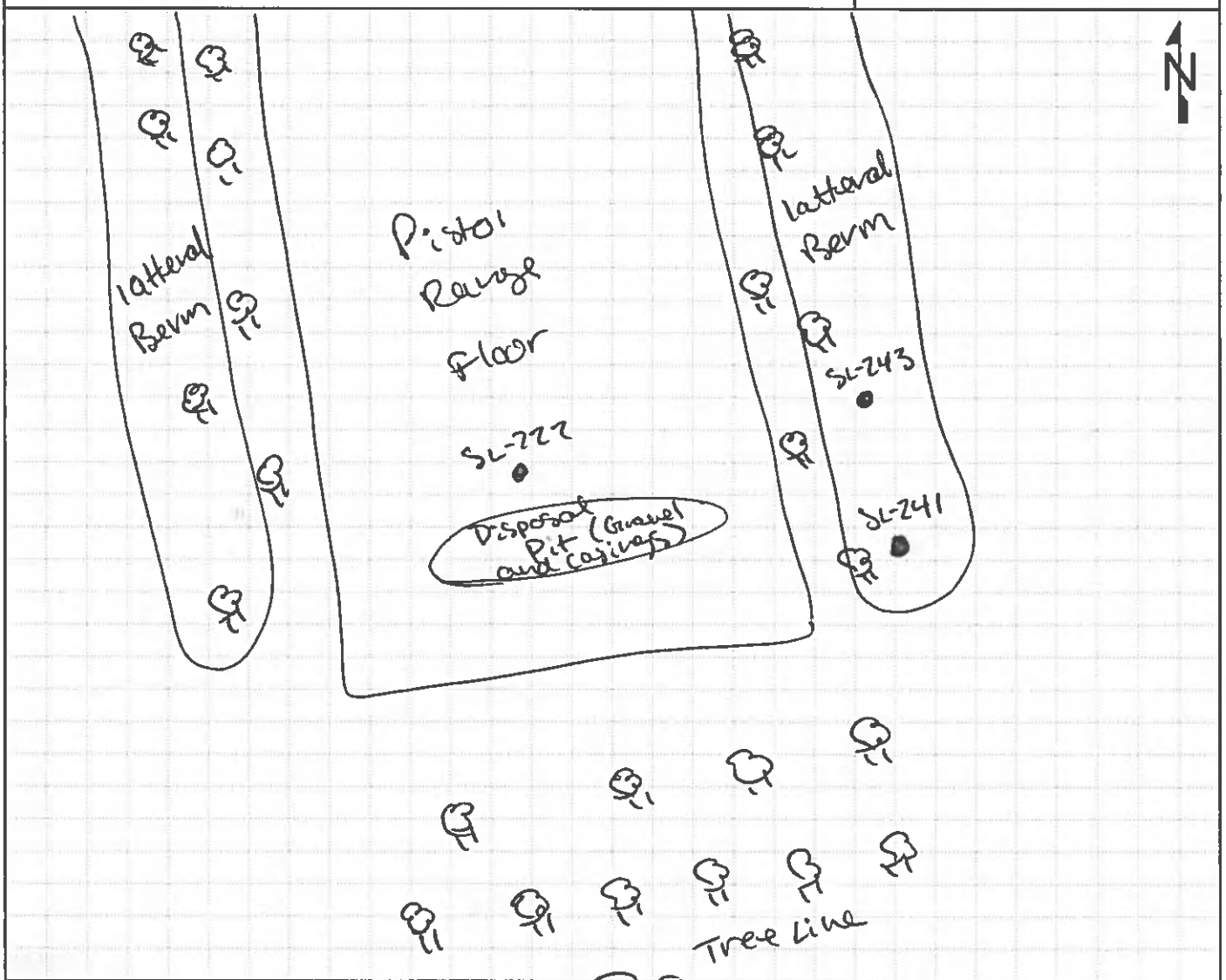
16 DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background — BGS: Below Ground Surface — PPM: Parts per Million

▽ : First Water Encountered — ▼ : Static Water Level — NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-241

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-241

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	SILT and little sand and little clay, fine to medium sand, 10 YR 2/1, organic odor, soft, few rock fragments (up to 1")	1/1	30	Organic odor ECCLSL0273@ 1515 (0'-1')
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

SJS 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-241

HTRW DRILLING LOG

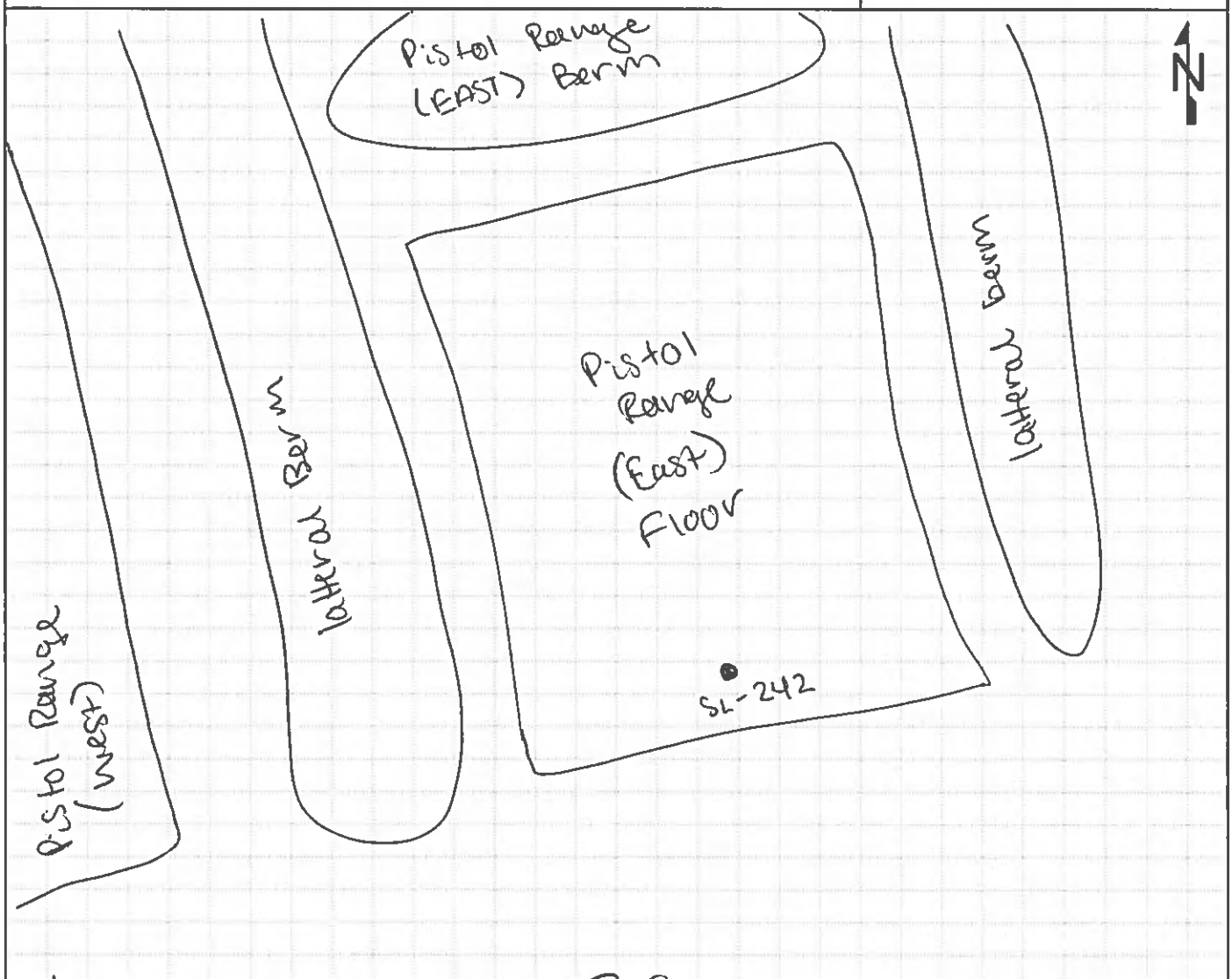
CLIENT: NASA	BOREHOLE NUMBER: SL-242	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg a Snellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME: STARTED: 8/8/19 / 1231 COMPLETED: 8/8/19 / 1234	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-242

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-242

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for PB	REMARKS (Sample IDs/Depths/Etc.)
		SC	CLAY and SILT with trace fine sand, 10YR 2/2, damp, nonplastic		200	organic odor ECCLSL0276@1240 (0'-1')
	1	CL	CLAY and some SAND, fine, 10YR 4/6, firm, damp, non plastic	3.8 / 4	80	
	1.7' 2	CL	CLAY and trace sand, fine, 10YR 6/1 and 10YR 5/8 mottled, damp non plastic moist low plasticity		70	No odor
	3					
	3.2' 4	SH	Bedrock, weathered SHALE	8/8/19	20	
			BOH @ 4'			
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-242

HTRW DRILLING LOG

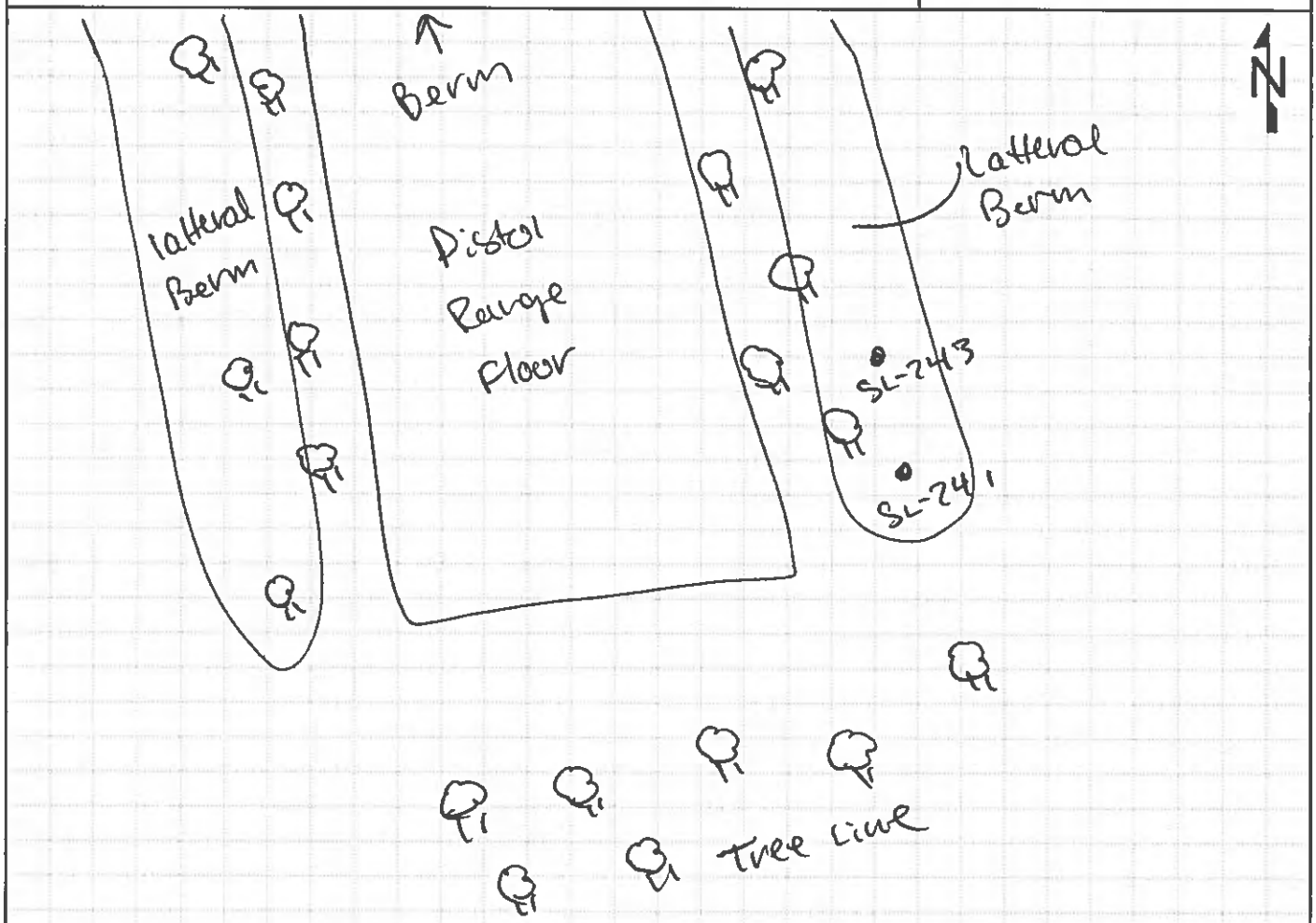
CLIENT: NASA	BOREHOLE NUMBER: SL-243	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: ~~Geo~~ N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME STARTED: 8/6/19 | ~~1540~~ 1530	COMPLETED: 8/6/19 | 1540
	10. DEPTH GROUNDWATER ENCOUNTERED: NA	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: NA	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-243

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-243

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT: ECCL Firing Range Removal Site Evaluation

4. DIRECTION OF BOREHOLE: VERTICAL

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 XRF for Pb

Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	CL	SILT and CLAY and trace sand, fine sand, 10YR6/1 + 10YR5/8 (clay), 10YR4/3 (silt), soft, damp to moist, few shale frags (~1")	1/1	70	Organic odor, clay chunks (low plasticity) 274 ECCLSL0[illegible] @ 1540 (0'-1')
	2		Bott			Duplicate sample ECCLSL030 @ 1541 (0'-10') for FR Metals only
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

TLS 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-243

HTRW DRILLING LOG

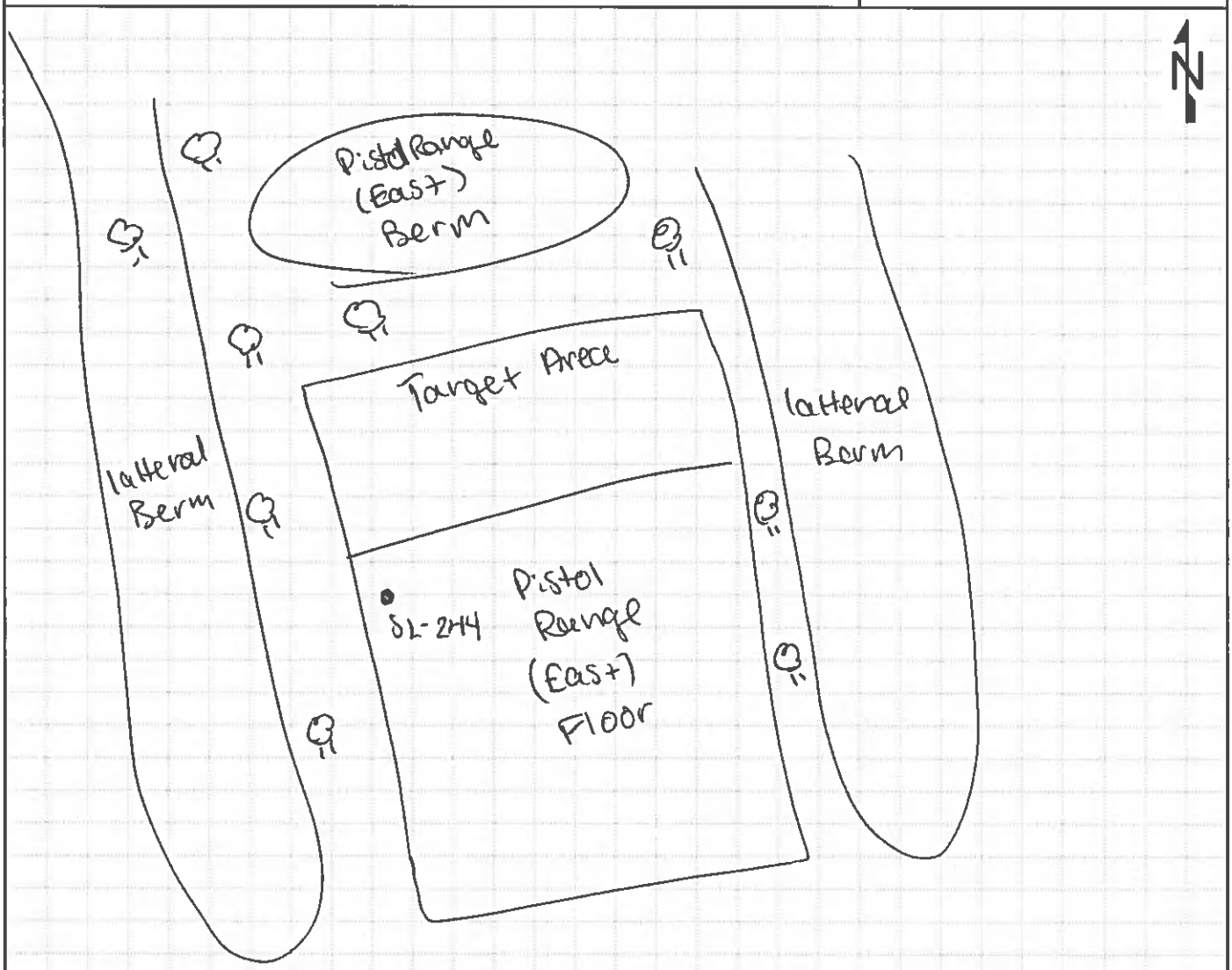
CLIENT: NASA		BOREHOLE NUMBER: SL-244
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME: STARTED: 8/8/19 1205; COMPLETED: 8/8/19 1209	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0.0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/8/19	SL-244

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-244	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SC	SILT and CLAY and little fine SAND, Trace SHALE, 10YR 3/2, (0.25" to 1")	4/4	150	organic odor ECCLSL0277 @ 1210 (0'-1')
	2	CL	CLAY and little fine sand, 10YR 2/1 mottled with 10YR 4/6, 10YR 2/1 only,		80	No odor
	3		medium to fine sand, poorly sorted damp, low plasticity		70	B2 @ sample table 0.035 mg/m³
	4	SH	weathered SHALE		100	
	5		BOH @ 4.0'			
	6					
	7					
	8					
	9					
	10					

SM 8/8/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-244

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-245 / MW-11	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME: STARTED: 8/7/19 / 0830 COMPLETED: 8/8/19 / 1333	
	10. DEPTH GROUNDWATER ENCOUNTERED: ~~N/A~~ 3.5'	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: 4.0	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs SL-245 TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

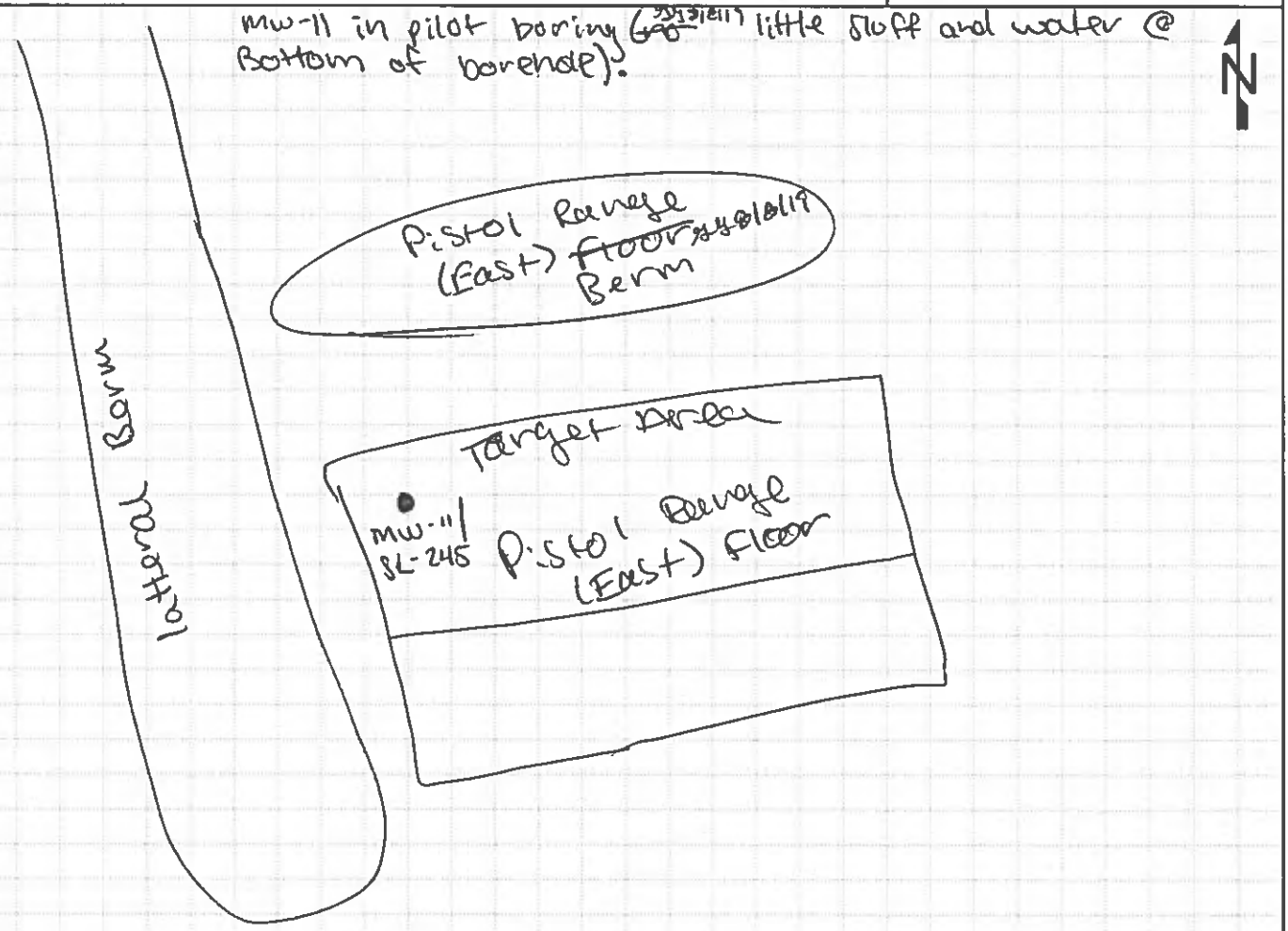
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-11

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS Use SL-245 as pilot boring for MW-11. SL-245 <5' from MW-11. Install MW-11 in pilot boring (~~8/8/19~~ little sluff and water @ Bottom of borehole). **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-245 / MW-11

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-245 | MW-11

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.3'	OL	Organic topsoil, SILT and little clay and trace fine sand, 10YR 2/1, wet, non plastic, soft		4910	organic odor
	1	FILL	Gravel fill, Gravel (0.10" to 0.25"), sand, and silt, fine to coarse, 10YR 3/2 and 10YR 7/1, damp		5420	ECCLSL0278@ 1150/8/8/19 (0.5-1)
	1.5'			2.8 / 4	110	ECCLSL0279@ 1155 | 8/8/19 (1-1.5
	2	SM	SAND and little CLAY, 10YR 3/2, 10YR 4/6, fine sand, damp to wet, soft, non-plastic		40	
	2.3'	CL	CLAY and trace fine sand, 10YR 2/1, wet, trace shale frags (0.10" to 0.5"), soft, low plasticity		50	
	3				60	strong organic odor
	▽		very soft, low to moderate plasticity SATURATED 8/8/19		80	saturated@3.5'
	3.8'				110	
	4	SH	weathered shale, dry, fissile broken material	0.5 / 0.5	20	Bedrock Refusal @4.5'
	4.5'		Bottom			
	5					
	6					
	7					
	8		8/7/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	SL-245 | MW-11

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: SL-246	
1. COMPANY NAME: Leidos	2. TRENCHING SUBCONTRACTOR: N/A	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF OPERATOR: Dana Winslow	6. MAKE/MODEL OF EXCAVATOR: Linkbelt 145x4	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 2' bucket on excavator	8. TRENCH LOCATION: Pistol (East) Range	
	9. DATE/TIME STARTED: 8/2/19 1050	COMPLETED: 8/5/19 1435
	10. DUST MONITOR: Dust S/N: 261146 Trak DRX	CALIBRATION DATE: N/A
11. OVERBURDEN THICKNESS: ~~6.5 ft~~ 5.5 ft in ethln		
12. DEPTH BEDROCK ENCOUNTERED: N/A	13. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
14. TOTAL DEPTH OF TRENCH: ~~6.5 ft~~ in ethln 5.5 ft		

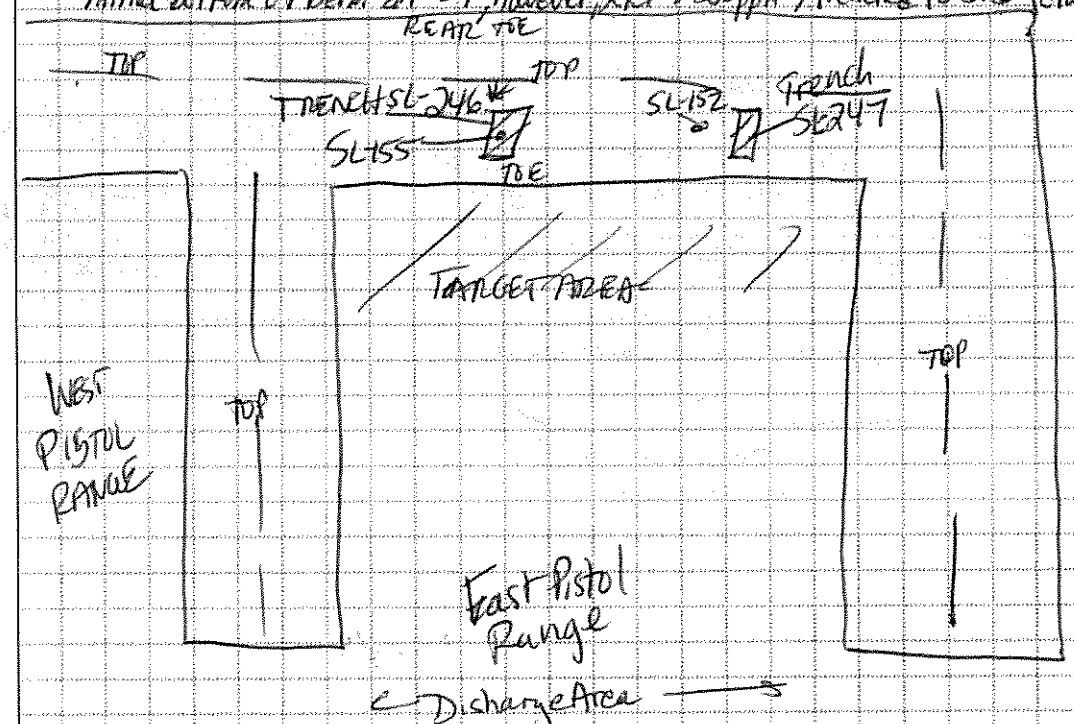
15. NOTES
PPM: PARTS PER MILLION
NA: Not Applicable

ECCLSL0280 @ 1110 8/5/19 4.5-5.0 ft.
ECCLSL0281 @ 1120 8/5/19 5.0-5.5 ft.

LOCATION SKETCH/COMMENTS N/A

SCALE: None

1 of 2 trenches on East Pistol FR Berm. This trench is located on west-central portion of berm, colocated with SL-155 (previous SI location). Upper 2 ft removed first prior to sampling (lots of bullets, few bullets in 2-2.5', 3-3.5'). Initial bottom of berm at ~4', however XRF >300 ppm → trenched to 5.5' (clay layer)



GEOLOGIST SIGNATURE/DATE: 8/5/19	QA/QC SIGNATURE/DATE: 8/9/19	TRENCH NUMBER: SL-246

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: SL-246	
1. COMPANY NAME: Leidos	2. OPERATOR: Dana Winslow	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION OF TRENCH: Pistor (East) Range	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1		SILT and little sand and little clay, 10YR 3/2, damp, ~~soft~~ as stiff firm, non-plastic, fine sand		NO SCREEN	Organic color, trace small gravel (0.25") DUST BZ=0.008 mg/m3 Lots of Bullets
	2	SM	Some angular shale fragments pebble sized (0.25" to 0.50")	100%	750	Few Bullets DUST BZ=0.003 mg/m3
	3				1150	
					940	2 Bullets DUST BZ=0.055 mg/m3
	4		- INCREASED SHALE FRAGMENTS		950	
			- CHANGE IN COLOR TO 10YR 4/2 DARK GRAYISH ~~BROWN~~ BROWN		4120	DUST BZ=0.003 mg/m3 - BULLET FRAGMENTS
	5				1460	ECCLSL0280 @ 1110 8/5/19 4.5-5.0 ft DUST BZ=0.000 mg/m3
		CL	SILT W/ LITTLE CLAY + LITTLE SAND, SAND IS FINE TO MEDIUM, SUB-ANGULAR TO SUB-ROUNDED 10YR 4/4 DARK YELLOWISH BROWN SOFT, DAMP, NON-PLASTIC		20	ECCLSL0281 @ 1120 8/5/19 5.0-5.5 ft
	6					
			END TRENCH AT 5.5 ft. BACKFILLED TRENCH.			
	7					
	8					
	9					
	10					

RW 8/7/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8-5-19	8/9/19	SL-246

8/7/19

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: ECCL-SL-247	
1. COMPANY NAME: Leidos	2. TRENCHING SUBCONTRACTOR: N/A	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF OPERATOR: DANA WINSLOW	6. MAKE/MODEL OF EXCAVATOR: LinkBelt 145X4	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Excavator Bucket, Disposable Foil Pan	8. TRENCH LOCATION: PISTOL (EAST) RANGE	
	9. DATE/TIME STARTED: 8/5/19 1130	COMPLETED: 8/5/19 1500
	10. DUST MONITOR: S/N: 26146	CALIBRATION DATE: 8/5/19
11. OVERBURDEN THICKNESS: 7.5 ft		
12. DEPTH BEDROCK ENCOUNTERED: N/A	13. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
14. TOTAL DEPTH OF TRENCH: 7.5		

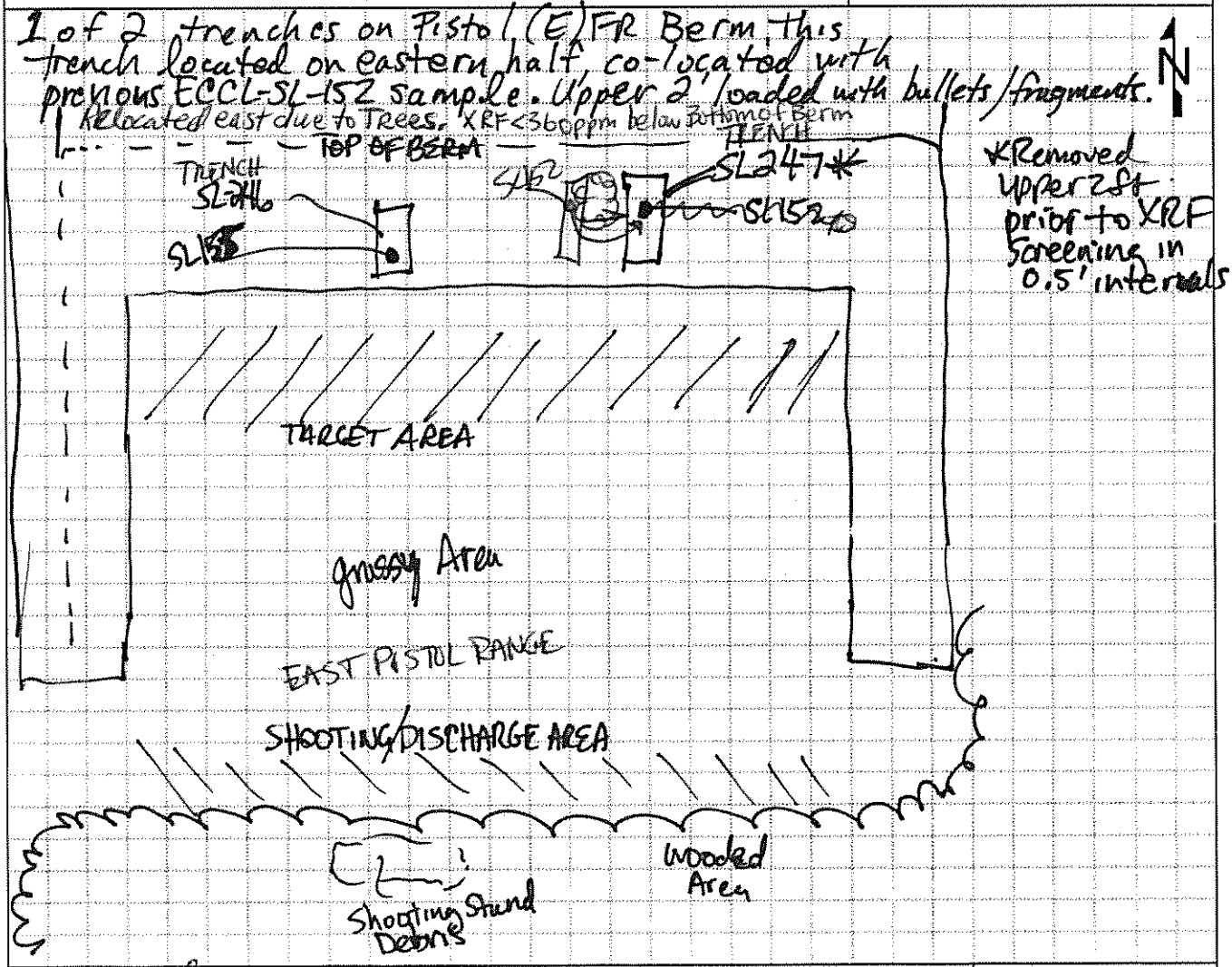
15. NOTES
PPM: PARTS PER MILLION
NA: Not Applicable

ECCLSL0282 @ 1400 8/5/19 5.5-6.0'
ECCLS0283 @ 1410 8/5/19 6.0-6.5'

LOCATION SKETCH/COMMENTS: NA

SCALE: None

1 of 2 trenches on Pistol (E) FR Berm, this trench located on eastern half, co-located with previous ECCL-SL-152 sample. Upper 2' loaded with bullets/fragments.



GEOLOGIST SIGNATURE/DATE: 8/7/19	QA/QC SIGNATURE/DATE: RS 8/9/19	TRENCH NUMBER: SL-247

HTRW TRENCH LOG

CLIENT: NASA	TRENCH NUMBER: SL-247	
1. COMPANY NAME: Leidos	2. OPERATOR: DANA WINSLOW	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION OF TRENCH:	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised: XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
			SHALE FRAGMENTS AND SILT W/TRACE ORGANICS. ANGULAR TO SUB-ROUNDED 10 YR 3/4 DARK YELLOWISH BROWN SOFT, DAMP, NON PLASTIC	100%		- BULLET FRAGMENTS 0-2' ~~BGS~~ 0-1/1 BGS.
	1				NO SCREENING	
	2		- DECREASE IN SHALE FRAGMENTS TO TRACE.		690	DUST $_{B2}$=0.002 mg/m³
	3	SM	- INCREASE IN SHALE FRAGMENTS TO SOME, LITTLE TO SOME FINE-MEDIUM SAND 10 YR 4/3 BROWN MOISTURE CHANGES TO DAMP TO DRY.		740	- 1 BULLET FOUND DURING TRENCHING.
					4550	
	4				5370	
					12600	- 1 BULLET FRAGMENT FOUND
					2010	
	5				150	
	6				950/620	5.5-6.0' APPROXIMATE BOTTOM OF BERM 4 RE-SCREENED 5.5-6.0' SAMPLES ~~ECCL02~~ 8/1/19
					200	
					180	
	7	SM	SILT W/ SOME CLAY + SOME SAND. SAND FINE-MEDIUM. ~~ANGULAR~~ SUBANGULAR TO SUB ROUNDED. 10 YR 5/6 YELLOWISH BROWN W/LITTLE 10 YR 5/1 GRAY. CLAY IS SOFT TO FIRM, NON-PLASTIC	100%	30	- ECCLSL0282 @ 1400 5.5-6.0'
	8					- ECCLSL0283 @ 1410 6.0-6.5'
	9		TRENCH END AT 7.5' BGS. BACKFILLED TRENCH.			8/1/19
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	TRENCH NUMBER
8/1/19	8/9/19	SL-247

HTRW DRILLING LOG

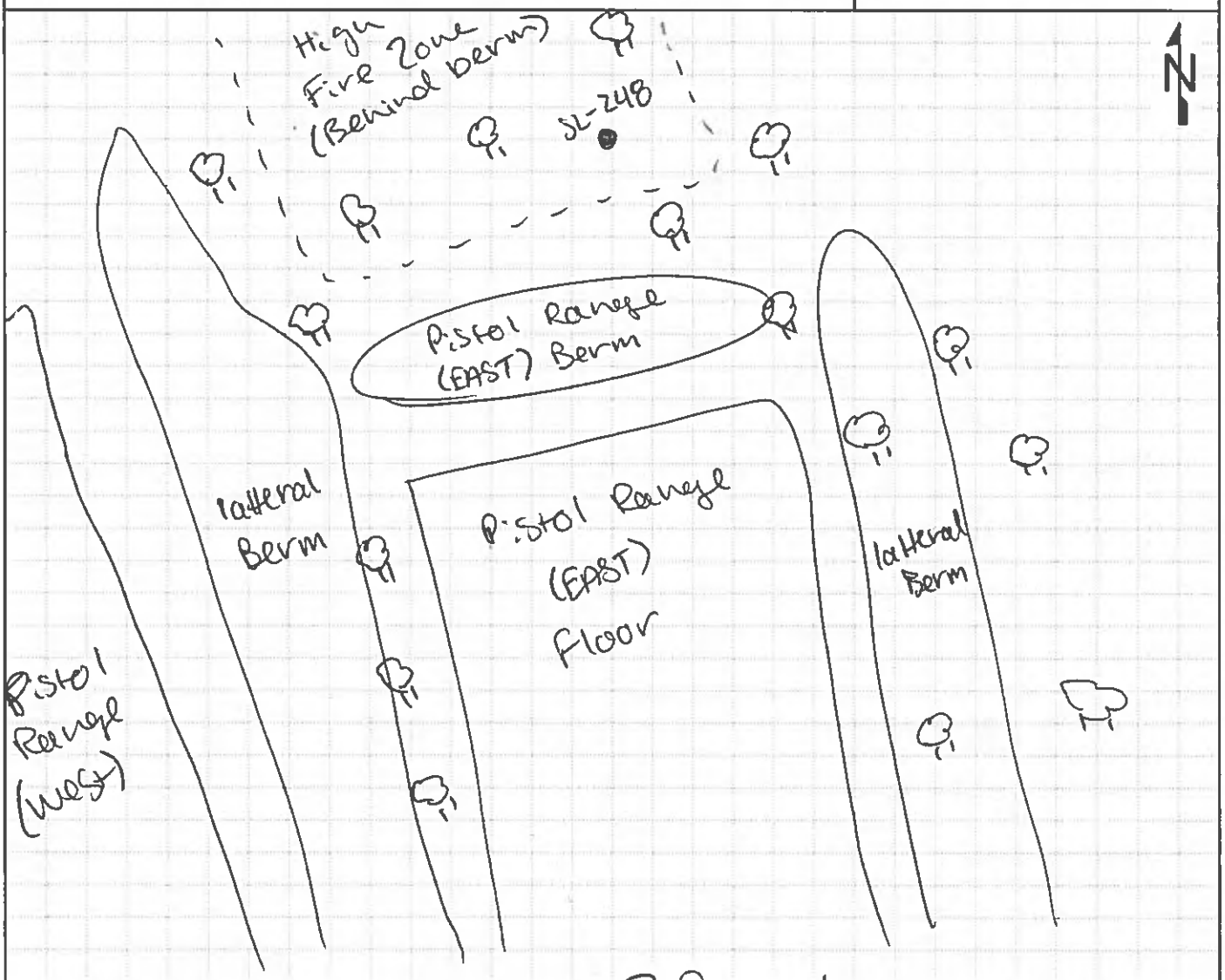
CLIENT: NASA	BOREHOLE NUMBER: SL-248	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brockhoff	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 0908	COMPLETED: 8/8/19 | 0912
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0.0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/14/19	SL-248

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-248

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	GC	SILT and SAND and some gravel, fine to coarse sand, gravel 0.10" to 0.5" 10YR4/4, dry, soft, non-plastic	1/1	1660	organic odor ECCLSL0284 @ 0908 (0'-1')
	2		BOH			
	3					XRF >360 ppm Sample submitted to lab
	4					
	5					
	6					
	7					
	8					
	9					
	10					

MW 8/8/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-248

HTRW DRILLING LOG

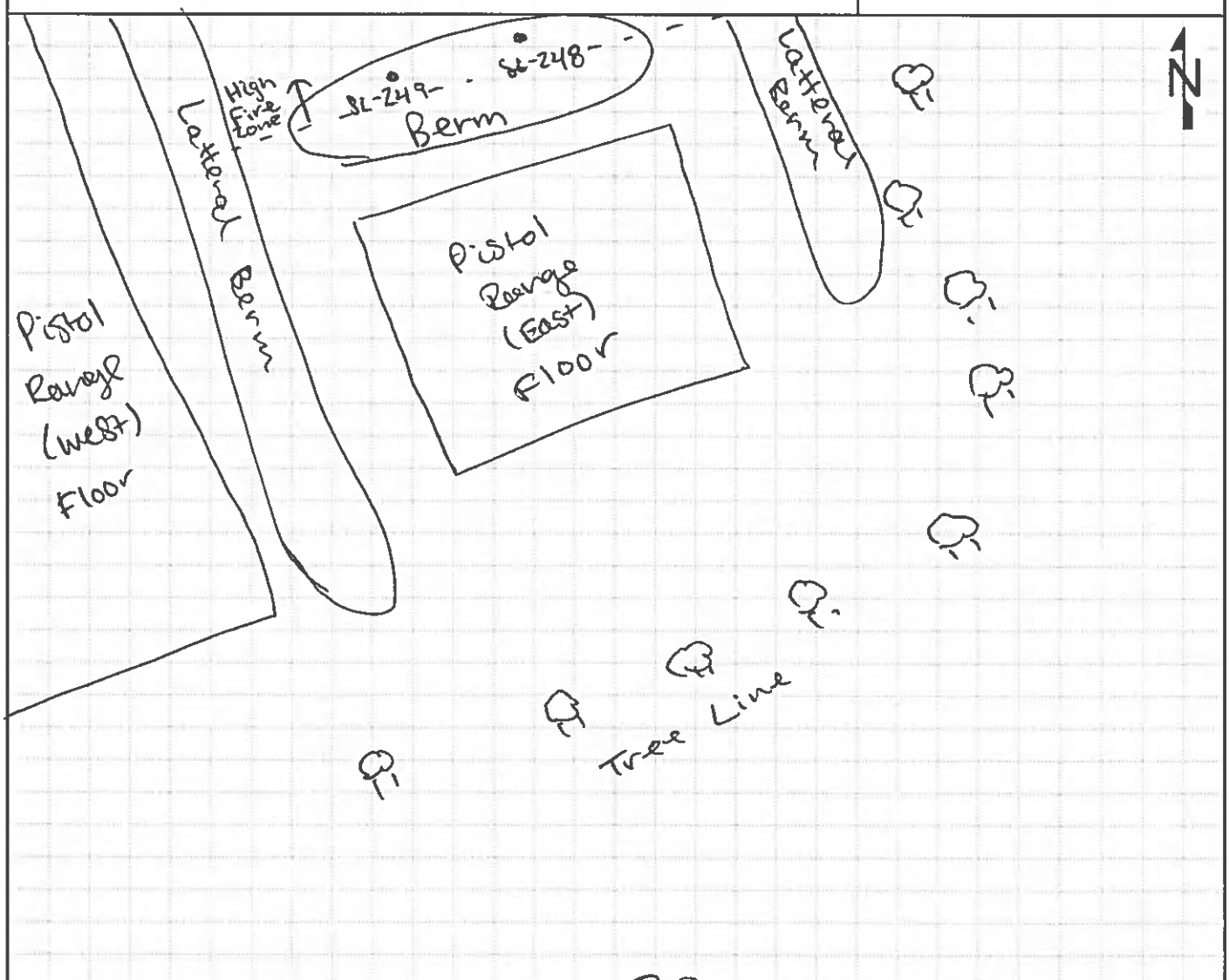
CLIENT: NASA	BOREHOLE NUMBER: SL-249	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brockhoff	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME STARTED: 8/8/19 / 0916	COMPLETED: 8/8/19 / 0922
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/8/19	QA/QC SIGNATURE/DATE: 8/8/19	BOREHOLE NUMBER: SL-249

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-249

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and SILT with little clay and little Gravel (0.10" to 3"), consolidated mottled clay (1" pieces) 10YR6/1 and 10YR5/8; Sand, silt and gravel is 10YR3/2, soft, damp	1/1	800	Shotgun shell plug and 4.5 casing @ surface organic odor
	2		BOH XRF > 3600 ppm			ECCLSL0825 @ 0916 (0'-1') Sample Submitted to Lab
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

NZ 8/8/19

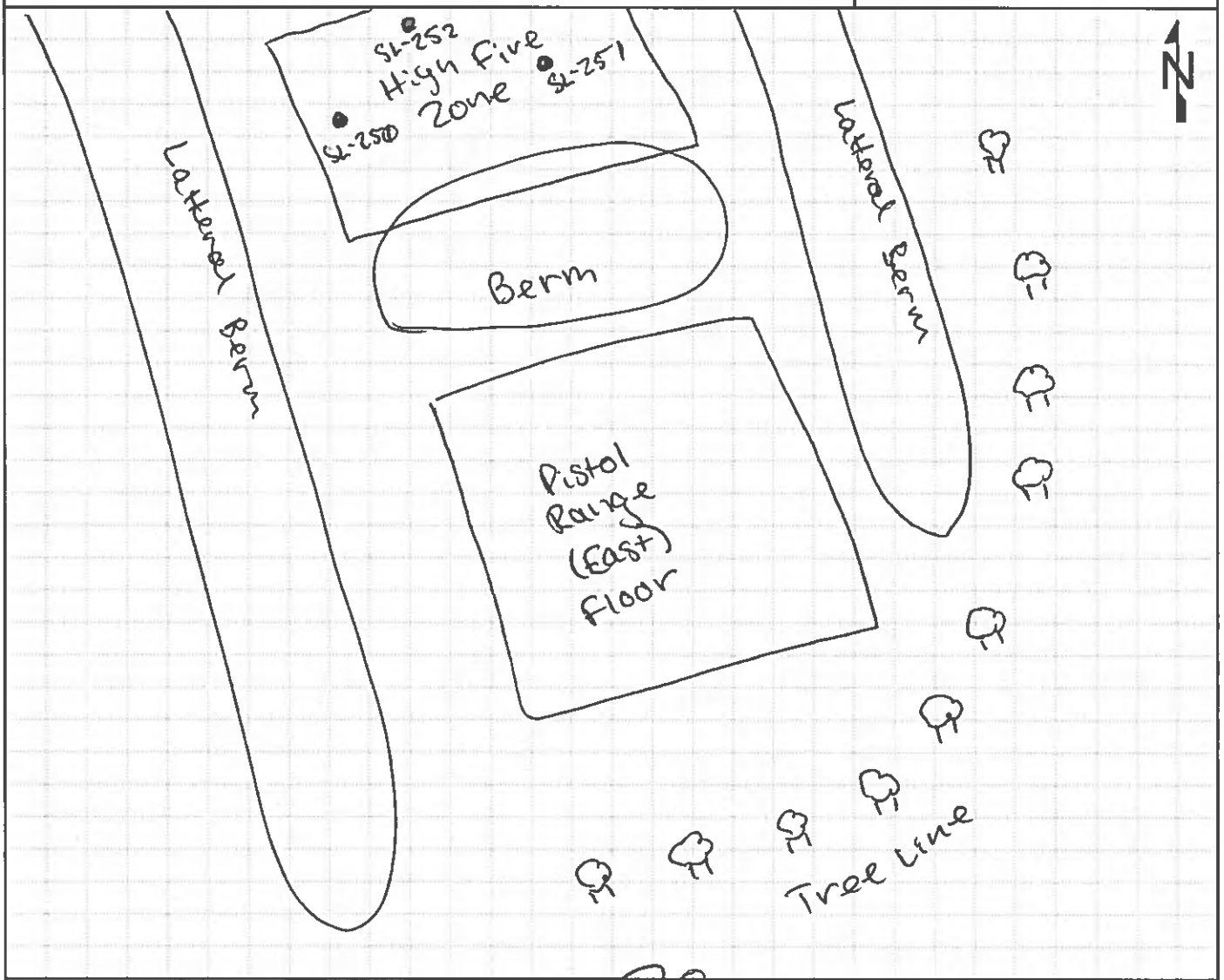
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-249

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-250	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brockhoff	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS hand auger (3")	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 0826 COMPLETED: 8/8/19 | 0832	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: ~~0'~~ 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): ~~None~~ VOCs (Pb) SVOCs PAHs TAL Metals Arsenic FR Metals Antimony ~~Pb~~	
15. TOTAL DEPTH OF BOREHOLE: 1'		
16. DISPOSITION OF BOREHOLE		
BACKFILL TYPE: GROUT (BENTONITE)	SEMI-TEMPORARY MONITORING WELL	WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/8/19	QA/QC SIGNATURE/DATE: 8/15/19	BOREHOLE NUMBER: SL-250

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-250	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and SILT and trace CLAY, 10YR 3/2, soft, damp, non-plastic, fine sand, subangular, trace gravel (angular shale 0.10"-0.25")	1/1	210	organic color ECCLSL0286 @ 0826 (0'-1')
	2		BOH	Sample to confirm	submitted to lab XRF	
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

8/8/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/8/19	SL-250

HTRW DRILLING LOG

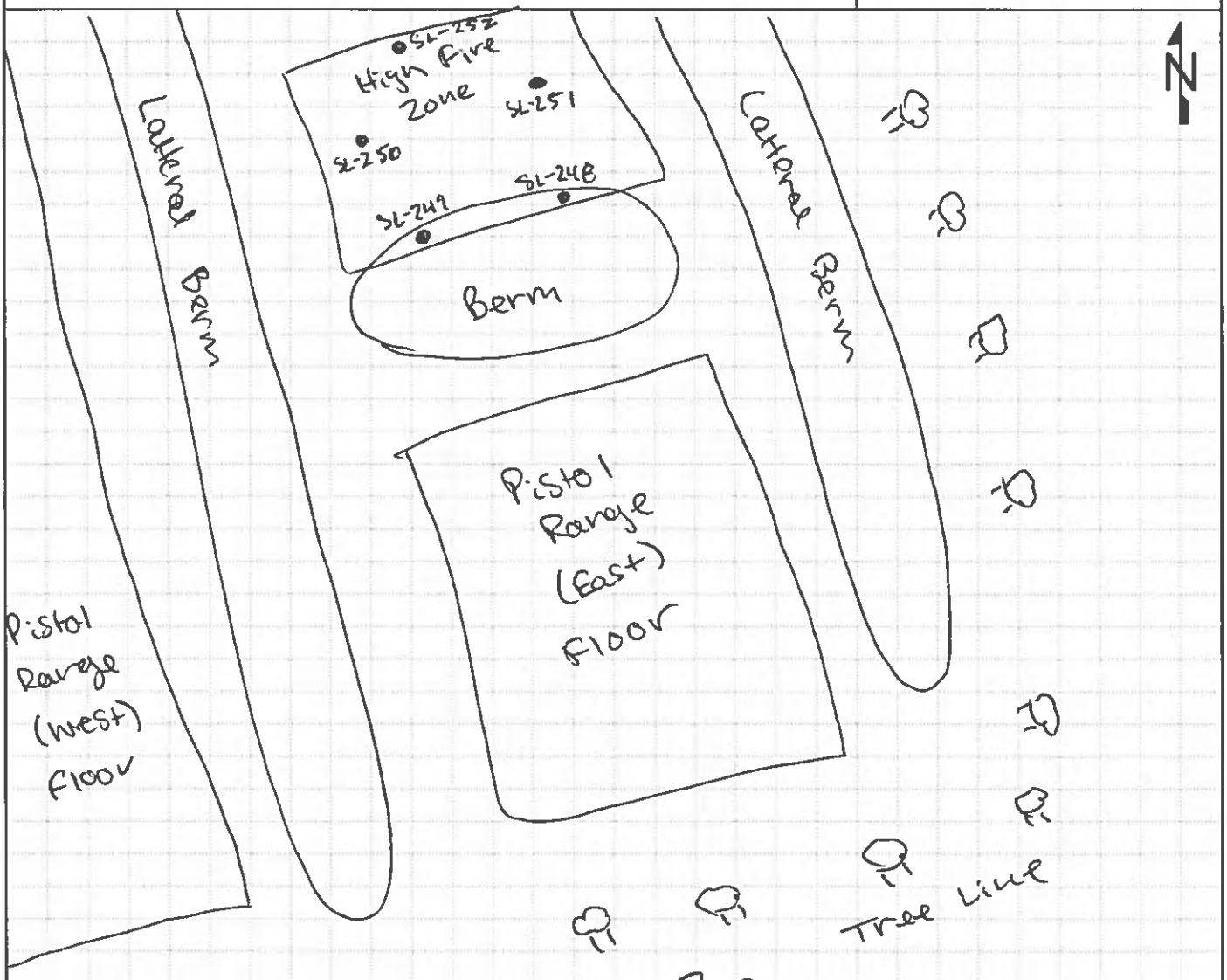
CLIENT: NASA	BOREHOLE NUMBER: SL-251	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brackhoff	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (4')	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME STARTED: 8/8/19 / 0815	COMPLETED: 8/8/19 / 0819
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, RR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-251

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-251	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and SILT, fine, 10YR 3/2, trace shale fragments, 0.10" to 0.25", damp, soft	1/1	2600	Organic odor ECCLSL0287 @ 0815 (0'-1')
	2		BOH			
	3					XRF <3600 ppm — Sample NOT Submitted to Lab
	4					
	5					
	6					
	7					
	8					
	9					
	10					

SLS 8/8/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	9/18/19	SL-251

HTRW DRILLING LOG

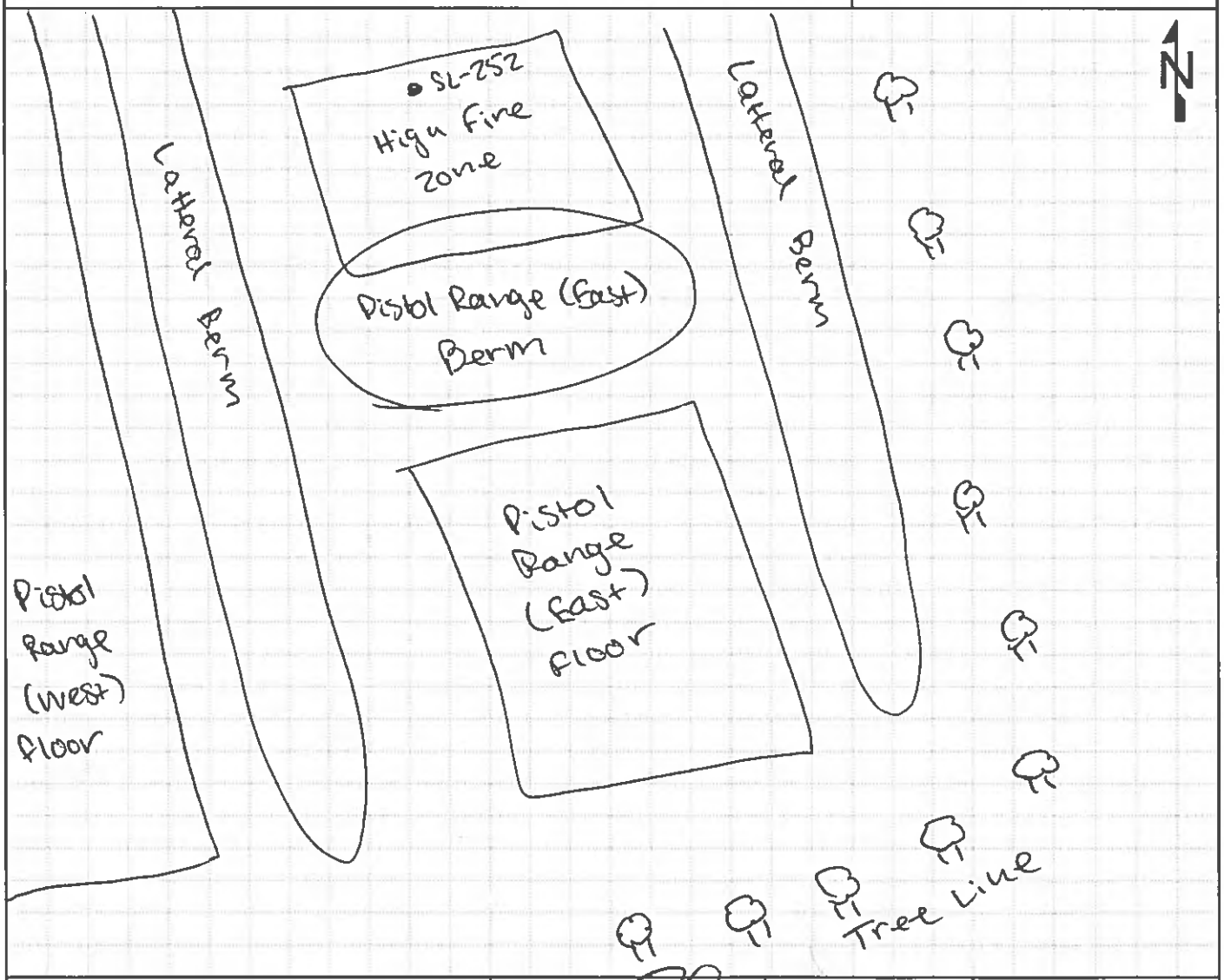
CLIENT: NASA	BOREHOLE NUMBER: SL-252	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brockhoff	6. MAKE/MODEL OF DRILL: (N/A)	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (4')	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME STARTED: 8/8/19 / 0820	COMPLETED: 8/8/19 / 0826
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/8/19	SL-252

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-252	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and Some SILT and Trace CLAY and trace GRAVEL, fine sand, shale fragments (0.10" to 0.25") 10YR 3/2, damp	1/1	540	organic odor ECCLSL0288@0820 (0'-1')
	2		BOH	XRF >3600 ppm - Sample Submitted to Lab		
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

AJY 8/8/22

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-252

HTRW DRILLING LOG

CLIENT: NASA		BOREHOLE NUMBER: SL-253
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Snellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/5/19 / 1219	COMPLETED: 8/5/19 / 1225
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12 DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13 DEPTH DRILLED INTO BEDROCK: 0'	14 CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15 TOTAL DEPTH OF BOREHOLE: 1'		

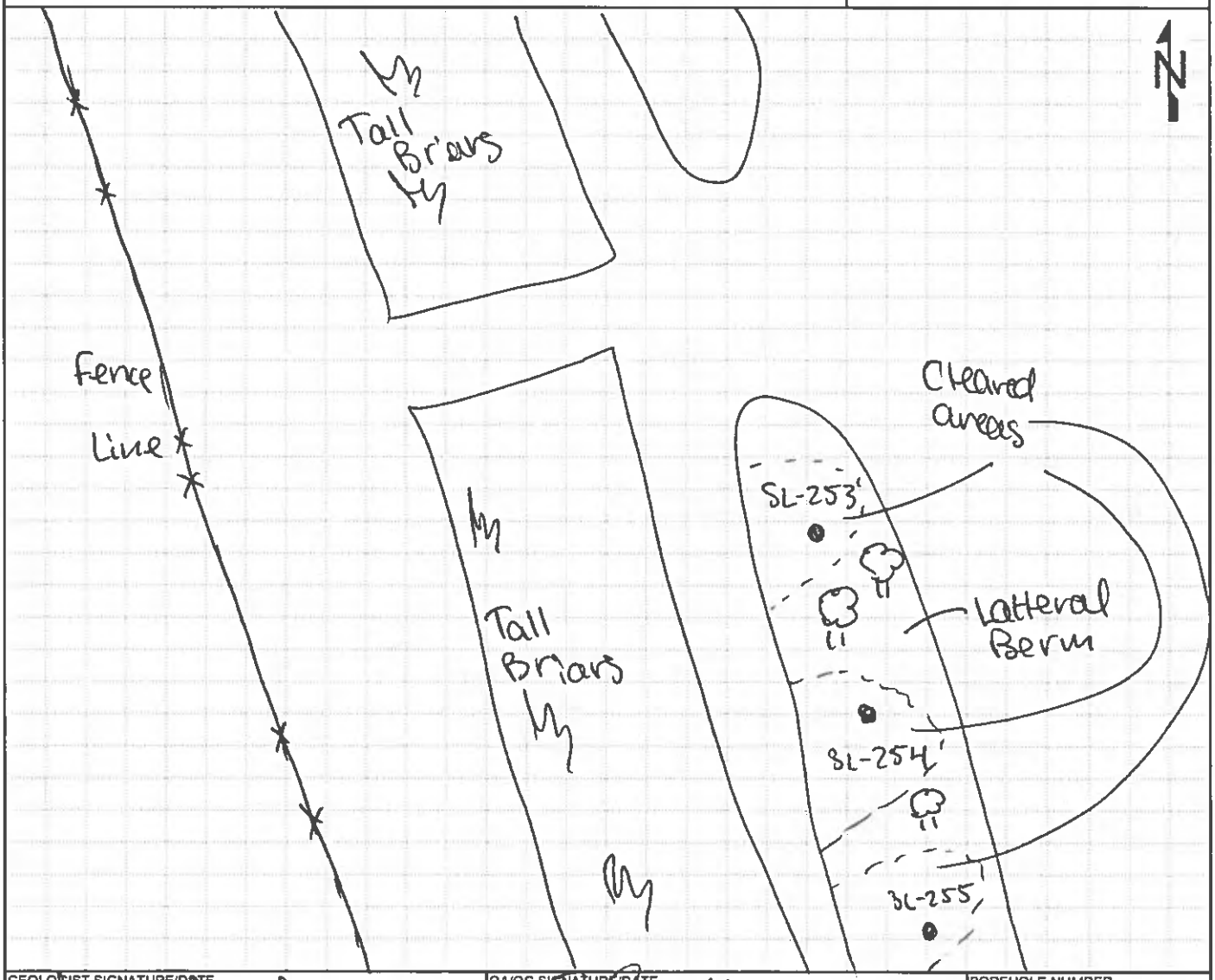
16 DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background — BGS: Below Ground Surface — PPM: Parts per Million

▽ : First Water Encountered — ▼ : Static Water Level — NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-253

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-253

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF For pb RE 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	UL	SILT and Sand (fine to coarse) and trace clay, some Shale fragments (angular, 1" to 0.10") 10YR 4/3, dry to damp, hard	1/1	40	organic odor ECCLSL0252 @ 1230 (0'-1')
	2					BOH
	3					XRF < 360 ppm Sample to Lab for confirmation of XRF screening in field
	4					
	5					
	6					
	7					
	8					
	9					
	10					

8/5/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-253

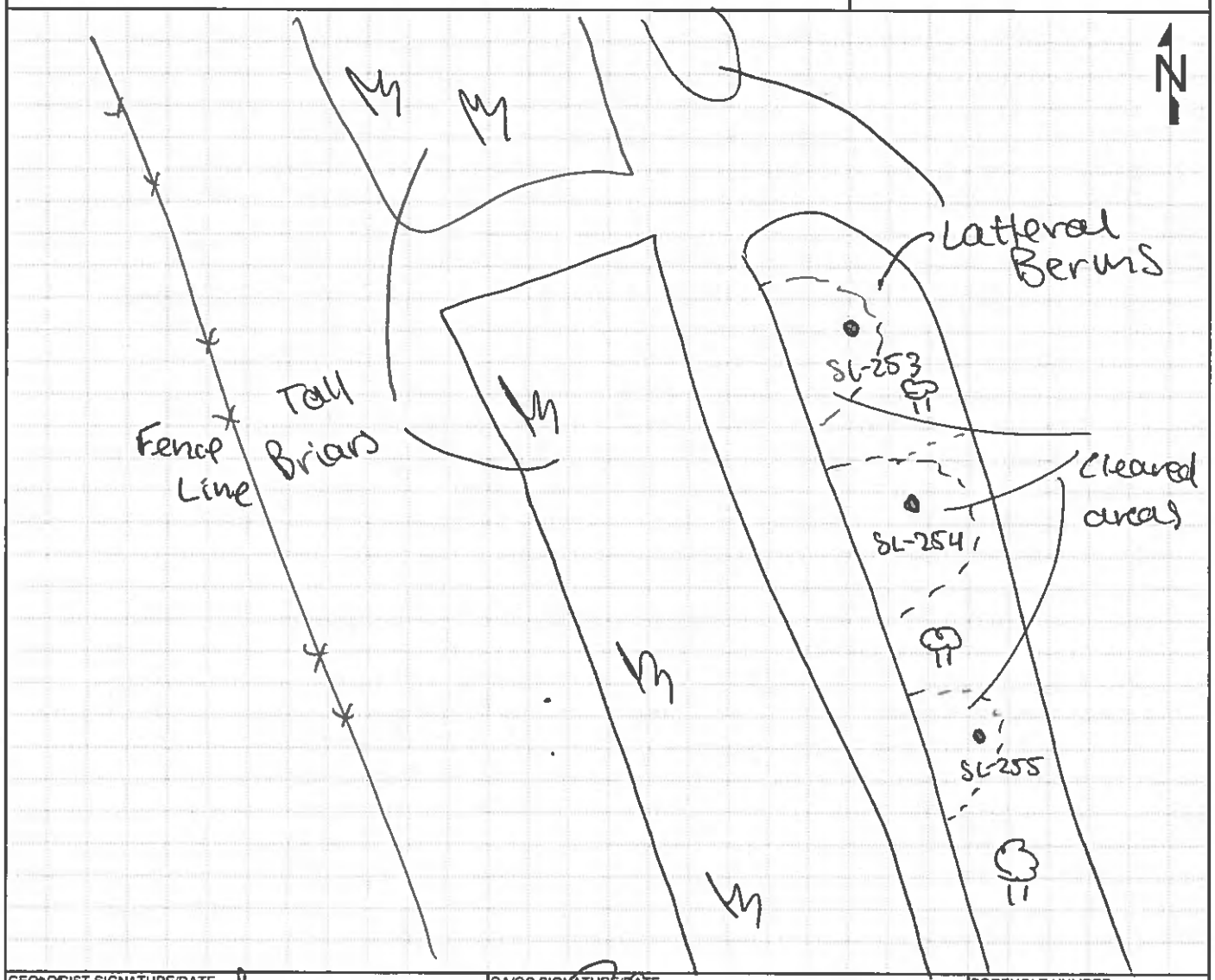
HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-254	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/5/19 / 1150 COMPLETED: 8/5/19 / 1155	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		
16. DISPOSITION OF BOREHOLE: MS 8/5/19		

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE: 8/5/19	QA/QC SIGNATURE/DATE: 8/6/19	BOREHOLE NUMBER: SL-254

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-254	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RC 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	SILT with some clay and little medium to fine sand, trace shale fragments (angular, 0.25" to 0.75"), 10YR 3/2 and 10YR 5/1, hard consolidated chunks and some crumbled material, dry to damp	1/1	40	organic odor shale frags ECCLSL0245 @ 1205 (0'-1')
	2		BOH			
	3					XRF < 560 ppm SAMPLE NOT SENT TO LAB
	4					
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-254

HTRW DRILLING LOG

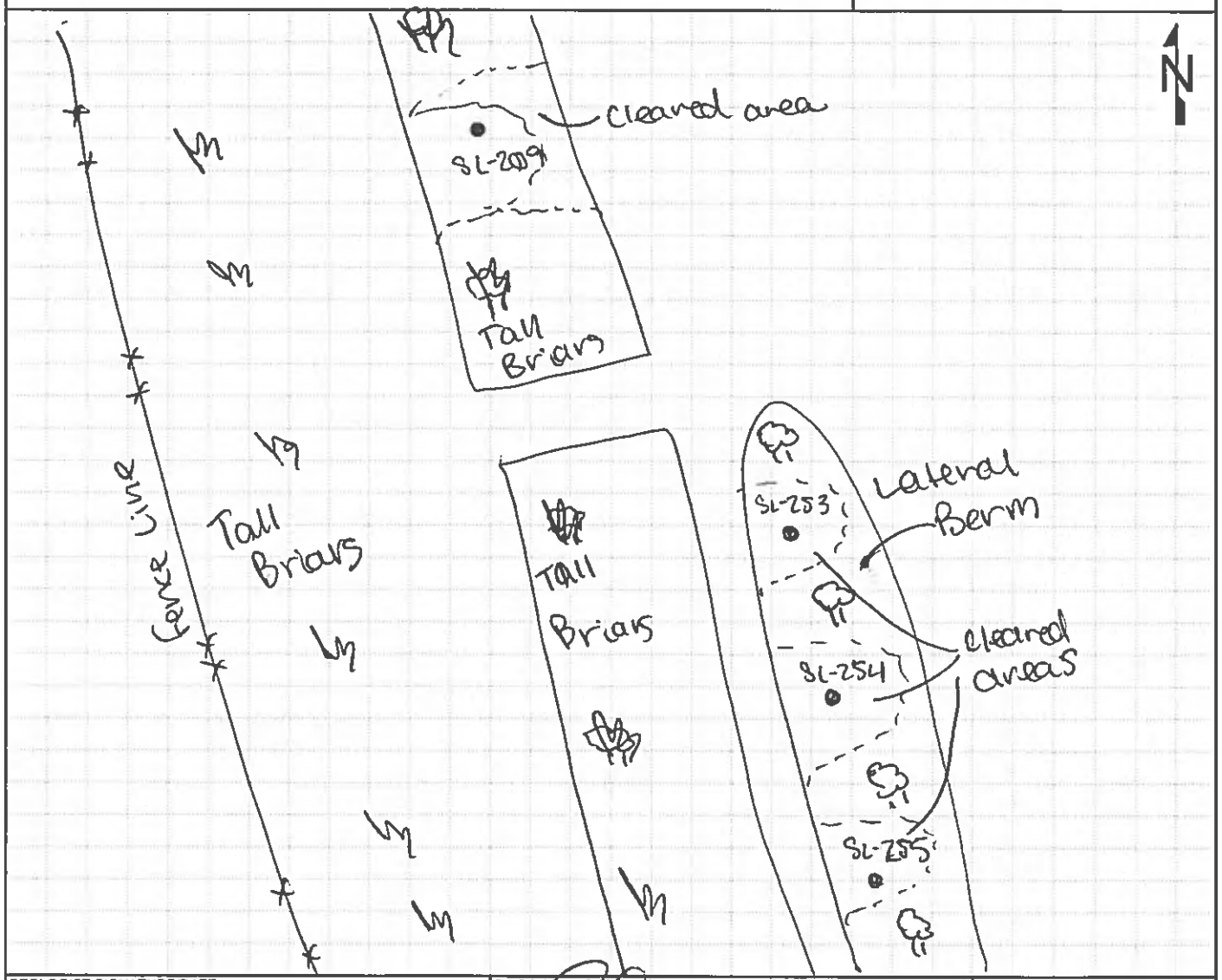
CLIENT: NASA	BOREHOLE NUMBER: SL-255	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Snellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED 8/5/19 / 1132	COMPLETED: 8/5/19 / 1140
	10. DEPTH GROUNDWATER ENCOUNTERED: NA	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-255

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-255

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 044982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RL 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	SILT with some clay and little sand, fine sand, 10YR 3/2, Hard consolidated chunks, dry to damp, non-plastic	1/1	60	Organic odor, Trace rock frags, shale (angular, 0.25" to 0.5")
	2					ECCLSL0246 @ 1145 (0'-1')
	3					XRF <50ppm Sample not sent to LAB RL 8/6/19
	4					
	5					
	6					
	7					
	8					
	9					
	10					

DD 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-255

HTRW DRILLING LOG

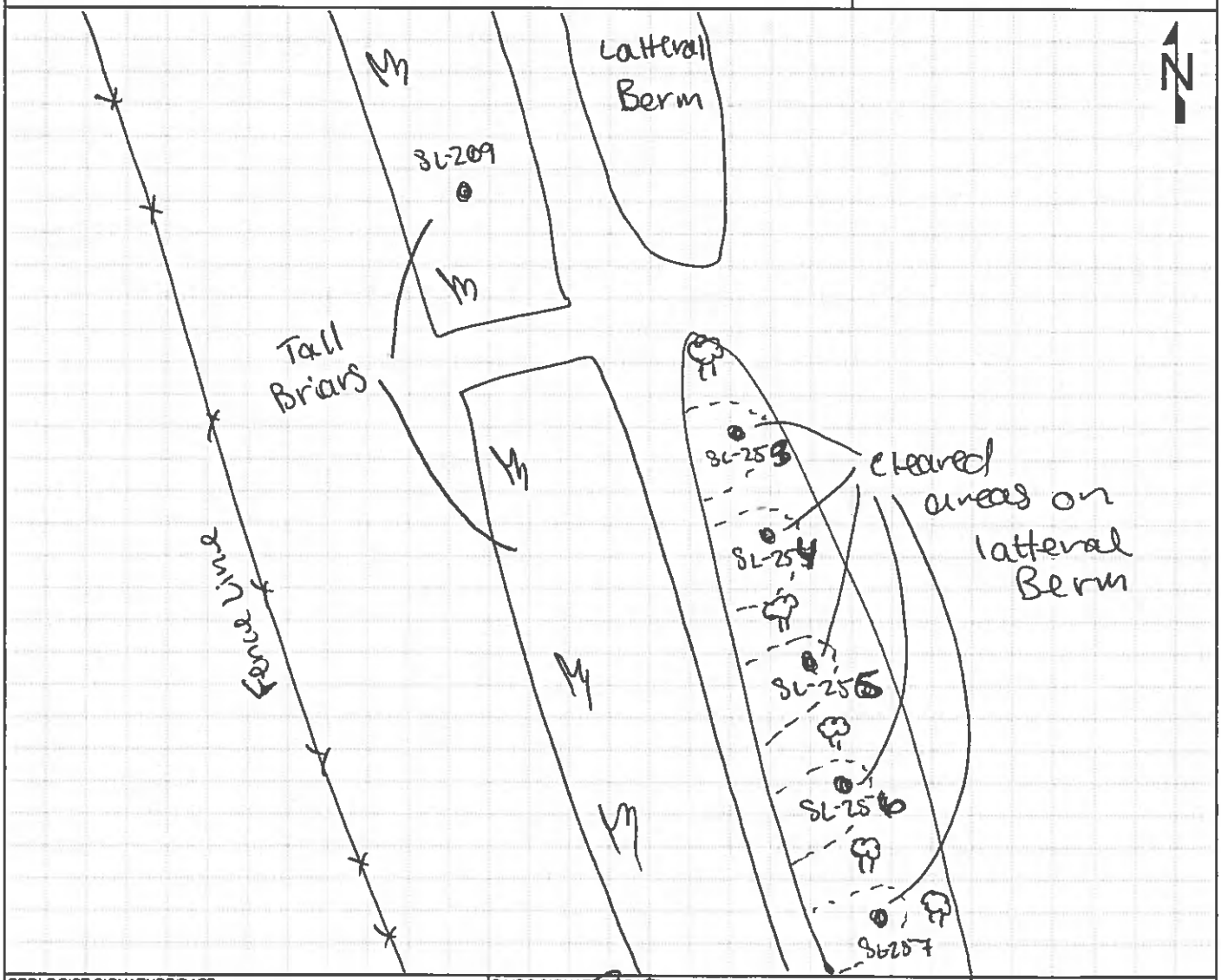
CLIENT: NASA	BOREHOLE NUMBER: ~~SL-256~~ SL-256	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shallhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (8")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/5/19 | 1106 COMPLETED: 8/5/19 | 1113	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-256

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-256

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RL 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	SILT and little sand and trace clay, 10YR 3/2, fine sand, hard consolidated chunks and soft crumbled material, shale frags, damp	1/1	30	Organic odor Shale frags (1"-0.25"), ECCLSL0247 @ 1130 (0'-1')
	2		BOH			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

RL 8/6/19
XRF <360ppm
SAMPLE NOT SENT TO LAB

RDS 8/5/19

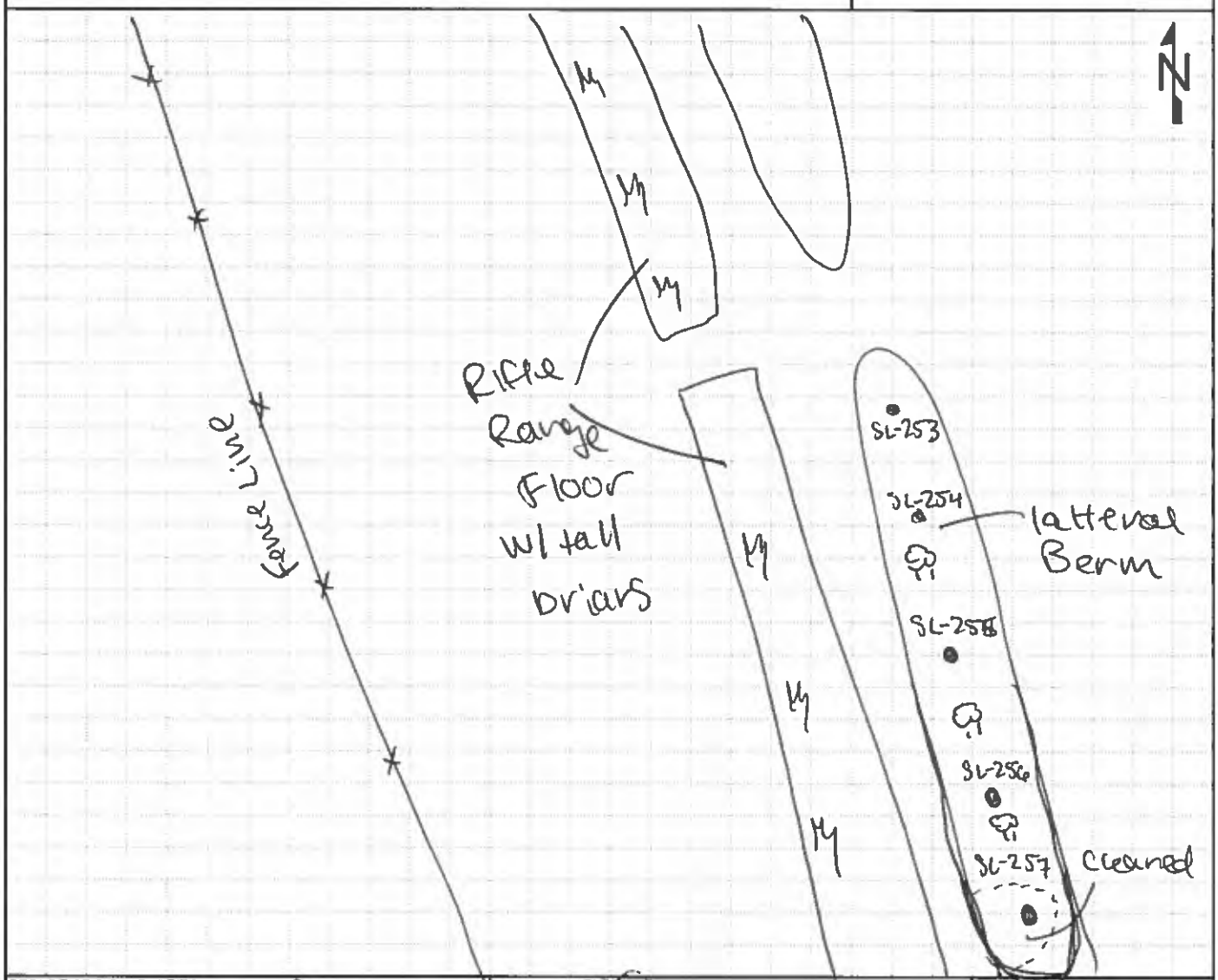
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-256

HTRW DRILLING LOG

CLIENT	NASA
BOREHOLE NUMBER	SL-257
1. COMPANY NAME	Leidos
2. DRILLING SUBCONTRACTOR	Geo-Environmental Drilling
SHEET	1 OF 2
3. PROJECT	ECCL Firing Range Removal Site Evaluation
4. LOCATION	NASA Plum Brook Station, Sandusky, Ohio
5. NAME OF DRILLER	Gregg Shellhammer
6. MAKE/MODEL OF DRILL	N/A
7. SIZES AND TYPES OF SAMPLING EQUIPMENT	SS Hand Auger (3")
8. BOREHOLE LOCATION	Rifle Range
9. DRILL DATE/TIME STARTED	8/5/19 | 1053
COMPLETED	8/5/19 | 1102
10. DEPTH GROUNDWATER ENCOUNTERED	N/A
11. OVERBURDEN THICKNESS	1'
12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION	N/A
13. DEPTH DRILLED INTO BEDROCK	0'
14. CHEMICAL SAMPLES (circle)	VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb
15. TOTAL DEPTH OF BOREHOLE	1'
16. DISPOSITION OF BOREHOLE	
BACKFILL TYPE:	GROUT BENTONITE
SEMI-TEMPORARY MONITORING WELL	
WELL ID	N/A
17. NOTES	BKG: Background BGS: Below Ground Surface PPM: Parts per Million ▽: First Water Encountered ▼: Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-257

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-257

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL# 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RL 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	SILT and little fine sand and trace clay, some shale fragments, (0.25"-0.10"), 10YR 3/2, soft to firm, some hard pieces of consolidated silt, damp	1/1	40	organic odor ECCLSL0248 @ 1120 (0'-1') BOH
	2					XRF <360 ppm SAMPLE NOT SENT TO LAB RL 8/6/19
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

DJS 8/5/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/5/19	8/6/19	SL-257

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: ECCL-SL-258	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3.25" hand auger	8. BOREHOLE LOCATION: Pistol Range (West)	
	9. DRILL DATE/TIME: 8/7/19 STARTED: 1525 COMPLETED: 1530	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: N/A	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): ~~VOC~~ ~~SVOCs~~ ~~PAHs~~ ~~TAL Metals~~ ~~Ap~~ ~~8/19/19~~ ~~FR Metals~~ Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 12"		

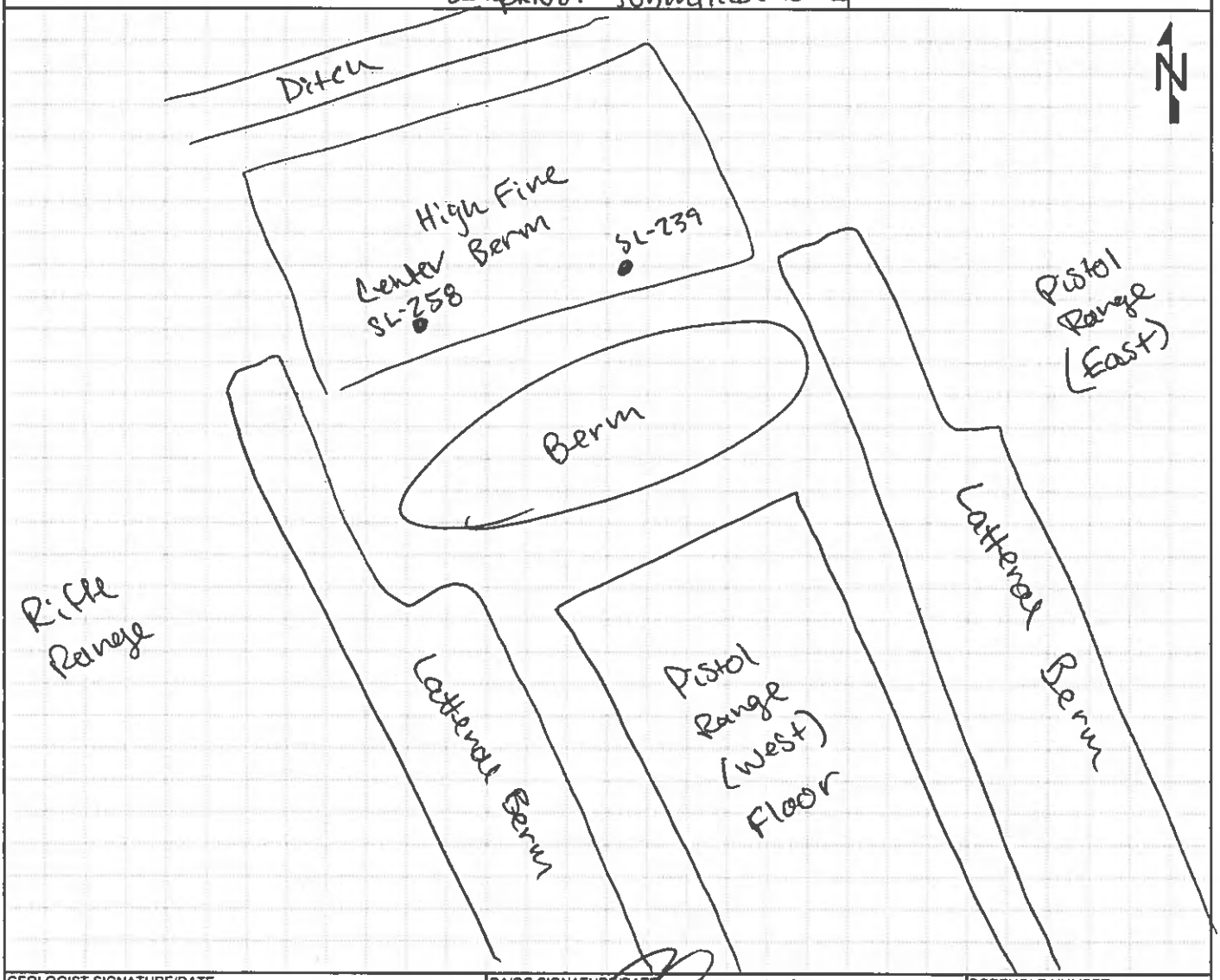
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: ~~N/A~~ 8/19/19 XRF <3600 ppm - Sample Not submitted to lab SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/7/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: ECCL-SL-258

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: ECCL - SL - 258	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: AVITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	GM	0-1" Pine needles & organics 1"-12" Silt, some Clay little Gravel (shale fragments) 10YR4/3 Brown mottled w/ 10YR6/4 light yellowish brown; very soft; damp non-plastic; roots present	1/1	1600	XRF <3600 ppm - Sample not Submitted to lab
	2					
	3		Boring terminated @ 1' BGS			
	4					
	5					
	6					
	7					
	8					
	9					
	10					

MS 8/19/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
[signature] 8/7/19	[signature] 8/19/19	ECCL-SL-258

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-260	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Stellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/6/19 / 0822 COMPLETED: 8/6/19 / 0830	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-260

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-260	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and ~~some~~ little clay and little SILT, trace gravel, sand medium to fine, gravel is 1.5" to 0.10"; 10YR4/4, damp, soft, non-plastic JSS 8/6/19	1/1	1210	organic odor, slate fragments ECCLSL0294 @ 0845 (0'-1')
	2		BOH	*XRF > 3600 ppm Submit sample to lab.		
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

JSS 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-260

HTRW DRILLING LOG

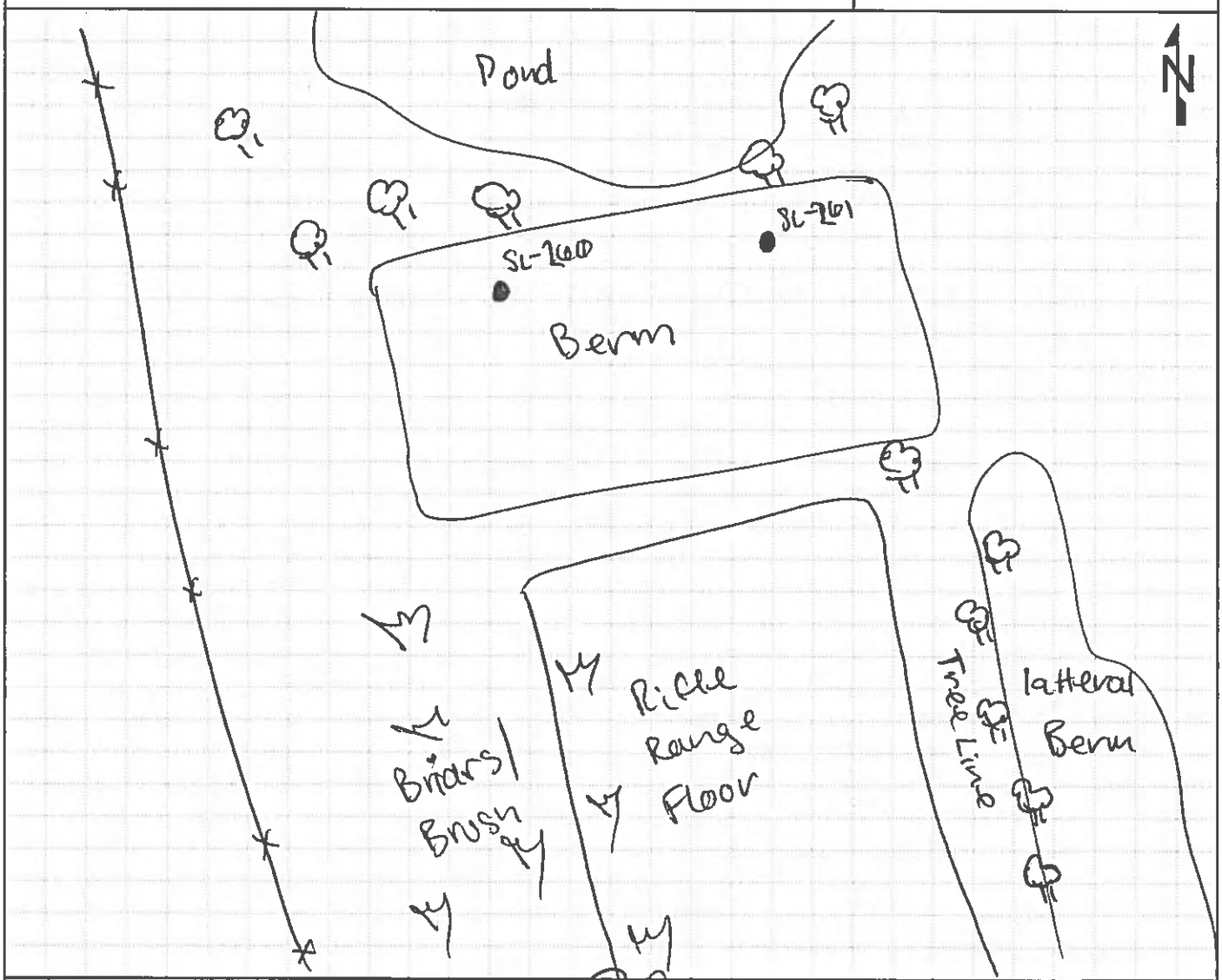
CLIENT: NASA	BOREHOLE NUMBER: SL-2601	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/6/19 | 0833	COMPLETED: 8/6/19 | 0838
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: N/A — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-2601

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-2601

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT: ECCL Firing Range Removal Site Evaluation

4. DIRECTION OF BOREHOLE: VERTICAL

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and some silt, coarse to fine, angular, shale fragments, 2.5" to 0.01", 10YR4/4, dry to damp, soft	1/1	100	organic odor shale frags ECCLSL0295 @ 0855 (0'-1')
	2		BOH		XRF <3600 ppm. Sample not submitted	
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

JJ 8/6/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/7/19	SL-2601

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-262	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: GEOPROBE 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 1020	COMPLETED: 8/8/19 | 1024
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

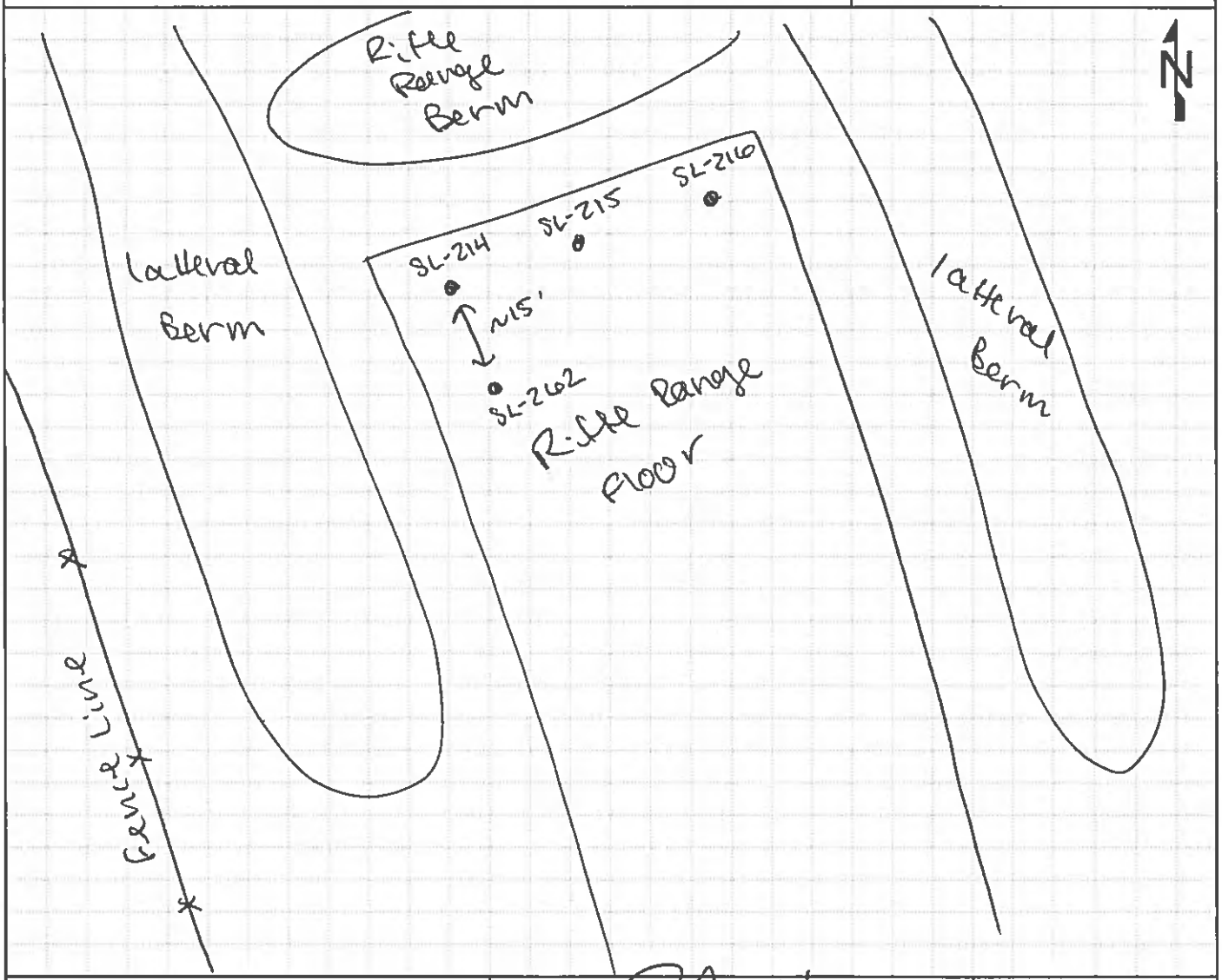
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: ~15' S. of SL-214. Added 8/8/19 SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-262

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-262

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for PID

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		GM	weathered SHALE and sand and SILT, 10YR 3/2 and 10YR 2/1, dry, angular rock fragments, 10.10" to 2" fine sand		180	organic odor
	0.8' 1	SM	SAND and SILT and some CLAY, 10YR 2/2, damp, firm, non-plastic, fine sand, sub angular	3.8/4	130	
	1.5'				100	
	2	CL	CLAY and little SAND, fine, 10YR 2/1 and 10YR 4/6 mottled, hard, damp, non plastic		280	No odor
			SAND and trace CLAY, 10YR 4/4, sub rounded, fine, soft, non plastic			
	3	SC	moist, low plasticity, SAND and some clay, 10YR 5/1 and 10YR 5/8 mottling			
	4					
			BOH @4'	XRF <360 ppm - no sample submitted to lab		
	5					
	6					
	7					
	8		HX 8/8/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-262

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-263	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle range	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 1047	COMPLETED: 8/8/19 | 1048
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): ~~None~~ VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

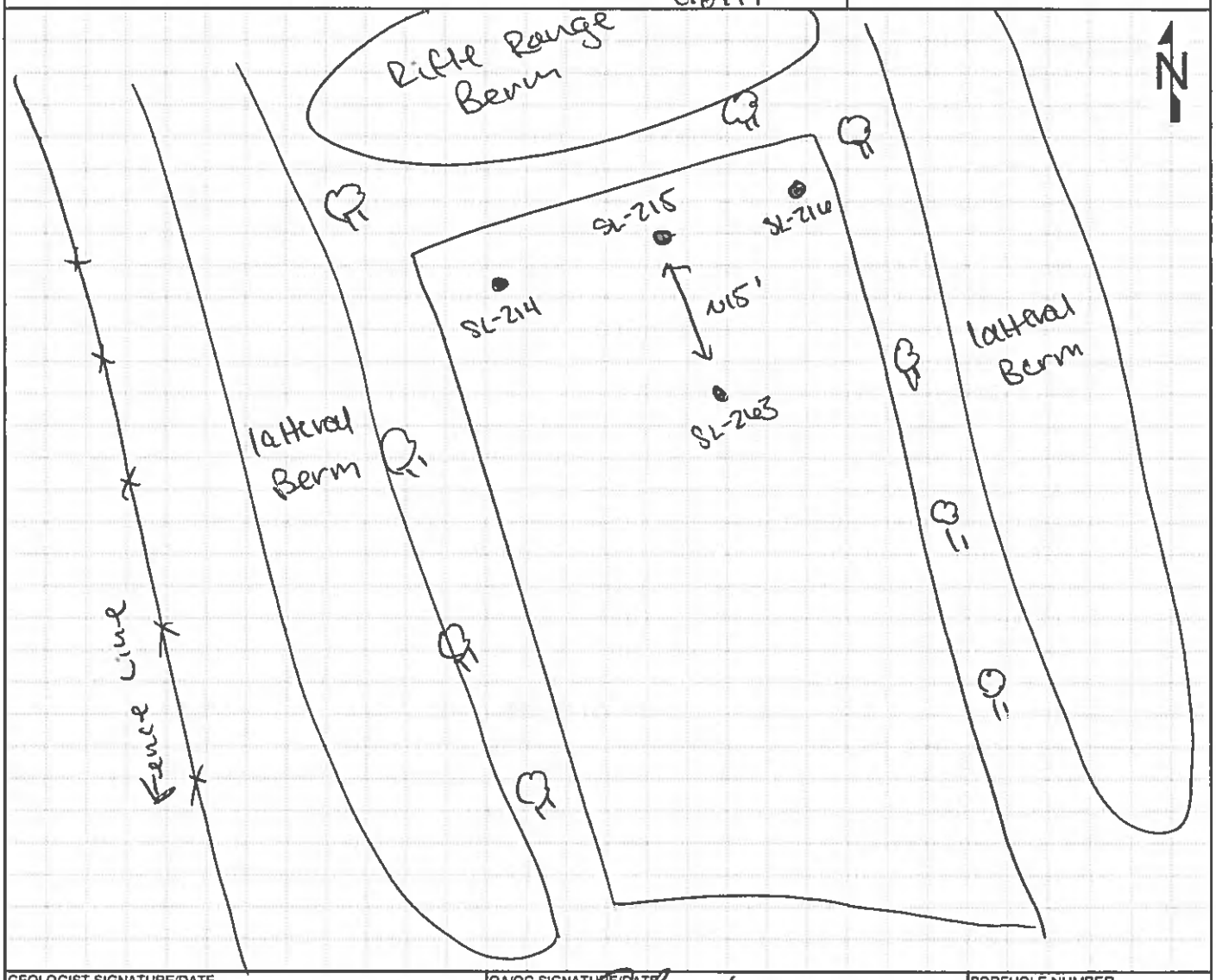
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: ~15' S. of SL-215. Sample added 8/8/19 SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-263

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-2603	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 011982	Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF monitoring for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	GM	AA 8/8/19 ~~SAND and~~ SILT and CLAY and some shale fragments (0.25" to 1"), angular rock, little SAND, fine, moist, 10YR 2/2, soft	3.5/4	690	organic odor
					480	ECCLSL0307 @ 1601 (0.5-1)
					80	ECCLSL0308@ 1612 (1-1.5)
	2	GM	small gravel fill material (0.5")		10	#Duplicate Sample ECCLSL9032 @1610 (0.5-1)
	2.5	CL	CLAY and some SAND, fine to medium, 10YR 5/1 and 10YR 5/8, damp to moist, firm, non-plastic		AA 8/8/19	BZ @ Geoprobe 0.044 mg/m3
	3	CL	CLAY and SAND, fine, subrounded, 10YR 6/1 and 10YR 5/8 mottled, damp to moist, low plasticity			NO odor
	4	SH	Highly weathered SHALE and silt, 10YR 2/2 and 10YR 5/8, crumbled rock fragments, angular			BZ @ sample table 0.014 mg/m3
	5		BOH			
	6					
	7					
	8		AA 8/8/19			
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-2603

HTRW DRILLING LOG

CLIENT: NASA		BOREHOLE NUMBER: SL-264
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/8/19 | 1102 COMPLETED: 8/8/19 | 1105	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

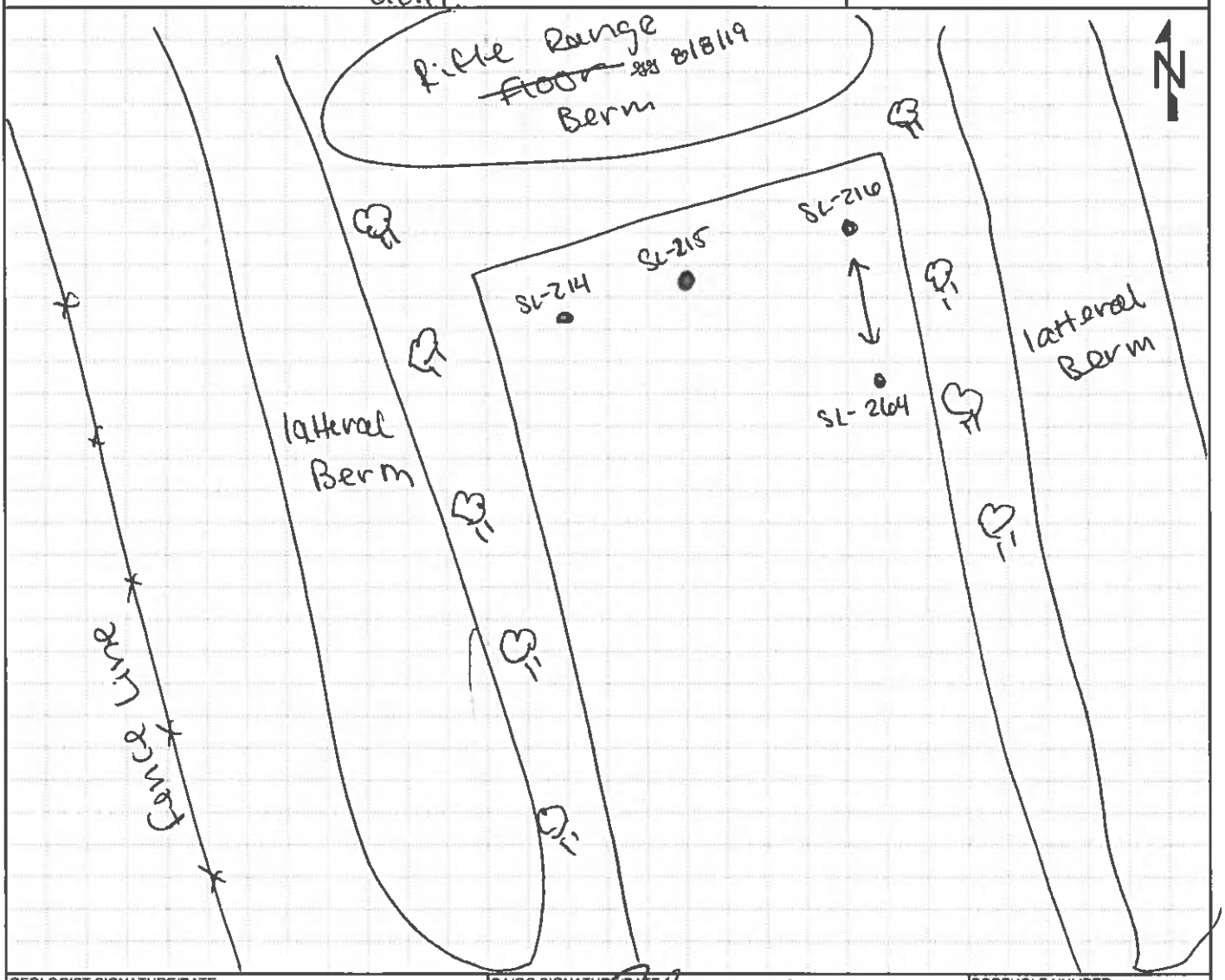
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: ~15' S. of SL-216. Sample added 8/8/19. SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-264

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-2604

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	
Leidos	Geo-Environmental Drilling	SHEET 2 OF 2

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		GM	SILT and SAND and some SHALE fragments (0.5" to 2") and little CLAY, 10YR 5/8 and 10YR 2/2, fine sand, damp	4/4	340	organic odor
	1				170	
	1.5'	CL	CLAY and some fine sand, 10YR 5/8, 10YR 2/2, and 10YR 6/1 mottled, damp, firm, non-plastic		110	No odor
	2	CL	CLAY and some fine sand, 10YR 5/8 mottled with 10YR 6/1, hard, damp, non-plastic		20	BZ @ Geoprobe 0.149 mg/m3 well Rich to inform him of elevated reading
	2.5'	SH	highly weathered SHALE, SILT between rock fragments, 0.5" to 0.25", damp			BZ @ Sample table 0.021 mg/m3
	3		more consolidated material			
	4					
			BOH			* no LAB SAMPLE XRF <360 ppm TL 8/19/19
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-2604

HTRW DRILLING LOG

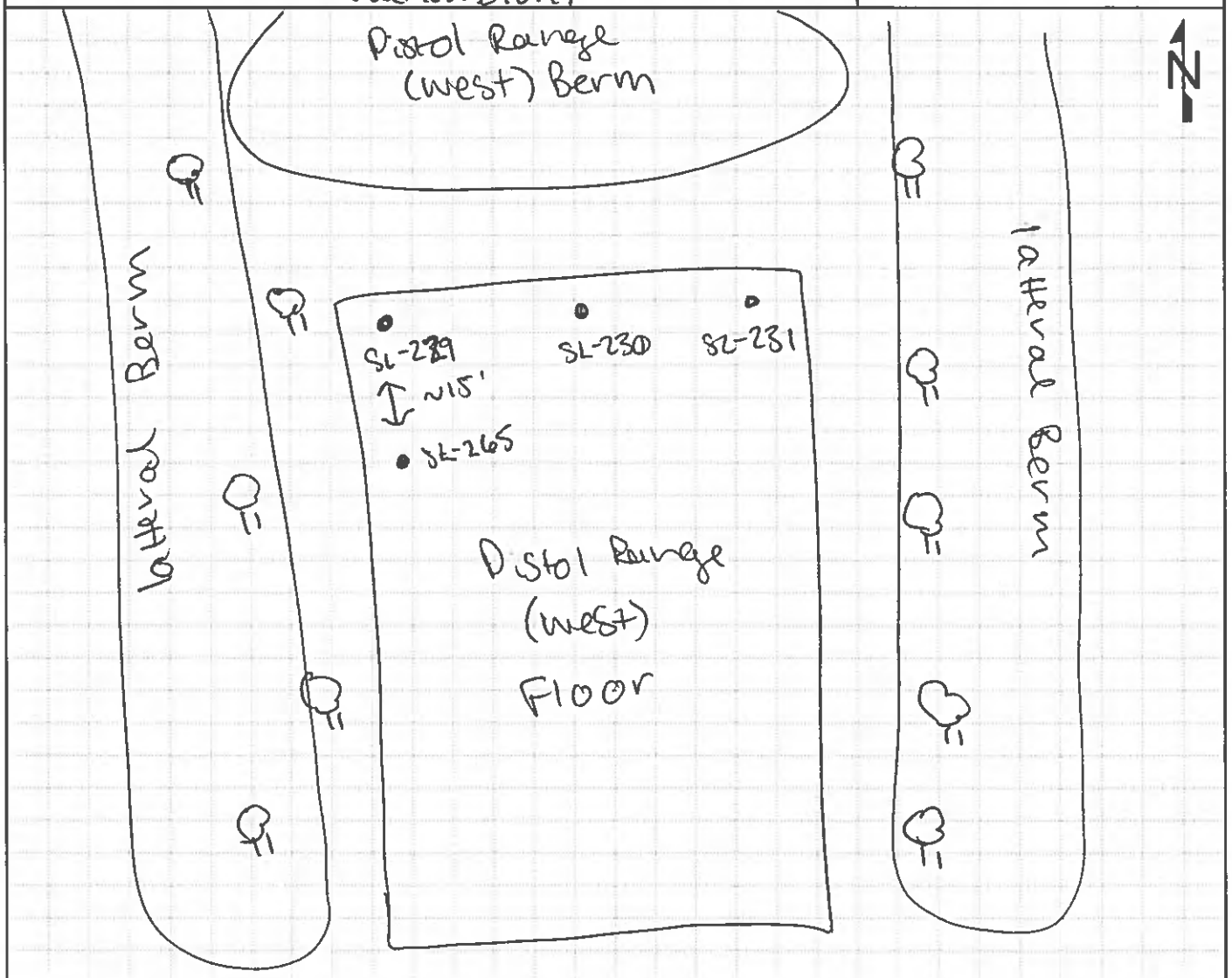
CLIENT: NASA		BOREHOLE NUMBER: SL-265
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brockhoff	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: ~~Rifle Range~~ BGS 8/8/19 Pistol Range (West)	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 1044	COMPLETED: 8/8/19 | 1050
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS Approx. 15' S. of SL-229. Actual location 8/8/19 — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-265

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-2605	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	GC	SILT and some SAND, fine, little gravel (0.25" to 0.5"), 10YR 4/3, dry, soft, non plastic	1/1	JJ 8/8/19 ~~107~~ 1260	organic odor, bullet casing, ECCLSL0305@ 1602 (0'-1')
	2		BOH			* SAMPLE SUBMITTED TO LAB XRF >360 ppm Pb elevated
	3					
	4					
	5					
	6					
	7		JJ 8/8/19			
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-2605

HTRW DRILLING LOG

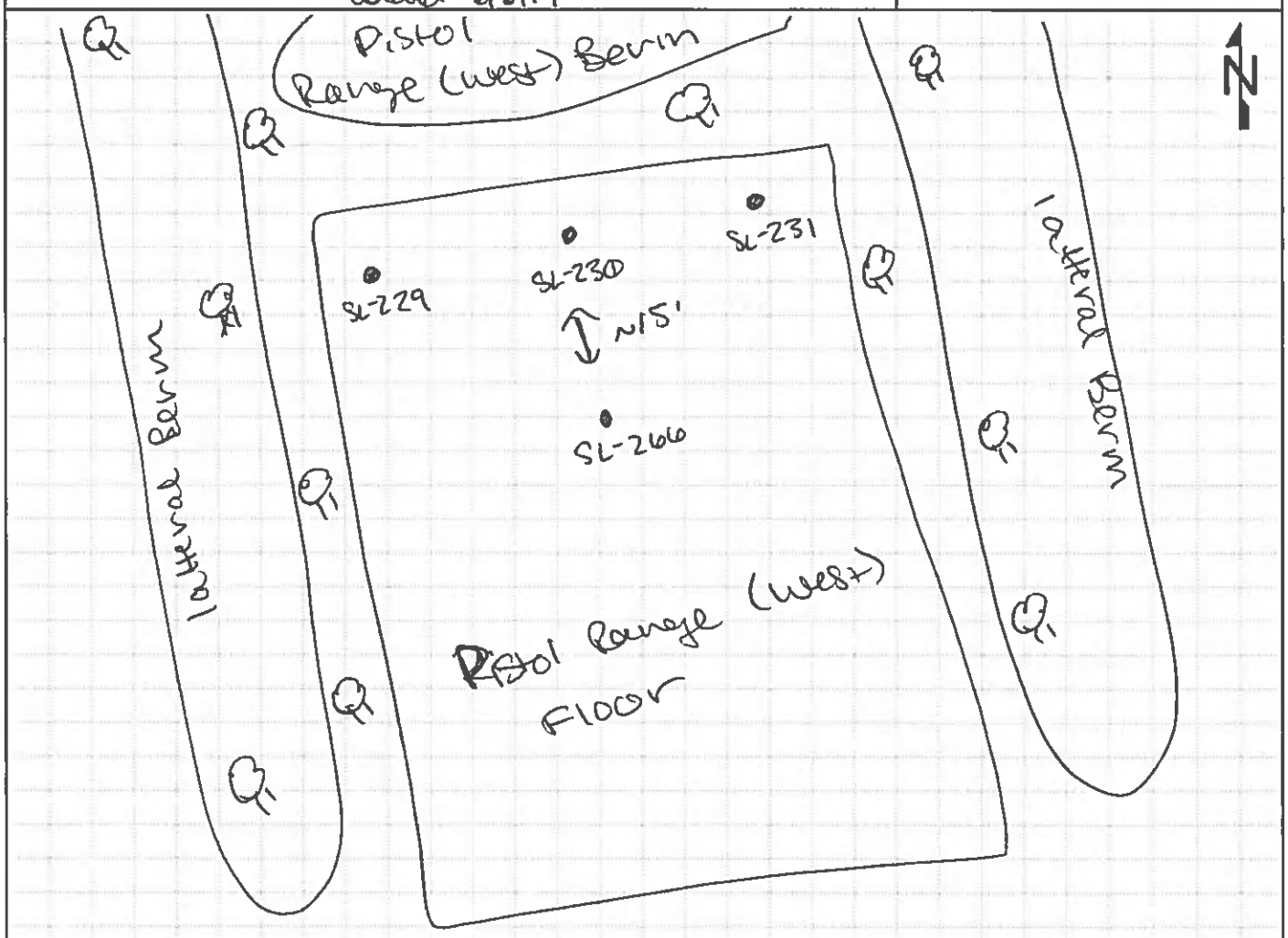
CLIENT: NASA	BOREHOLE NUMBER: ~~SL-226~~ SL-266	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Dan Brockhoff	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS hand auger (3")	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 1146	COMPLETED: 8/8/19 | 1149
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0.0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: Approx. 15' S. of SL-230, location added 8/8/19 — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/13/19	SL-266

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-266

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	GC	SILT and some SAND and little CLAY and little GRAVEL (0.25" to 1") fine to medium sand, 10YR 2/2, moist, soft, chunks of clay and sand w/ low plasticity	1/1	1100	ECCL SL0306 @ 1554 (0'-1')
	2		BOH	Sample submitted to lab - XRF	>3600 ppm	
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-266

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-267	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhamme	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 1150	COMPLETED: 8/8/19 | 1200
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs 8/8/19 EB 1/5	
15. TOTAL DEPTH OF BOREHOLE: 1.0'	TAL Metals Arsenic FR Metals Antimony Pb	

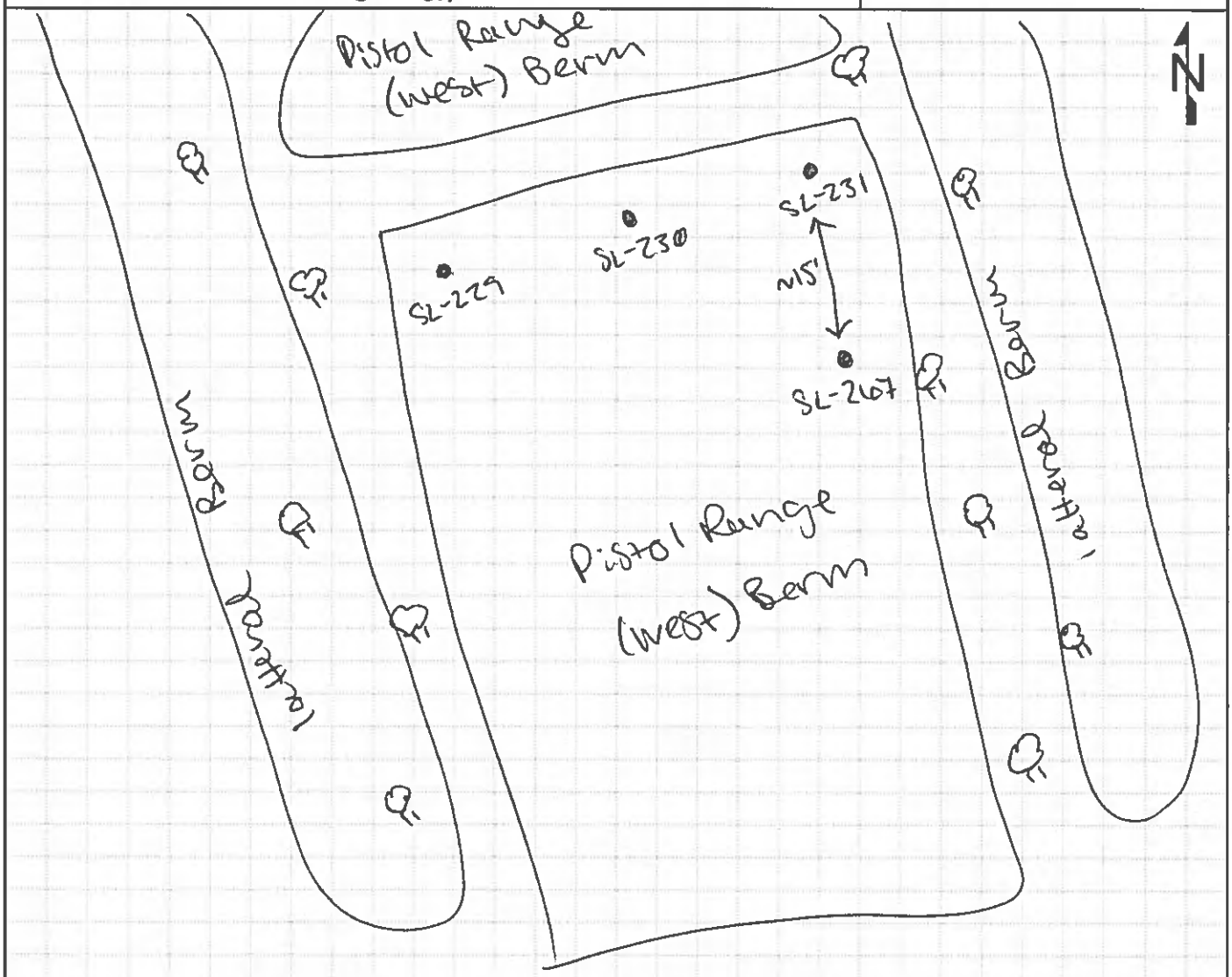
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: Approx. 15' S. of SL-231. Location added. SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/8/19	SL-267

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-267

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	GC	SILT, SAND, Little CLAY, and trace Gravel (0.10" to 0.25"), fine to medium Sand, 10YR 2/2, moist, non-plastic, Some consolidated clay chunks w/ low plasticity	1/1	350	organic odor
	2		BOH	No Sample Submitted — XRF <3000 ppm		
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

JJ 8/8/12

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-267

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-268	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3" SS Hand Auger	8. BOREHOLE LOCATION: ~~Skeet~~ Trap Range	
	9. DRILL DATE/TIME: STARTED: 8/8/19 | 1405 COMPLETED: 8/8/19 | 1410	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony (Pb)	
15. TOTAL DEPTH OF BOREHOLE: 1.0'		

16. DISPOSITION OF BOREHOLE

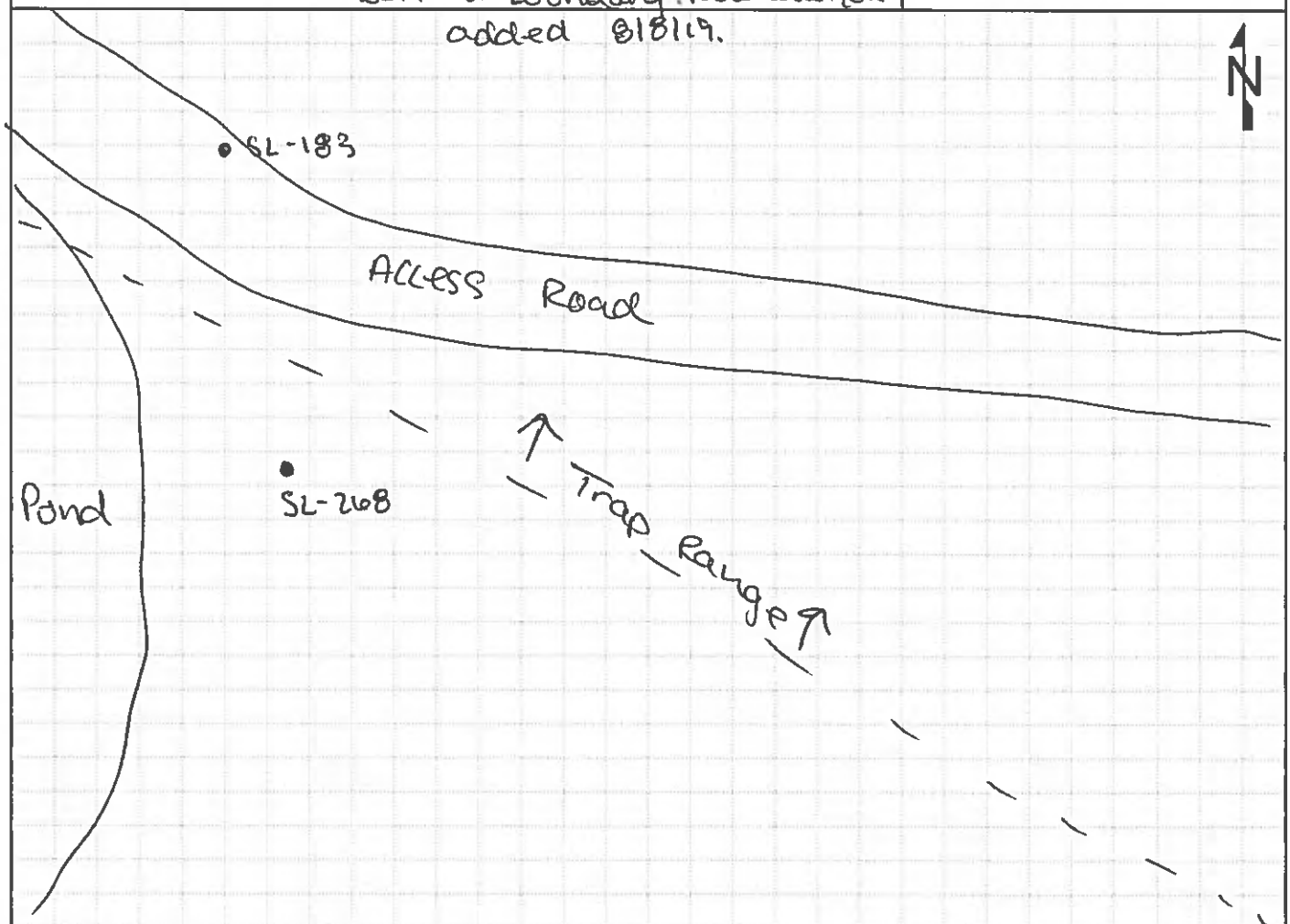
BACKFILL TYPE: GROUT (BENTONITE) SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS Approx. 30' S. of SL-183 @ wetland boundary. New location added 8/8/19.

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-268

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-268	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for PD	REMARKS (Sample IDs/Depths/Etc.)
	1	SC	SILT and some fine SAND and trace CLAY, 10YR 4/3, moist, non-plastic	~~720~~ 0.5/0.5	720	ECCLSL0297@1405 (0-0.5)
				8/8/17 ~~380~~ 0.5/0.5	380	ECCLSL0298@1406 (0.5-1)
	2		BOH	Both samples to lab	– XRF	Submitted >3600 PPM
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-268

HTRW DRILLING LOG

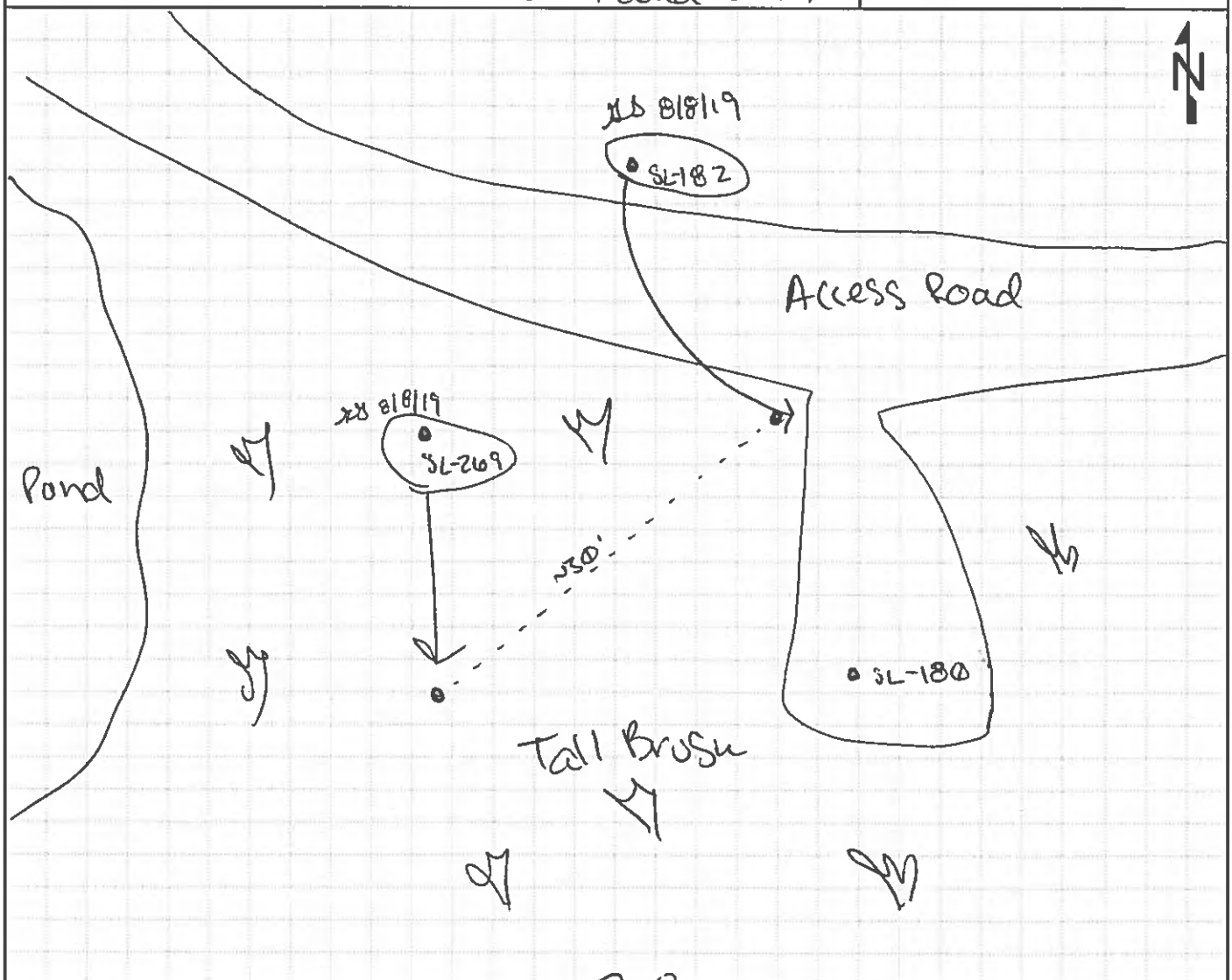
CLIENT: NASA	BOREHOLE NUMBER: SL-269	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Lindsey Moyer	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: SS Hand Auger (3")	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME STARTED: 8/8/19 | 1413	COMPLETED: 8/8/19 | 1420
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 1.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 1.0'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: Approx. 30' SW. of SL-182 @ wetland Border. Location Added 8/8/19 — SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-269

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-2609

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT: ECCL Firing Range Removal Site Evaluation

4. DIRECTION OF BOREHOLE: VERTICAL

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SILT and SAND, fine, sub angular, 10YR 2/2, moist to wet, non-plastic, soft	1/1	370	ECCLSL0299 @ 1413 (0-1) Duplicate @ 1413 ECCLSL0031
	2		BOH	Sample submitted to lab – XRF > 360 ppm		
	3					
	4					
	5					
	6					
	7		JSJ 8/8/19			
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/8/19	SL-2609

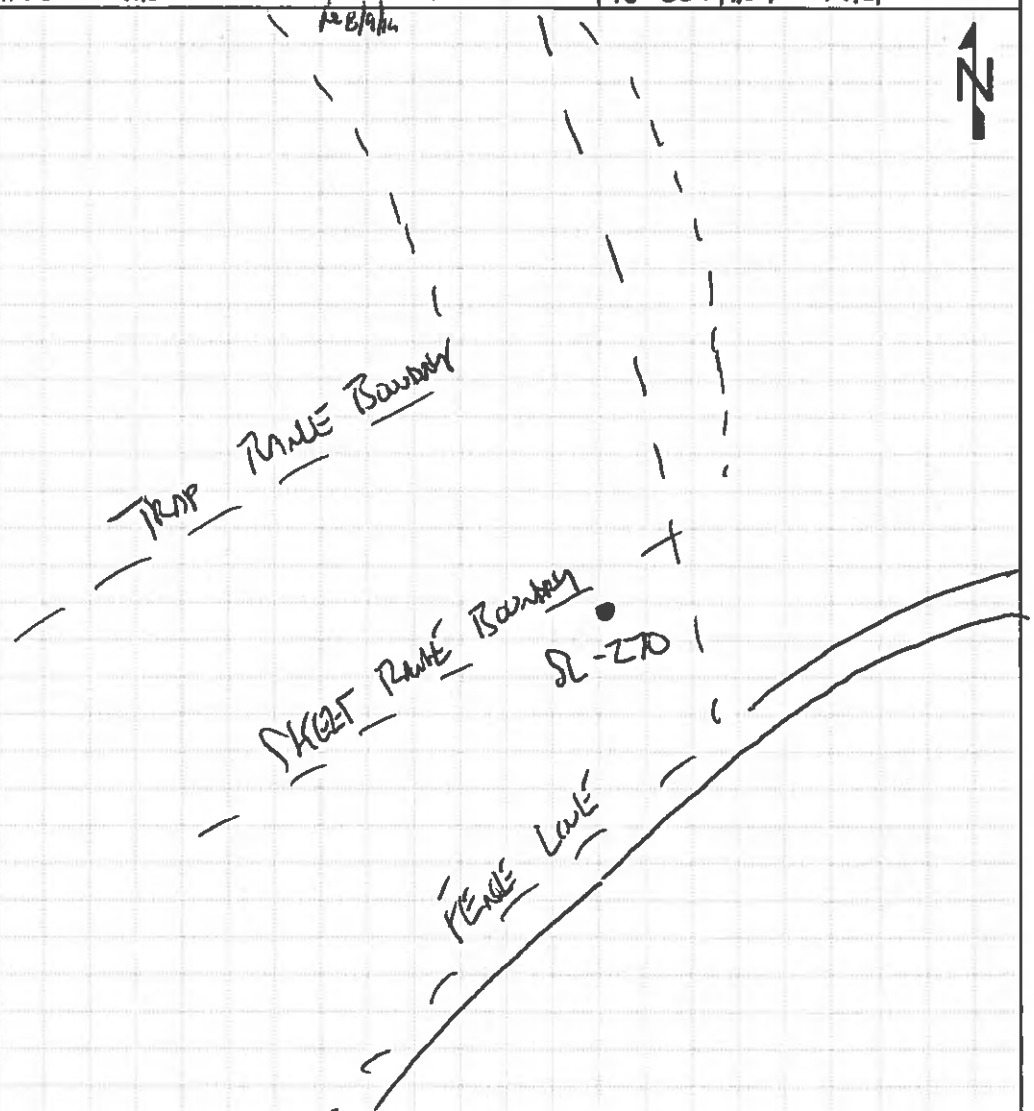
HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-270	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: NA	6. MAKE/MODEL OF DRILL: NA	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: HAND AUGER	8. BOREHOLE LOCATION: SKEET RANGE	
	9. DRILL DATE/TIME: 8/8/19 STARTED: 1455	COMPLETED: 1445
	10. DEPTH GROUNDWATER ENCOUNTERED: NA	
11. OVERBURDEN THICKNESS: UNKNOWN	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: NA	
13. DEPTH DRILLED INTO BEDROCK: NA	14. CHEMICAL SAMPLES (circle): ~~VOC~~ ~~SVOCs~~ ~~PAHs~~ ~~TAL Metals~~ ~~Arsenic~~ ~~PFAS~~ 8/9/19 Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 1 ft.		
16. DISPOSITION OF BOREHOLE: CAPED IN AFTER AUGER PULLED		
BACKFILL TYPE: GROUT BENTONITE	SEMI-TEMPORARY MONITORING WELL	WELL ID: NA

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS ADDED LOCATION 8/6/19 XRF <360 ppm ~~TO~~ LAB SAMPLE 8/9/19 | SCALE: None TO CONFIRM XRF



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/9/19	8/19/19	SL-270

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-270	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SILT w/ LITTLE TO TRACE FINE SAND, TRACE ORGANICS, SUB-ROUNDED 10 YR 3/2 VERY DARK GRAYISH BROWN w/ TRACE 10 YR 4/6 DARK YELLOWISH BROWN, SOFT, DAMP, NON-PLASTIC.	1/1'	230	ECCLSL0296 8/8/19 @ 1441 0.0-0.5 ft. <300 ppm - SENT TO CONFIRM XRF DATA
					170	
	2		END OF BORING - CASED IN AFTER AUGER PULLED			NO LAB SAMPLE FROM 0.5-1.0 ft
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

8/9/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/9/19	8/9/19	SL-270

HTRW DRILLING LOG

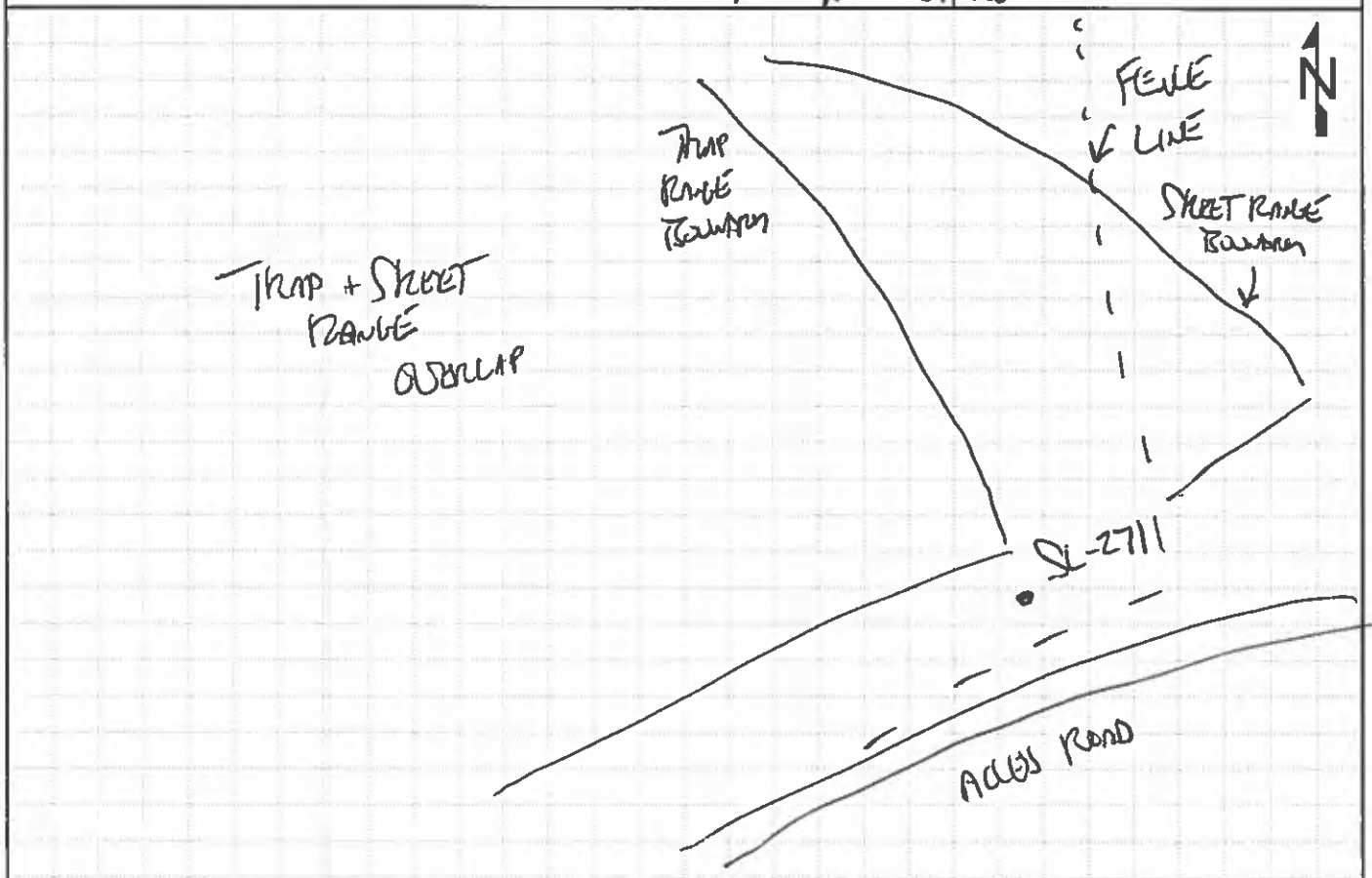
CLIENT: NASA	BOREHOLE NUMBER: SL-271	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: NA	6. MAKE/MODEL OF DRILL: NA	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3" HAND AUGER	8. BOREHOLE LOCATION: SKEET RANGE	
	9. DRILL DATE/TIME: 8/8/19 STARTED: 1425 COMPLETED: 1450	
	10. DEPTH GROUNDWATER ENCOUNTERED: NA	
11. OVERBURDEN THICKNESS: Unknown	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: NA	
13. DEPTH DRILLED INTO BEDROCK: NA	14. CHEMICAL SAMPLES (circle): VOCs SVOCs PAHs TAL Metals Arsenic Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 1 ft		
16. DISPOSITION OF BOREHOLE: CAVED IN AFTER AUGER PULLED		
BACKFILL TYPE: GROUT BENTONITE	SEMI-TEMPORARY MONITORING WELL	WELL ID: NA

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS ADDED LOCATION 8/8/19 XRF CIS ON NO SAMPLE

SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/9/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: SL-271

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-271	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLD+ XRF SERIAL#: 0419BZ Colors from Munsell Soil Color Chart, 2009 Year Revised XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SILT W/LITTLE FINE SAND, TRACE ORGANICS, SUBROUNDED, 10YR3/3 DARK BROWN, SOFT, DAMP, NON-PLASTIC	1/1'	30	XRF <360 ppm NO LAB SAMPLE
	2		END OF BORING - CASED IN AFTER AUGER PULLED.			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

TW 8/9/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/9/19	8/19/19	SL-271

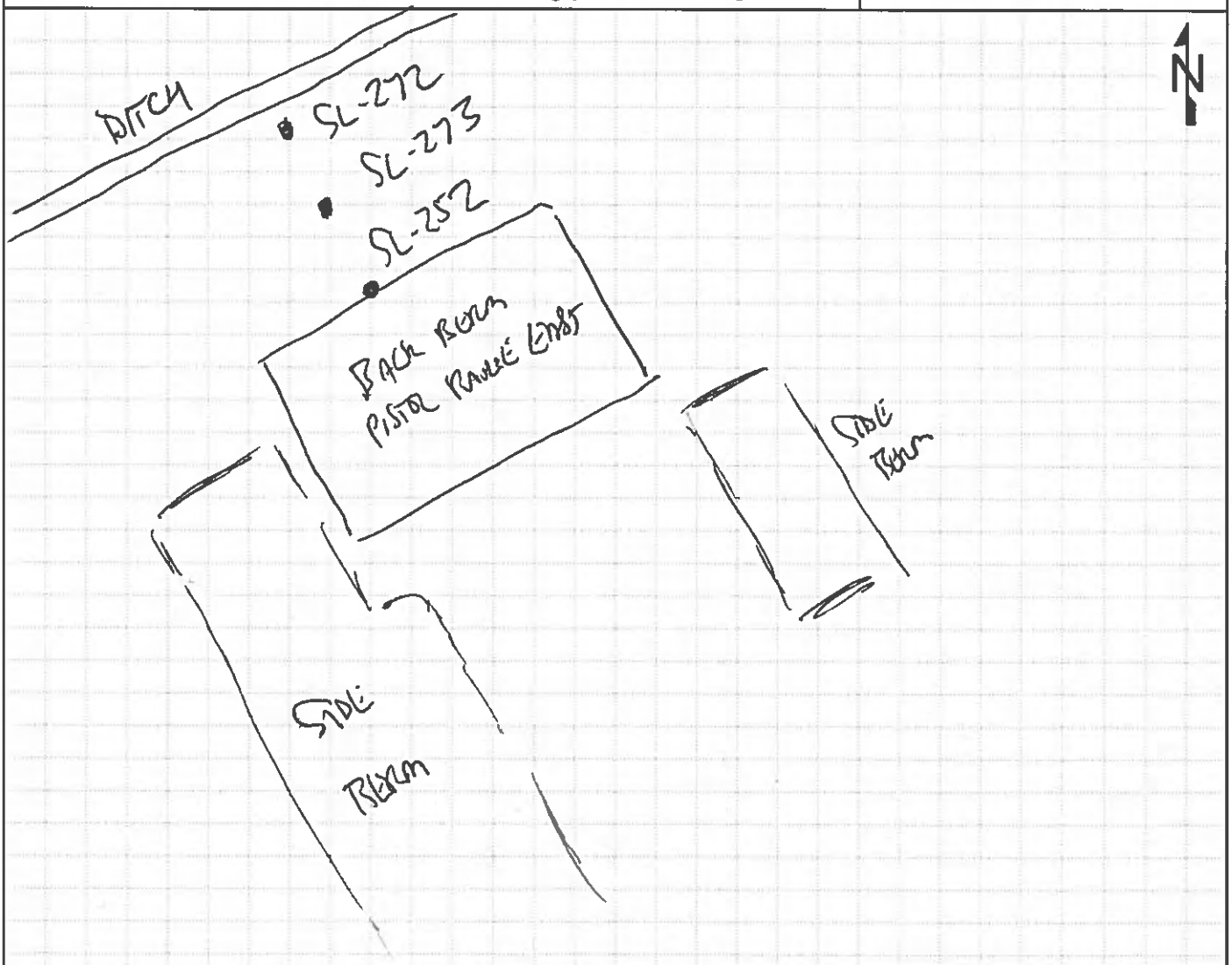
HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-272	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3" HAND AUGER	8. BOREHOLE LOCATION: PISTOL RANGE EAST	
	9. DRILL DATE/TIME: 8/8/19 STARTED: 1625 COMPLETED: 1636	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: UNKNOWN	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 0-1		
16. DISPOSITION OF BOREHOLE: CAVES IN AFTER AUGER PULLED		
BACKFILL TYPE: GROUT BENTONITE	SEMI-TEMPORARY MONITORING WELL	WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS ADDITIONAL LOCATION ADDED

SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/9/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: SL-272

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-272	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised: XRF-Sr pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		SM	SILT W/ TRACE FINE SAND, TRACE ORGANICS, SUB-ROUNDED, 10 YR 4/3 BROWN SOFT, DAMP, NON-PLASTIC	1/1'	320	~~ECCLSL0304 8/8/19 1103 0-1ft.~~ 8/19/19 ECCLSL0300 8/8/19 @ 1630 (0'-1')
	1					
			END OF BORING - CAVED IN AFTER AUGER PULLED			
	2					XRF L360 ppm sent to lab to confirm XRF
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

8/19/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/19/19	8/19/19	SL-272

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-273	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3" HAND AUGER	8. BOREHOLE LOCATION: PISTOL RANGE EAST	
	9. DRILL DATE/TIME: STARTED 8/8/19 1630 COMPLETED 1636	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: Unknown	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 0-1 ft.		

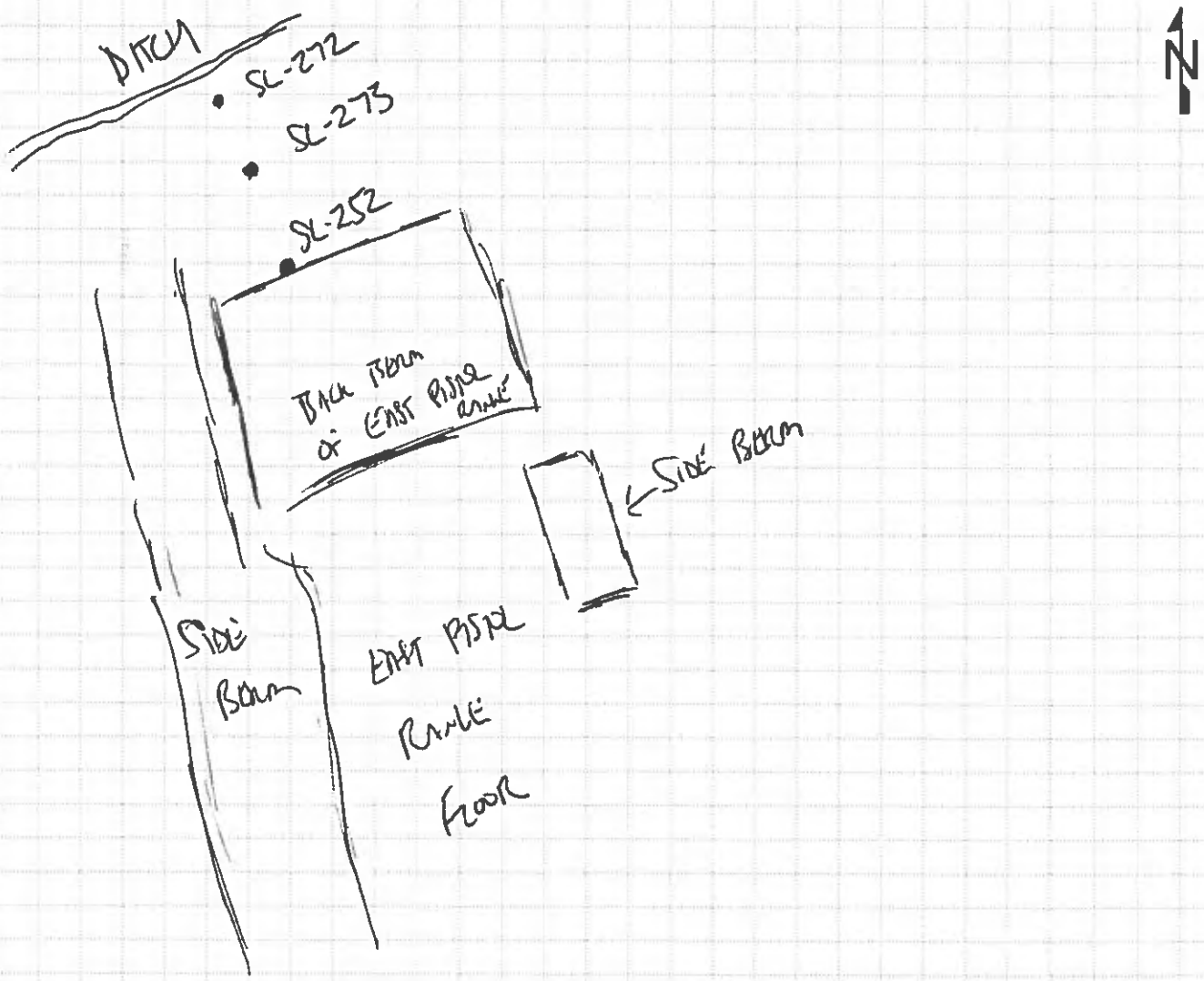
16. DISPOSITION OF BOREHOLE: CAVED IN AFTER AUGER PULLED

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: N/A

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: ADDITIONAL LOCATION ADDED 8/8/19 SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/8/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: SL-273

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-273	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised; XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		SM	SILT W/ LITTLE TO TRACE FINE SAND + LITTLE ORGANICS, SUB-ROUNDED, 10YR 2/2 VERY DARK BROWN, SOFT, DAMP, NON-PLASTIC	1/1'	310 ppm ~ elev	ECCLSL0304 8/8/19 @ 1635 0-1 ft. >360 ppm SENT TO LAB TO CONFIRM
	1					
			END OF BOREHOLE CAVED IN AFTER AUGER PULLED			
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/19/19	SL-273

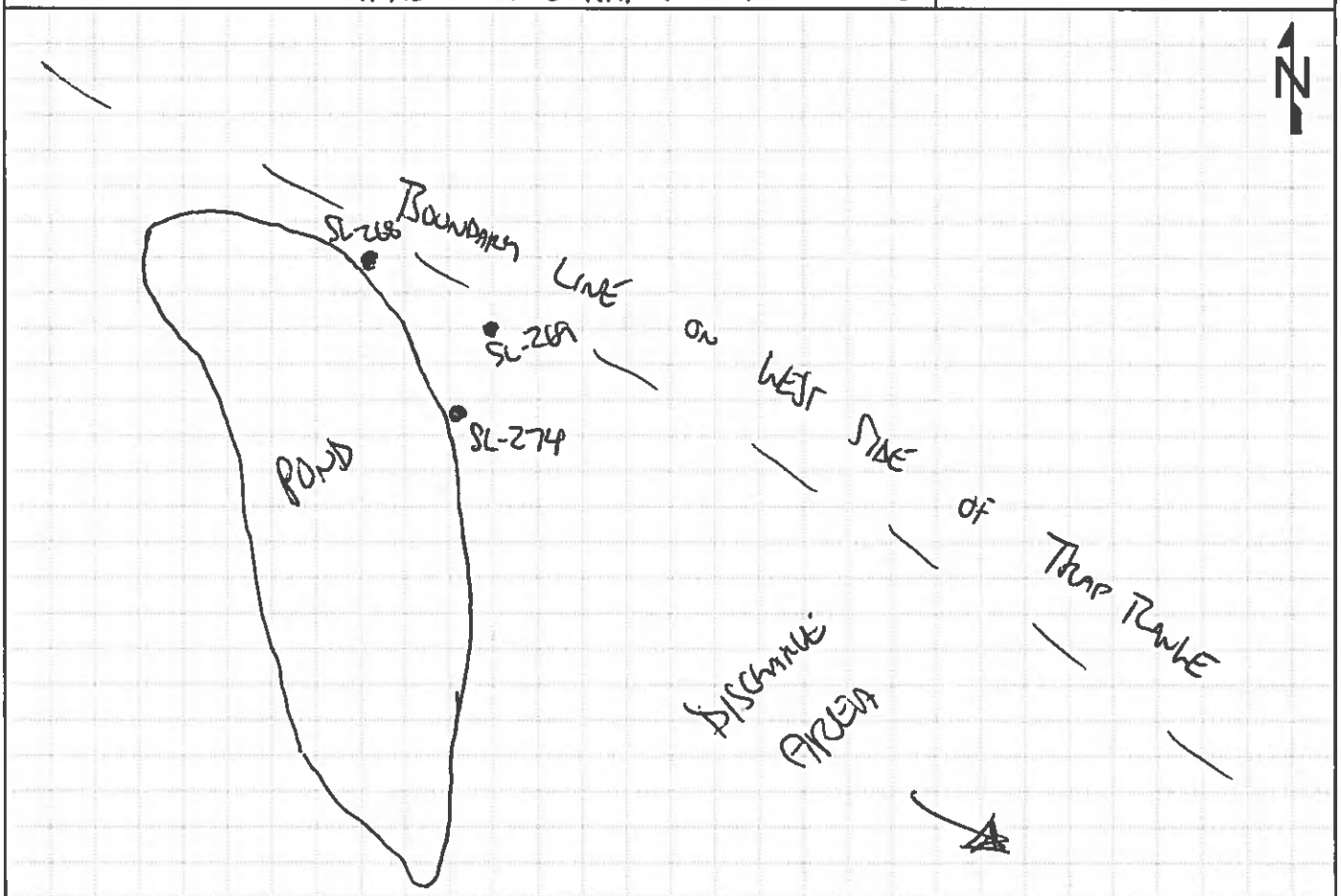
HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-274	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECC Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: N/A	6. MAKE/MODEL OF DRILL: N/A	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 3" HAND AUGER	8. BOREHOLE LOCATION: TRAP RANGE	
	9. DRILL DATE/TIME: STARTED 8/8/19 1710 COMPLETED 1716	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: Unknown	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: N/A	14. CHEMICAL SAMPLES (circle): ~~TAL Metals~~ ~~Arsenic~~ ~~VOC~~ ~~PR Metals~~ ~~SVOCs~~ ~~Antimony~~ ~~PAHs~~ ~~Pb~~ 8/9/19	
15. TOTAL DEPTH OF BOREHOLE: 1 ft.		
16. DISPOSITION OF BOREHOLE: CAVED IN AFTER AUGER PULLED		
BACKFILL TYPE: GROUT BENTONITE	SEMI-TEMPORARY MONITORING WELL	WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS ADDED LOCATION XRF <350 NO LAB SAMPLE

SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/8/19	QA/QC SIGNATURE/DATE: 8/19/19	BOREHOLE NUMBER: SL-274

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SC-274	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised: XRF for pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	CL	CLAY w/ SOME - LITTLE SILT, TRACE FINE SAND, TRACE ORGANICS, ROOTED 10YR 3/1 VERY DARK GRAY, SOFT MOIST, NON-PLASTIC.	1/1'	310	NO LAB SAMPLE XRF < 360
	2		END OF BORING - CAVED IN AFTER AUGER PULLED.			
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

8/9/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/9/19	8/19/19	SC-274

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

EU (circle): Western Ponds (Ditches)

1. Sample Team: Gabby Gromofsky, Dan Brocknoff (Geo)

2. Location ID: SD-019

Northing:

Easting:

10. Sediment Sample ID: ECCLSD0019

11. Date and Time: 7/31/19 | 1240

12. Dupe ID (if needed): N/A

13. Equipment Risate ID (if needed): N/A

14. Sediment Sample Equipment Used: Hand Auger

15. MS/MSD: N/A

16. Weather Conditions: 76° F, cloudy, humid

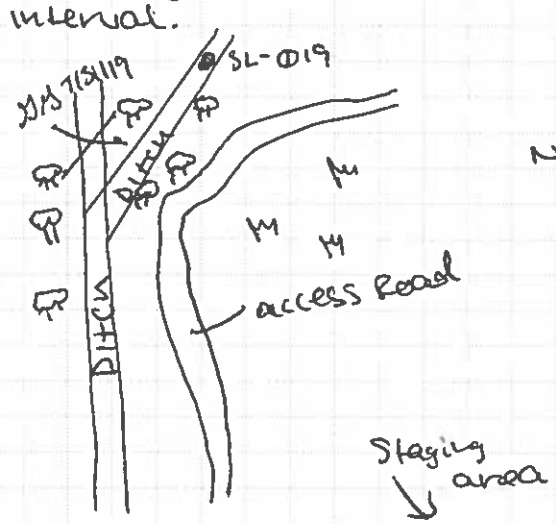
17. Activities in the Area: ~~None~~ DS 7/31/19 Dana Winslow onsite for photos and to locate path out of dit

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) Dry sediment in ditch (ditch is dry); Overgrown weeds and trees surround location yet center of ditch is clear of vegetation.

LOCATION SKETCH/COMMENTS N/A

SCALE: Not to scale

Field Notes: Refusal @ 0.7'; offset ~1' to SW; Bedrock refusal @ 0.7'; Call Rich S. to inform that only 0'-0.7' can be collected - R.S. gives the go-ahead to sample only the top interval.



Note: not all access roads are shown

Sediment Description: Organic rich SILT with some fine sand, fine sand, subangular, 10YR2/2, moist, soft, non-plastic, organic odor; 0'-0.7'

~~0'-0~~ DS 7/31/19 0.7' - Bedrock, sandstone, quartz grains range from fine to coarse, poorly sorted, highly weathered, 10YR7/1, 10YR2/2, and 10YR6/6; iron staining.

Analyses: Pb

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary? Bedrock encountered @ 0.7', therefore 2 samples could not be collected down to 3'

COC NO: NASA-ECCL-007

Laboratory: TestAmerica

Recorded By: [signature] 7/31/19 (Signature and Date)

QC Checked by: [signature] 8/2/19 (Signature and Date)

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

1. Sample Team: Rich Sprinzl, Charles Spurr

EU (circle): Western Ponds (Ditches)

2. Location ID: ECCL-SD-020

Northing: (Relocated)

Easting:

10. Sediment Sample ID: ECCLSD0021

11. Date and Time: 7/31/19 1400

12. Dupe ID (if needed): yes ECCLSD9003
MS/MSD: ECCLSD0021MS/MSD

13. Equipment Risate ID (if needed): NA

14. Sediment Sample Equipment Used: 3.25" hand auger

15. MS/MSD: yes

16. Weather Conditions: 78°F mostly cloudy

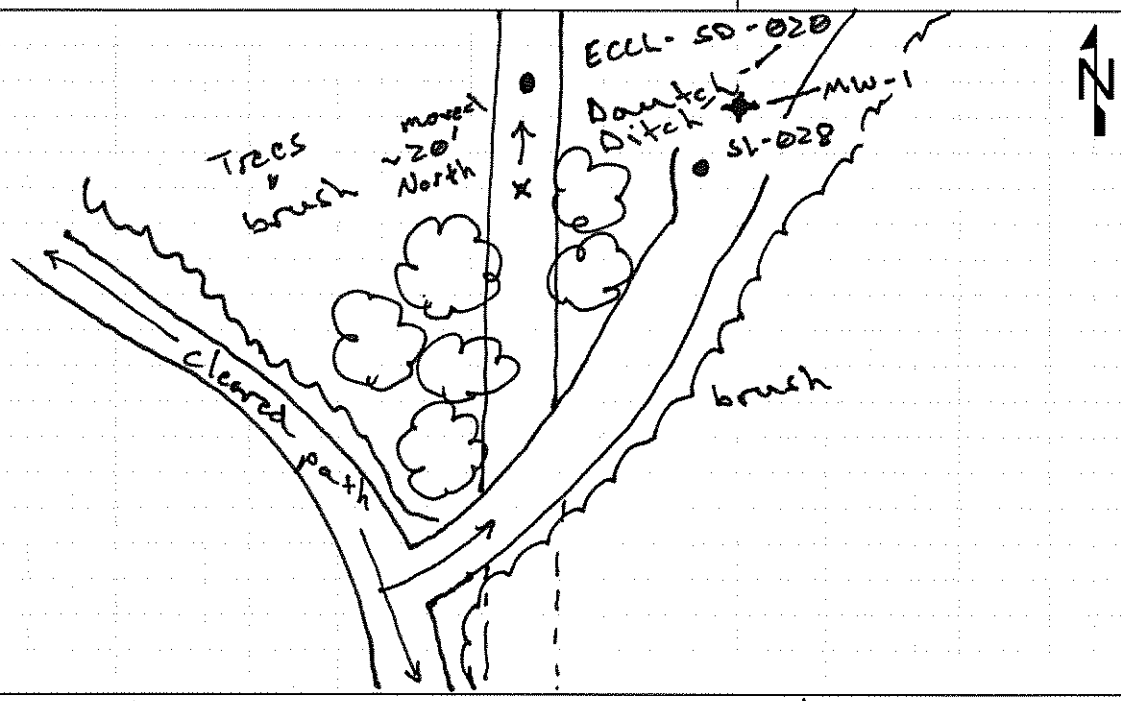
17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) sediment moist to wet
refusal @ ~1' BGS encountered bedrock shale
No (1.5'-3') collected. Moved location ~20' North to avoid visible surface debris.

LOCATION SKETCH/COMMENTS

SCALE: Not to scale

Field Notes:



Sediment Description: Clay & Silt some organics 10YR4/2 Dark grayish brown; very soft; moist to wet; contains skeet clay fragment, roots, & shotgun wads

TR 8/6/19

Analyses: PAHs, Lead

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?

TR 8/6/19

COC NO: NASA-ECCL-007

Laboratory: TestAmerica

Recorded By: [signature] 7/31/19 (Signature and Date)

QC Checked by: [signature] 8/6/19 (Signature and Date)

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

EU (circle): Western Ponds Ditches

1. Sample Team: Rich Sprinzl, Charles Spurr

2. Location ID: ECCL-SD-021

Northing: See SD-005

Easting:

10. Sediment Sample ID: NA

11. Date and Time: Attempted at 1420 7/31/19

12. Dupe ID (if needed): NA

13. Equipment Risate ID (if needed): NA

14. Sediment Sample Equipment Used: 3.25" Hand Auger

15. MS/MSD: NA

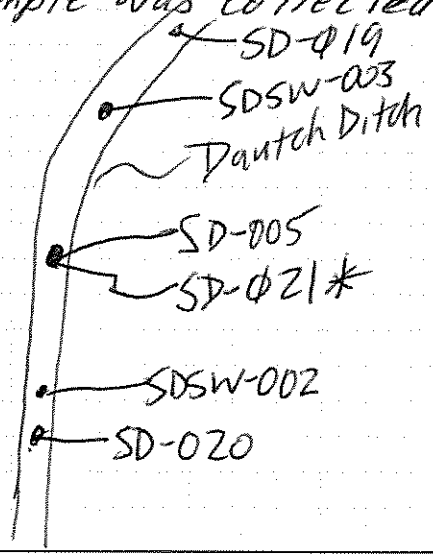
16. Weather Conditions: 80° mostly cloudy

17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) Dry sediment in Ditch (ditch is dry). overgrown brush/weeds around ditch.

LOCATION SKETCH/COMMENTS **SCALE:** Not to scale

Field Notes: Colocated with SI sample location ECCL-SD-005. Proposed 1.5-3' interval; however, refusal @ ~10" bgs (Bedrock) No sample was collected.



Sediment Description: See SI Log for ECCL-SD-005. No skeet clay fragments or shotgun wadds observed.

RS 7/31/19

Analyses: NA

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary? RS 7/31/19

COC NO: NA

Laboratory: NA

Recorded By: RS 7/31/19 (Signature and Date)

QC Checked by: [illegible] 10/22/19 (Signature and Date)

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

1. Sample Team: RS DW

EU (circle): Western Ponds Ditches

2. Location ID: ECCL-SD-022

Northing:

Easting:

10. Sediment Sample ID: ECCLSP0024

11. Date and Time: 31 July 2019 1045

12. Dupe ID (if needed): NA

13. Equipment Risate ID (if needed) NA

14. Sediment Sample Equipment Used: HAND AUGER

15. MS/MSD: NA

16. Weather Conditions: 72° CLOUDY

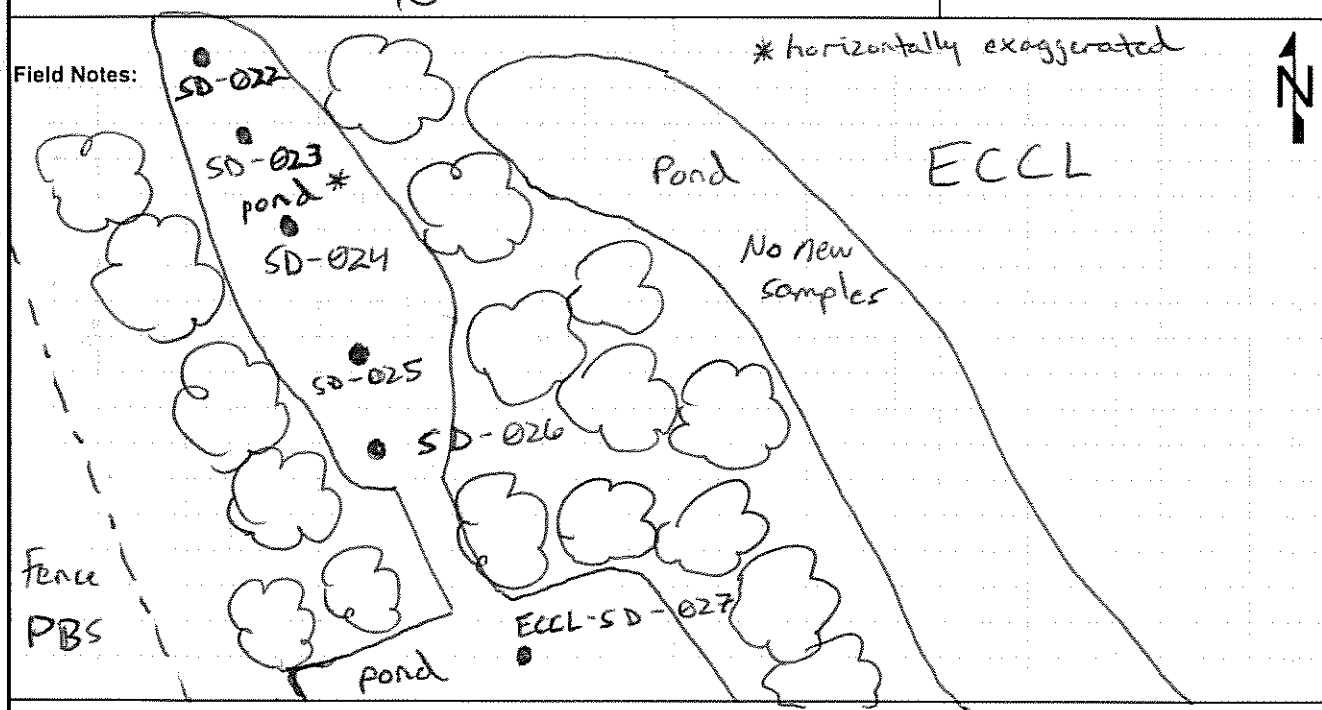
17. Activities in the Area: NONE

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) Water ~24"
Sediment/organic ~8" thick prior to shale refusal
RL/8/6/19

LOCATION SKETCH/COMMENTS N/A

SCALE: Not to scale

Field Notes:



Sediment Description: Clay, Silt, & Organics 10YR2/2 very dark brown; very soft; saturated; twigs, roots, & leaves decaying organic odor
RL/8/6/19

Analyses: Lead/Arsenic

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?
RL/8/6/19

COC NO: NASA-ECCL-007

Laboratory: TestAmerica

Recorded By: RS 7/31/19 (Signature and Date)

QC Checked by: 8/6/19 (Signature and Date)

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NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

1. Sample Team: RS DW

EU (circle): Western Ponds Ditches

2. Location ID: ECCL-SD-023 (Former ECCL-SDSW-015)

Northing:

Easting:

10. Sediment Sample ID: NA

11. Date and Time: 7/31/19 NA

12. Dupe ID (if needed): NA

13. Equipment Risate ID (if needed) NA

14. Sediment Sample Equipment Used: HAND AUGER

15. MS/MSD: NA

16. Weather Conditions: 72° overcast

17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.)
Former ECCL-SDSW-015 sample location, <4" sediment, insufficient sediment to sample location deeper - no sample collected

LOCATION SKETCH/COMMENTS NA

SCALE: Not to scale

Field Notes: See log for ECCL-SD-022

N

RW 8/6/19

Sediment Description: mostly organic leaf/root/sticks
SEE LOG FROM SI SAMPLE AT ECCL-SDSW-015

RW 8/6/19

Analyses: None

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?

RW 8/6/19

COC NO: NA

Laboratory: NA

Recorded By: [signature] 7/31/19 (Signature and Date)

QC Checked by: [signature] 8/6/19 (Signature and Date)

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NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

EU (circle): Western Ponds Ditches

1. Sample Team: Rich Sprunz / Dana Winslow

2. Location ID: ECCL-SD-024

Northing:

Easting:

10. Sediment Sample ID: ~~ECCL-SD-024~~ ECCLSD0026 7/31/19

11. Date and Time: 31 July 2019 1022

12. Dupe ID (if needed): NA

13. Equipment Risate ID (if needed): NA

14. Sediment Sample Equipment Used: Auger Bucket

15. MS/MSD: NA

16. Weather Conditions: Cloudy 72°

17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) Wet sediment / 36" Depth

Clear water to 24" / 8" sediment Depth

RL/8/6/19

LOCATION SKETCH/COMMENTS NA

SCALE: Not to scale

Field Notes: See log for ECCL-SD-022

N

RL 8/6/19

Sediment Description: Clay & Silt; some organics 10YR2/2 very dark brown; very soft; saturated; roots & leaves decaying organic odor

RL/8/6/19

Analyses: Lead, Arsenic

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?

RL 8/6/19

COC NO: NASA-ECCL-007

Laboratory: TestAmerica

Recorded By: [signature] 07/31/19 (Signature and Date)

QC Checked by: [signature] 8/6/19 (Signature and Date)

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NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

1. Sample Team: RS DW

EU (circle): ~~Western Ponds~~ Ditches

2. Location ID: ECCL-SD-025

Northing:

Easting:

10. Sediment Sample ID: NA

11. Date and Time: 7/31/19 NA

12. Dupe ID (if needed): NA

13. Equipment Risate ID (if needed) NA

14. Sediment Sample Equipment Used: HAND AUGER

15. MS/MSD: NA

16. Weather Conditions: 72° overcast

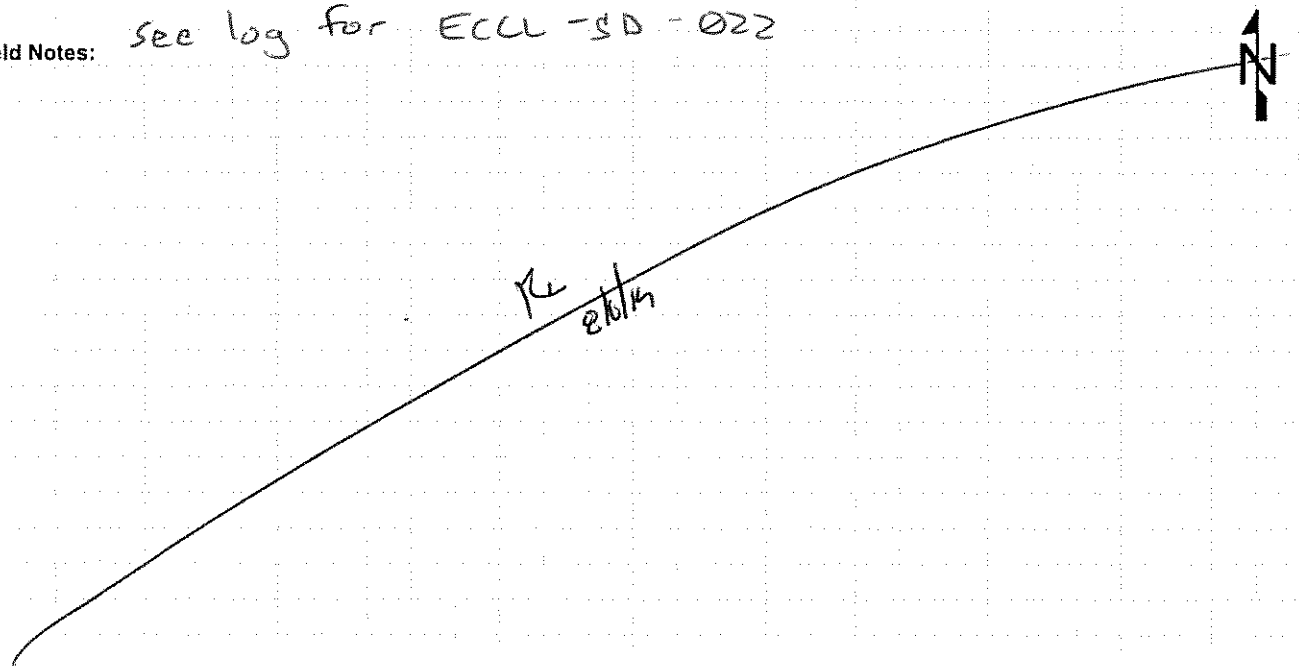
17. Activities in the Area: None (Former Firing Range High Fire)

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.)
FORMER ECCL-SDSW-016 ; ~3-4" wet sediment, 3' water, (< previous sample interval and insufficient for deeper sample collection)

LOCATION SKETCH/COMMENTS NA

SCALE: Not to scale

Field Notes: see log for ECCL-SD-022



Sediment Description: SEE SI LOG FOR ECCL-SDSW-016

RL 8/6/19

Analyses: NA

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?

RL 8/6/19

COC NO: NA

Laboratory: NA

Recorded By: RS 7/31/19 (Signature and Date)

QC Checked by: 8/6/19 (Signature and Date)

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

EU (circle): Western Ponds Ditches

1. Sample Team: Rich Sprinzl / Dana Winslow

2. Location ID: ECCL-SD-026

Northing:

Easting:

10. Sediment Sample ID: ~~ECCL-SD-026~~ 7/31/19 ECCLSD0928

11. Date and Time: 31 July 2019 1000

12. Dupe ID (if needed): NA

13. Equipment Risate ID (if needed) NA

14. Sediment Sample Equipment Used: AUGER BUCKET

15. MS/MSD: NA

16. Weather Conditions: 72° cloudy

17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) WET SEDIMENT / 18" Deep / JUST NORTH of channel from POND WATER CLEAR 18" visable / 4" SEDIMENT Depth

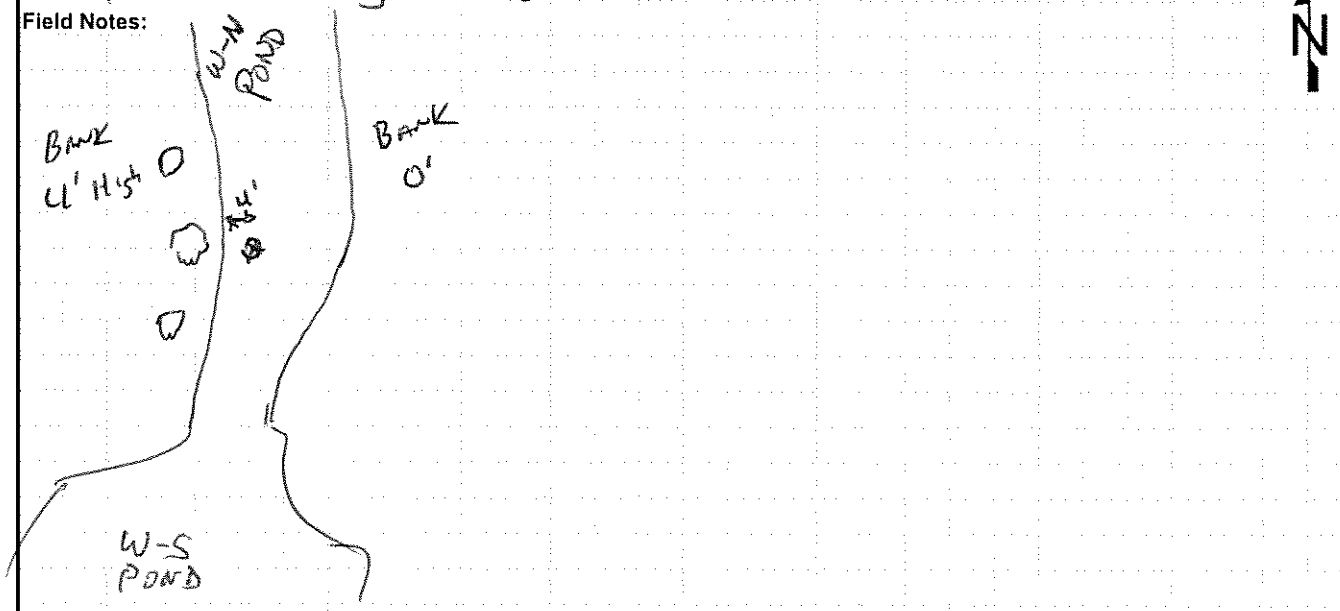
RL/8/6/19

LOCATION SKETCH/COMMENTS N/A

SCALE: Not to scale

Also see log for ECCL-SD-022

Field Notes:



Sediment Description: Clay, Silt, & Organics 10YR2/2 very dark brown; very soft; saturated; small branches & roots decaying organic odor

RL/8/6/19

Analyses: Lead / Arsenic

Sampling Procedure Followed: ☑ Yes ☐ No If no, why was deviation necessary?

RL/8/6/19

COC NO: NASA-ECCL-007

Laboratory: TestAmerica

Recorded By: RS 7/31/19 (Signature and Date)

QC Checked by: 8/6/19 (Signature and Date)

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NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

1. Sample Team: Rich Sprinzl, Charles Spurr

EU (circle): ~~Western Ponds~~ Ditches

2. Location ID: ECCL-SD-027

Northing:

Easting:

10. Sediment Sample ID: NA

11. Date and Time: 7/31/19 0915

12. Dupe ID (if needed): NA

13. Equipment Risate ID (if needed): NA

14. Sediment Sample Equipment Used: HAND AUGER

15. MS/MSD: NA

16. Weather Conditions: 73°F Cloudy; humid

17. Activities in the Area: NONE

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) 2.5' water depth ~2-3" sediment insufficient to collect sample in area around location previously sampled as ECCL-SDSW-017 (0-0.5')

LOCATION SKETCH/COMMENTS

SCALE: Not to scale

Field Notes: see log for ECCL-SD-028

N

RL 8/6/19

Sediment Description: see log for ECCL-SDSW-017

RL 8/6/19

Analyses: NA

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?

RL 8/6/19

COC NO: NA

Laboratory: NA

Recorded By: [signature] 7/31/19 (Signature and Date)

QC Checked by: [signature] 8/6/19 (Signature and Date)

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

1. Sample Team: Rich Sprinzl, Charles Spurr

EU (circle): Western Ponds Ditches

2. Location ID: ECCL-SD-028

Northing:

Easting:

10. Sediment Sample ID: ECCLSD0030

11. Date and Time: 7/31/19 0845

12. Dupe ID (if needed): yes ECCLSD9004

13. Equipment Risate ID (if needed): None

14. Sediment Sample Equipment Used: 3.25" hand auger

15. MS/MSD: N/A

16. Weather Conditions: 72°F Cloudy; humid

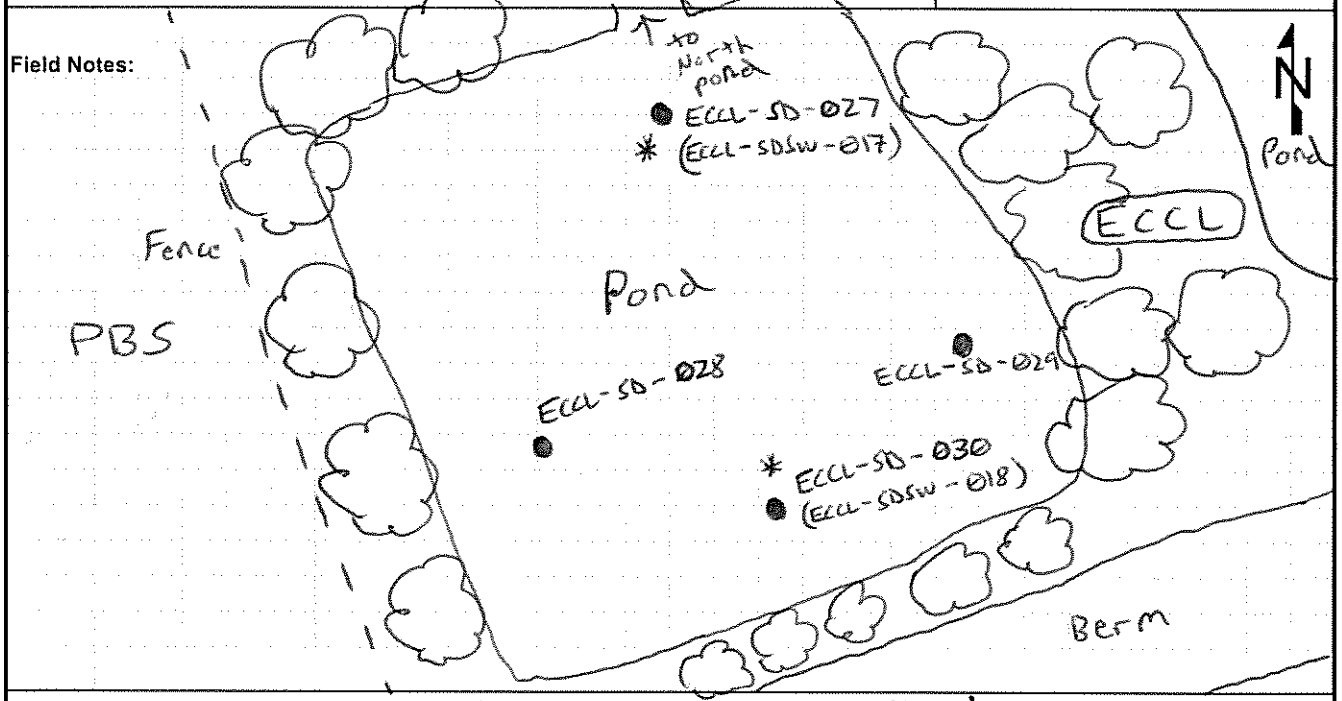
17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) saturated sediment. Strong decaying organic odor; refusal at ~ 8-12" below sediment surface RL 8/6/19

LOCATION SKETCH/COMMENTS *unable to collect sample

SCALE: Not to scale

Field Notes:



Sediment Description: Clay, Silt, & organics 10YR2/2 very dark brown; very soft; saturated; leaves & branches; plant roots; decaying organic odor

RL 8/6/19

Analyses: Lead, Arsenic

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?

RL 8/6/19

COC NO: NASA-ECCL-007

Laboratory: TestAmerica

Recorded By: [signature] for 7/31/19 (Signature and Date)

QC Checked by: [signature] 8/6/19 (Signature and Date)

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

EU (circle): Western Ponds Ditches

1. Sample Team: Rich Sprinzl, Charles Spurr

2. Location ID: ECCL- SD - 029

Northing:

Easting:

10. Sediment Sample ID: ECCLSD0031 ECCLSD0031MS ECCLSD0031MSD

11. Date and Time: 7/31/19 0930

12. Dupe ID (if needed): N/A

13. Equipment Risate ID (if needed): NA

14. Sediment Sample Equipment Used: 3.25" hand auger

15. MS/MSD: yes

16. Weather Conditions: 73°F Cloudy; humid

17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) ~2.5' water depth

~6" sediment depth saturated

Strong decaying organic odor

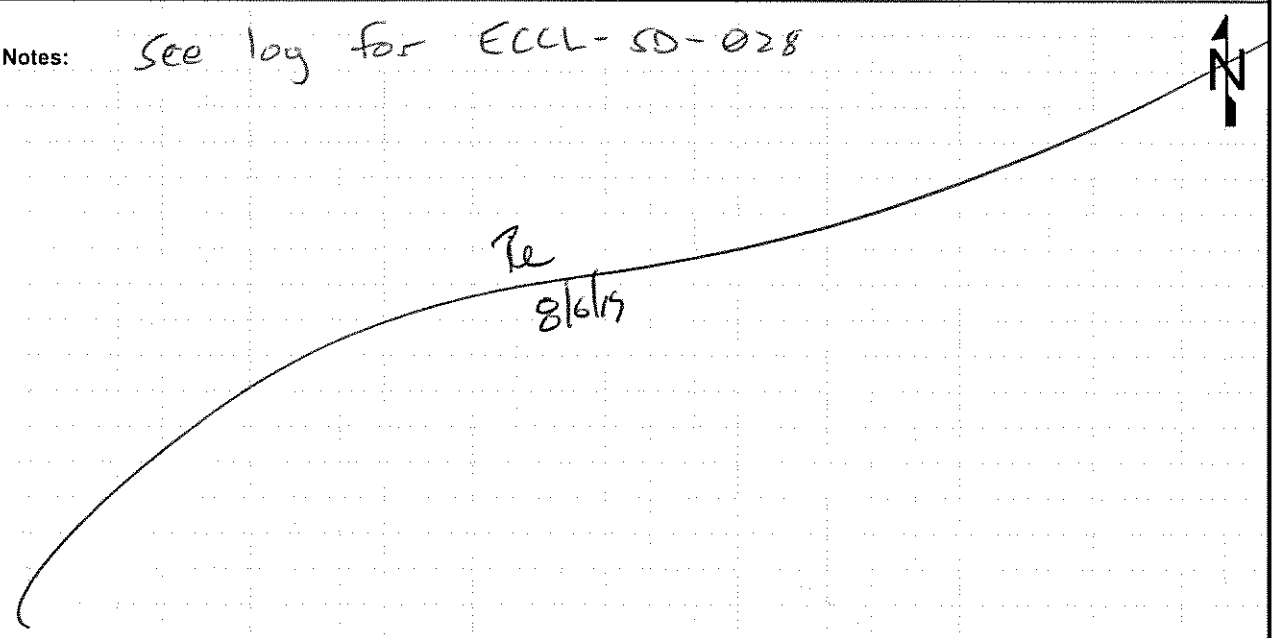
Brass bullet fragment

TR 8/6/19

LOCATION SKETCH/COMMENTS None

SCALE: Not to scale

Field Notes: See log for ECCL-SD-028



Sediment Description: Clay, silt, & Organics 10YR2/2 Very dark brown very soft; saturated; roots, leaves, & branches decaying organic odor

TR / 8/6/19

Analyses: Lead, Arsenic, TR / 8/6/19

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary?

TR / 8/6/19

COC NO: NASA-ECCL-007

Laboratory: TestAmerica

Recorded By: [signature] 7/31/19 (Signature and Date)

QC Checked by: [signature] 8/6/19 (Signature and Date)

leidos

NASA Plum Brook Station ECCL Sediment Log

SHEET 1 OF 1

ECCL Removal Site Evaluation

EU (circle): Western Ponds Ditches

1. Sample Team: Rich Spranzi, Charles Spurr

2. Location ID: ECCL-SD-030

Northing:

Easting:

10. Sediment Sample ID: N/A

11. Date and Time: 7/31/19 0945

12. Dupe ID (if needed): N/A

13. Equipment Risate ID (if needed) N/A

14. Sediment Sample Equipment Used: 3.25" hand auger

15. MS/MSD: N/A

16. Weather Conditions: 73°F cloudy; humid

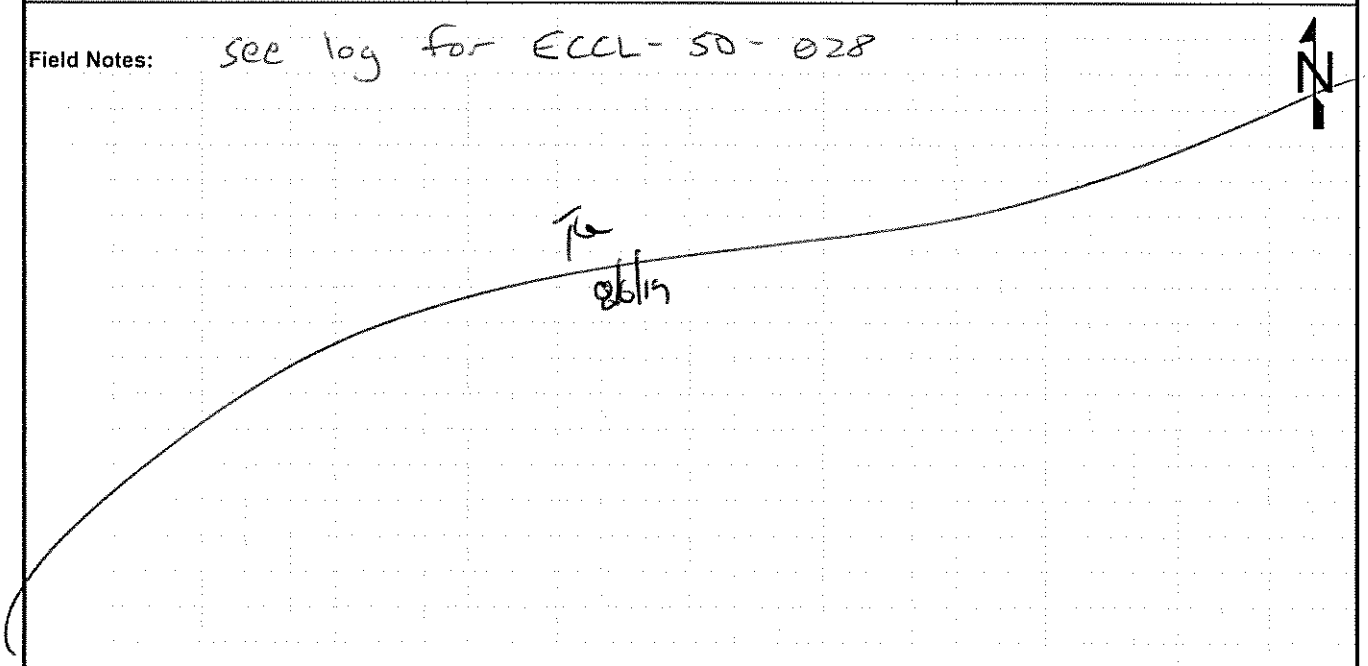
17. Activities in the Area: None

Field Observations (wet/dry sediment, depth of water, field conditions, water description, etc.) ~2.5' water depth ~3" sediment refusal met at 3" below sediment surface insufficient to collect sample.

LOCATION SKETCH/COMMENTS N/A

SCALE: Not to scale

Field Notes: see log for ECCL-SD-028



Sediment Description: see log for ECCL-SDSW-018

8/6/19

Analyses: N/A

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary? 8/6/19

COC NO: N/A

Laboratory: N/A

Recorded By: 7/31/19 (Signature and Date)

QC Checked by: 8/6/19 (Signature and Date)

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-1	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/7/19 | 1100 COMPLETED: 8/8/19 | 1629	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: Dry 8/8/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

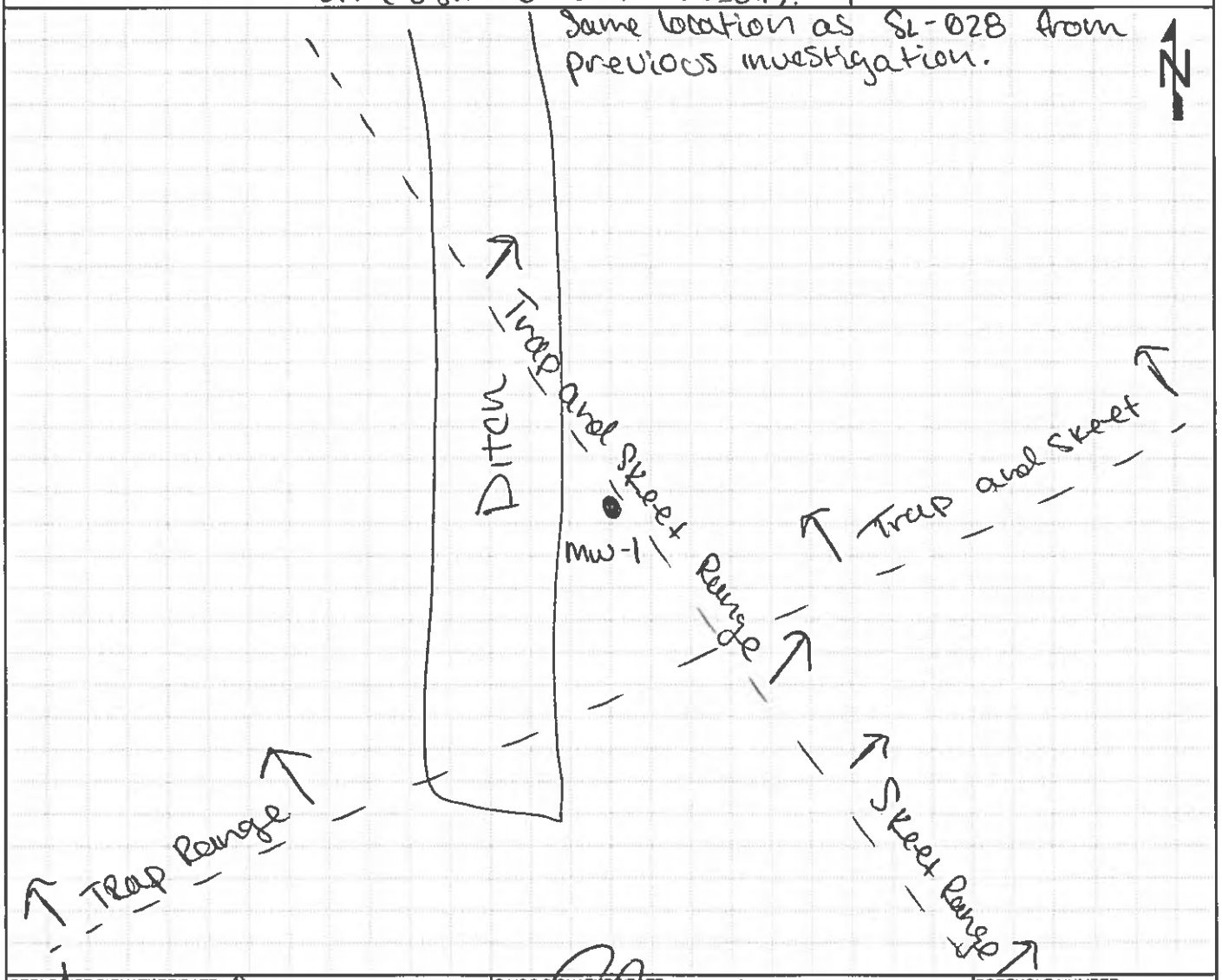
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-1

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: Well installed in Pilot boring from 8/7 (no sluff or water in BOH). SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	MW-1

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-1	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil with clay pigeons, SILT and little fine sand, 10YR2/2, damp, 30 ft.		160	clay pigeons, organic odor to 0.5
	1	SC	SAND and clay, fine sand, sub-angular, 10YR6/1 mottled with 10YR5/8	3.7/4	20	0.5'- burn plastic or rubber odor, no clay pigeons
	2	SH	weathered Bedrock, SHALE, fissile, broken pieces, silt between layers of rock, dry		20	B2 @ Geoprobe 0.022 mg/m3 B2 @ Sample table 0.044 mg/m3
	3				20	
	4					Bedrock Refusal @ 4'
	5		BOH			
	6					
	7					
	8					
	9					
	10					

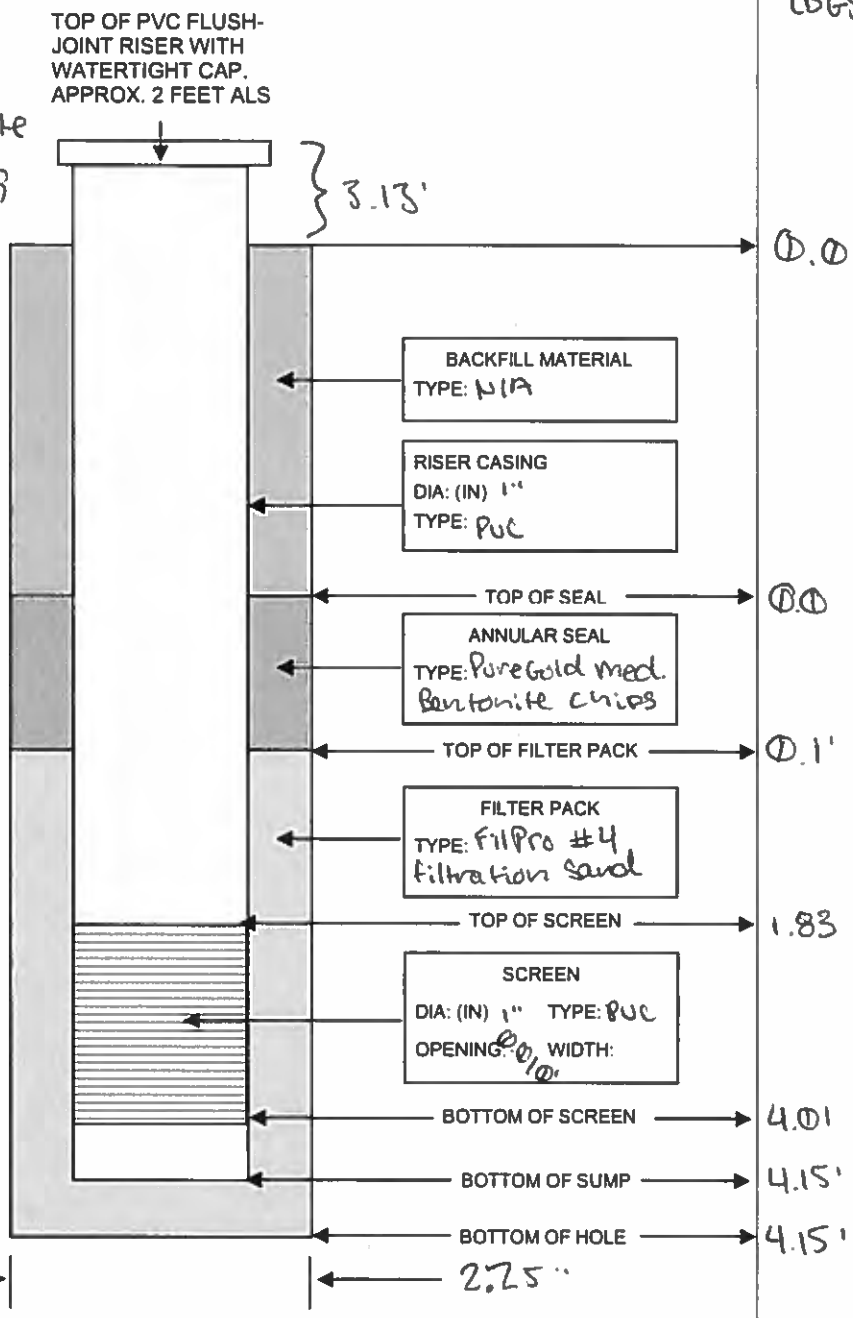
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/7/19	MW-1

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Trap and Skeet Range

WELL NUMBER: MW-1	**BEGIN:** 8/8/19 | 1621	**END:** 8/8/19 | 1629
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

~0.75 gallons potable water used to hydrate bentonite chips



DEPTH (BGS)	ELEVATION
0.0	
0.0	
0.1'	
1.83	
4.01	
4.15'	
4.15'	

Recorded by: [signature] 8/8/19 QA performed by: [signature] 8/8/19

leidos

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-2	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME: STARTED: 8/7/19 | 1255 COMPLETED: 8/8/19 | 1750	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: 3.65'	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic TR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

16. DISPOSITION OF BOREHOLE

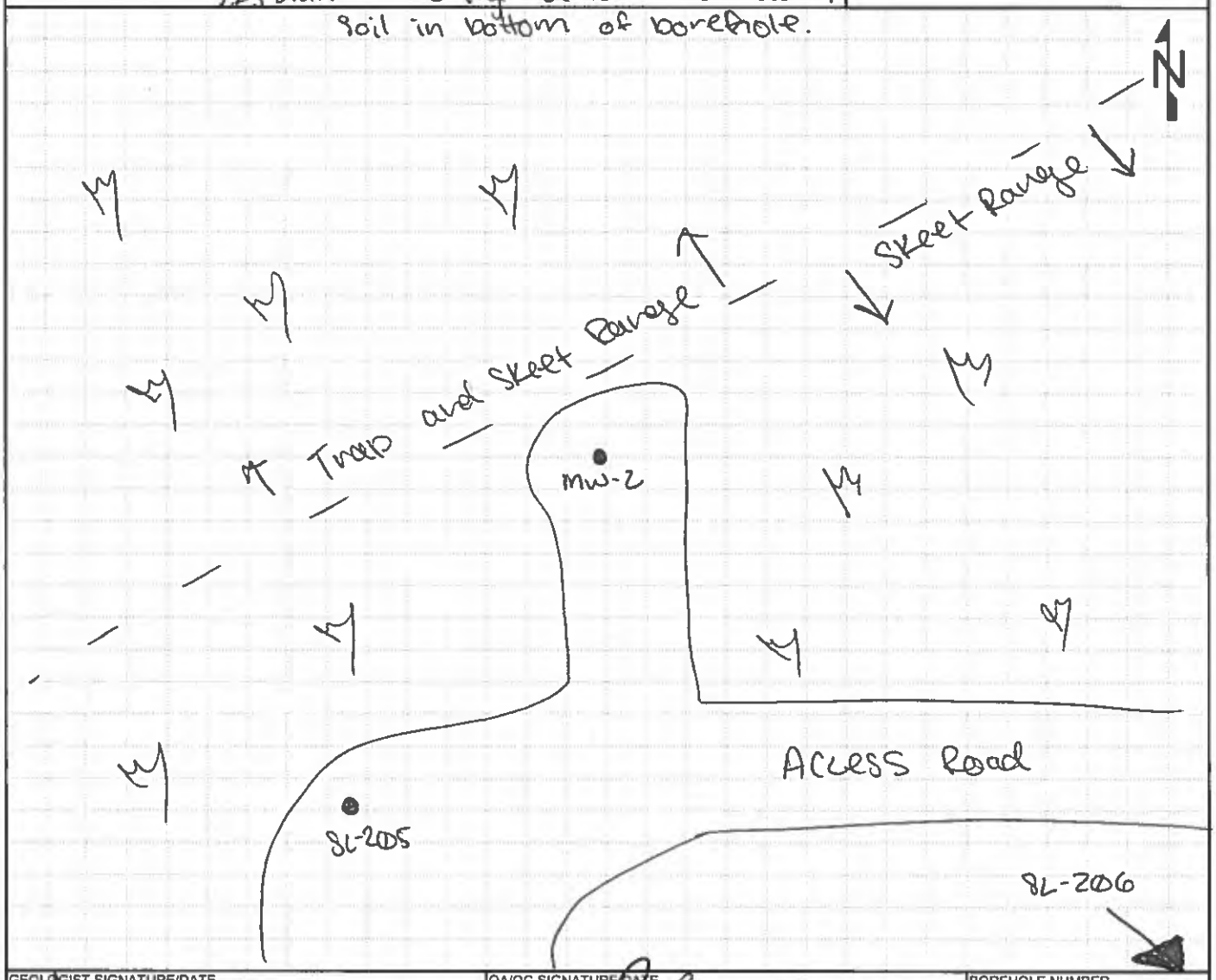
BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-2

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: ~~HG 8/8/19~~ N/A Install MW-2 in pilot boring due to lack of stuff soil in bottom of borehole.

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/15/19	MW-2

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-2	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	0.9' 1	ML	SILT and some SAND and trace CLAY, 10YR 2/2, fine sand, firm to hard, dry to damp, non-plastic	4/4	30	organic odor NO odor
	2	CL	CLAY and little fine sand, 10YR 6/1 and 10YR 5/8 mottled, damp, firm to hard, non-plastic trace sand, moist, nonplastic		20	
	3	SH	weathered SHALE, fissile, Broken fragments of rock, SILT between layers of rock, dry to damp, ~~in some~~ 8/7/19 - more consolidated rock layers, yet broken with silt between layers		20	B2 @ sample table 0.0 mg/m³
	4				10	Bedrock Refusal @ 4.0'
	5		BOH			
	6					
	7					
	8					
	9					
	10					

MM 8/7/19

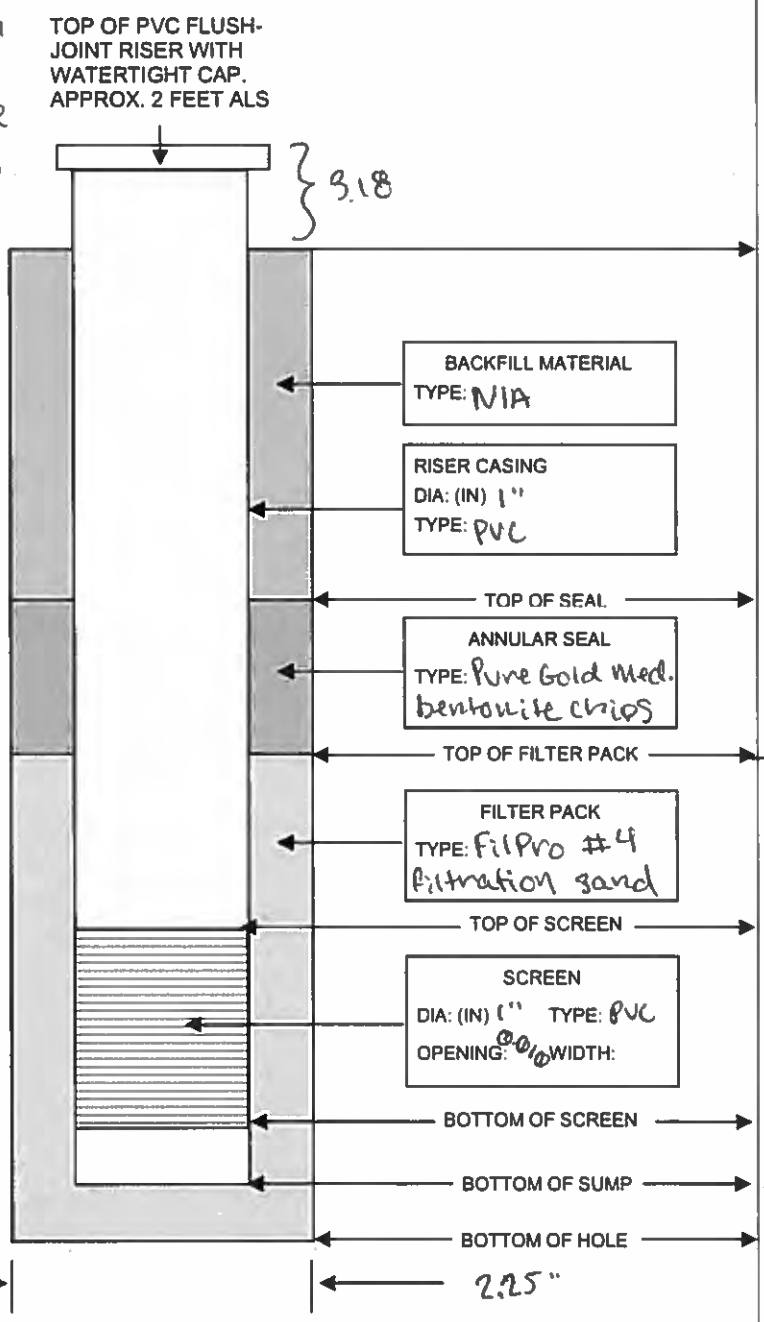
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/15/19	MW-2

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Skeet Range

WELL NUMBER: MW-2	**BEGIN:** 8/8/19 / 1750	**END:** 8/8/19 / 1808
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

Approx. 1 gallon potable water used to hydrate bentonite chips



DEPTH	ELEVATION

Recorded by: [signature] 8/8/19 QA performed by: [signature] 8/8/19

leidos

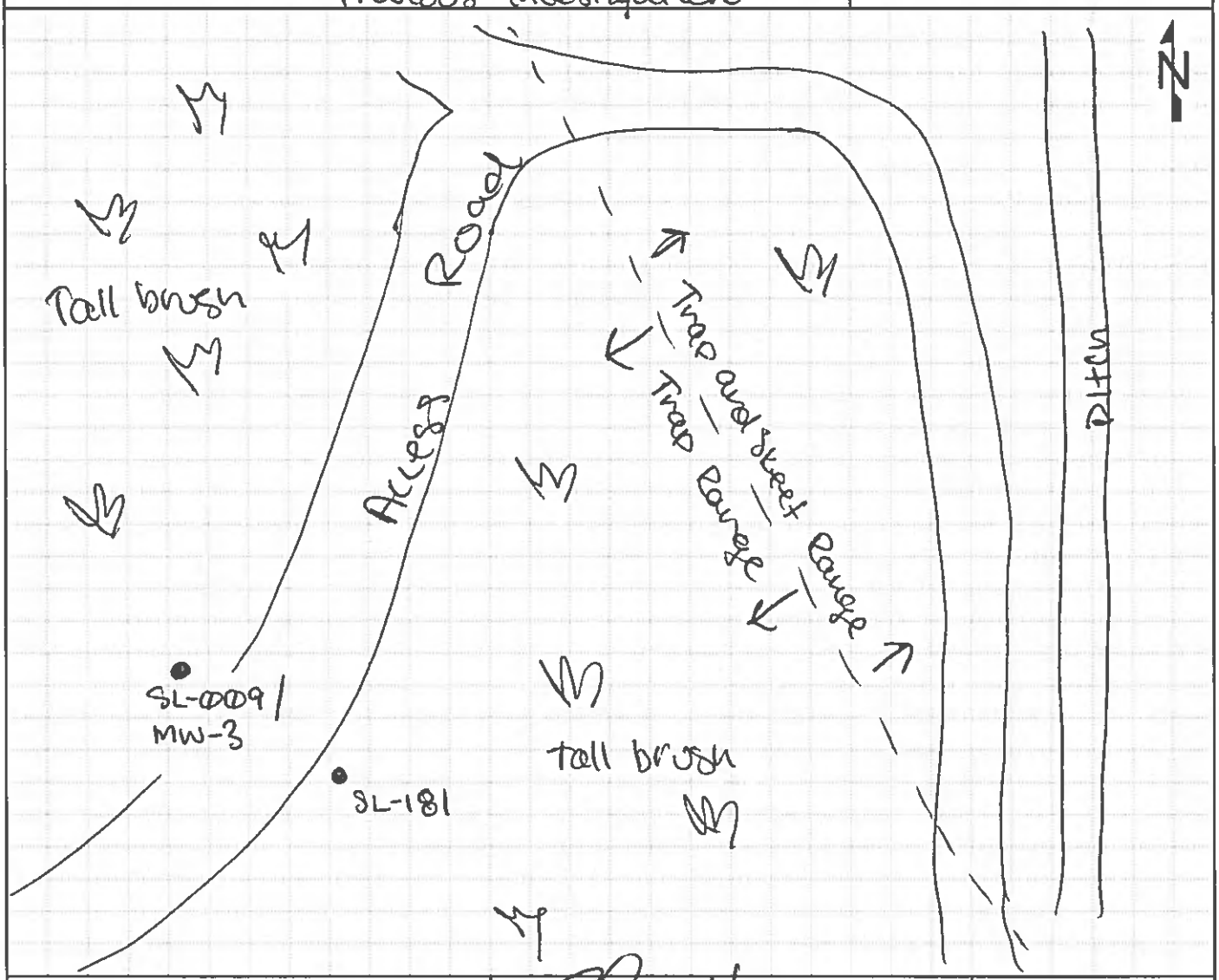
HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-3	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Snallhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: 4' Acetate Liner, DT325 Rods (3")	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME: STARTED: 8/2/19 0950 COMPLETED: 8/2/19 1100	
	10. DEPTH GROUNDWATER ENCOUNTERED: NA	
11. OVERBURDEN THICKNESS: 4.2"	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: Dry 8/5/19	
13. DEPTH DRILLED INTO BEDROCK: 0"	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.2"		
16. DISPOSITION OF BOREHOLE		
BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL	WELL ID: MW-3	

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS: MW-3 located @ SL-009 from previous investigation

SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/2/19	QA/QC SIGNATURE/DATE: 8/6/19	BOREHOLE NUMBER: MW-3

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-3	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for pb RC 8/6/19

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	1	OL	Organic topsoil, SILT and some sand and trace clay, 10YR 2/2, fine sand, firm to hard, dry to damp	3.5 / 4.2	3220 ppm w/ XRF	organic odor
					250	
	2				90	
	2.8	CL	Clay and some sand, and little silt, 10YR 5/2 and 3/2 and 3/6, moist, low plasticity			
	3	FILL	Brick fill, large (~2") fragments			
		CL	Clay and some sand and little silt 10YR 7/1 mottled with 10YR 2/2 and 10YR 5/8,		20	NO odor
	4	SH	weathered SHALE, fissile, silt between layers, damp			Bedrock Refusal @ 4.2
	5		BOH 4.2			~~NO LAB SAMPLES AT THIS LOCATION RC 8/6/19~~
	6					
	7					
	8					
	9					
	10					

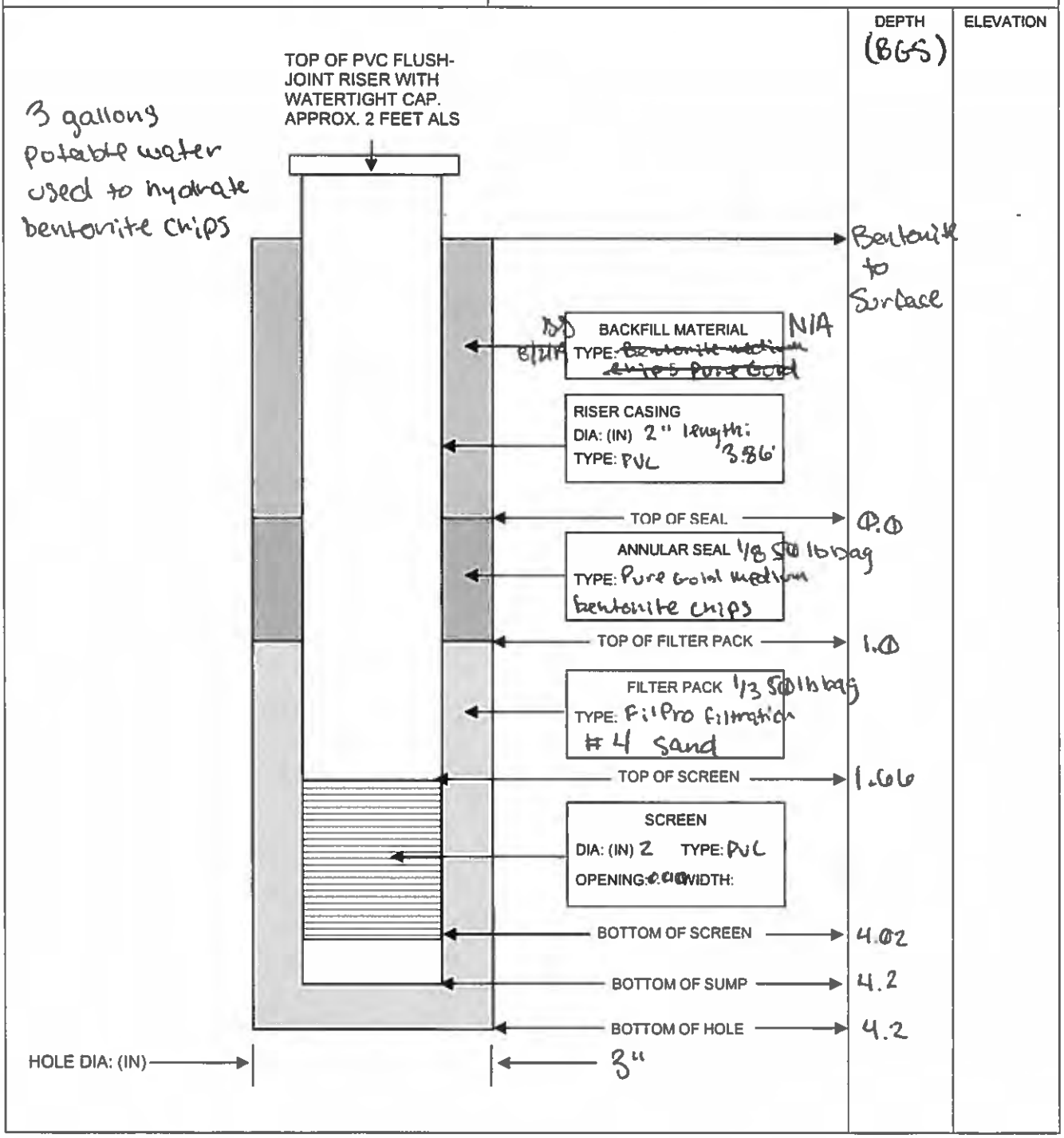
MB 8/2/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/2/19	8/6/19	MW-3

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Trap ~~Wet Skeet~~ Range JS 8/2/19

WELL NUMBER: MW-3	**BEGIN:** 8/2/19 / 0950	**END:** 8/2/19 / 1031
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL



Recorded by: [signature] 8/2/19 QA performed by: [signature] 8/6/19

leidos

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-4	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg A Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4') ~~325 DT Roots (5')~~ AA 8/8/19	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/7/19 | 1152	COMPLETED: 8/8/19 | 1720
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	AA 8/8/19
11. OVERBURDEN THICKNESS: 4.00'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: ~~N~~ 3.69	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.00'		

16. DISPOSITION OF BOREHOLE

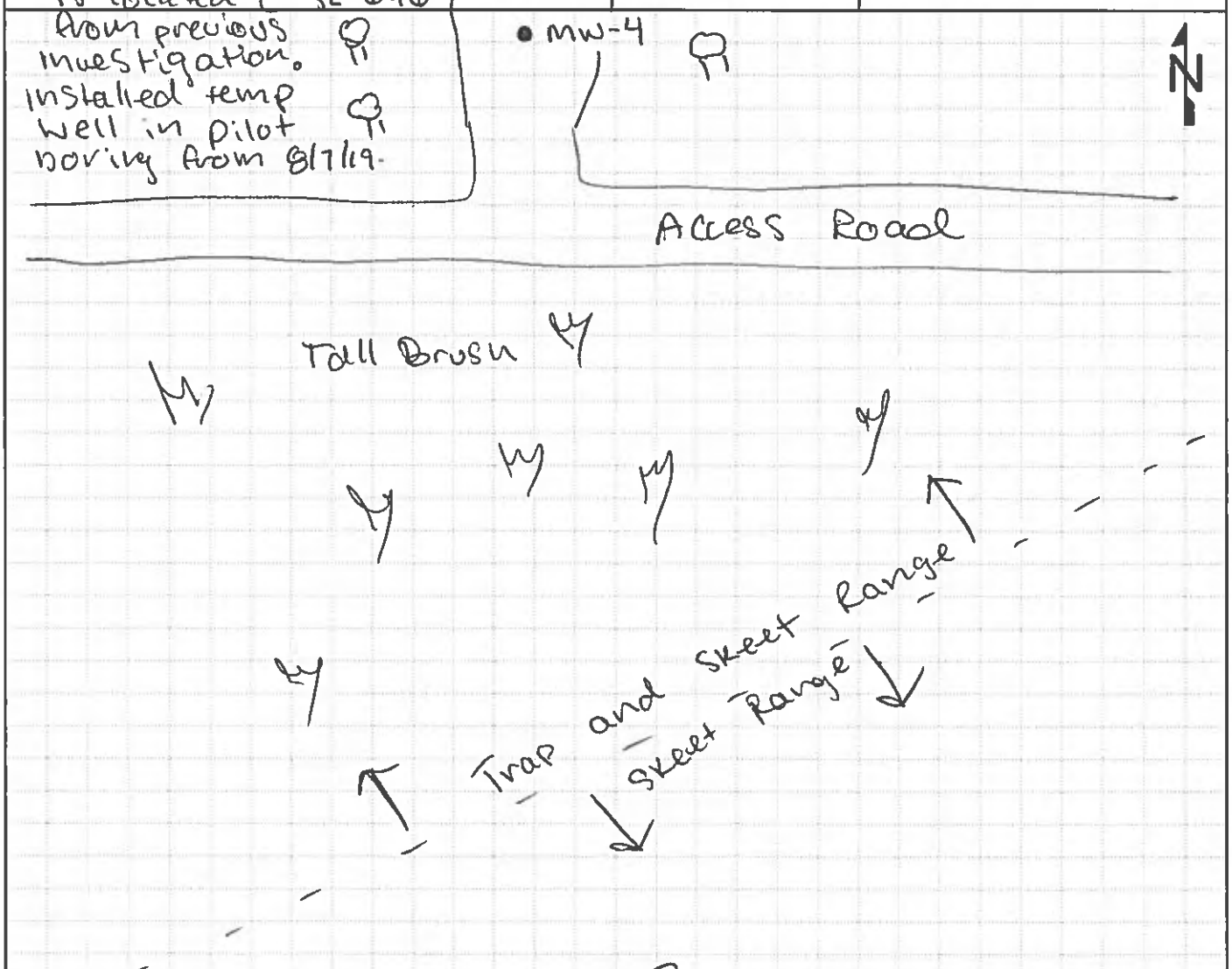
BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-4

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: MW-4 is located @ SL-0416 from previous investigation. Installed temp well in pilot boring from 8/7/19.

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/9/19	MW-4

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-4	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF Cr, Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.5'	ML	SILT and SAND, fine, sub-angular, 10YR 3/2, moist, non-plastic, soft	4/4	2700	Slight organic odor
	1	SC	SAND and trace CLAY, 10YR 4/6, fine, sub-rounded, moist, soft, non plastic		30	No odor
	1.8' 2	CL	CLAY and some SAND, 10YR 7/1 and 10YR 5/8 mottled, soft, moist, non plastic		30	B2 @ Geoprobe 0.047 mg/m³
	3	SH	Weathered SHALE, dry, silt between bedrock fragments,		20	Bedrock Refusal @ 4.0'
	4					
	5		BOH			
	6					
	7					
	8					
	9					
	10					

MM 8/7/19

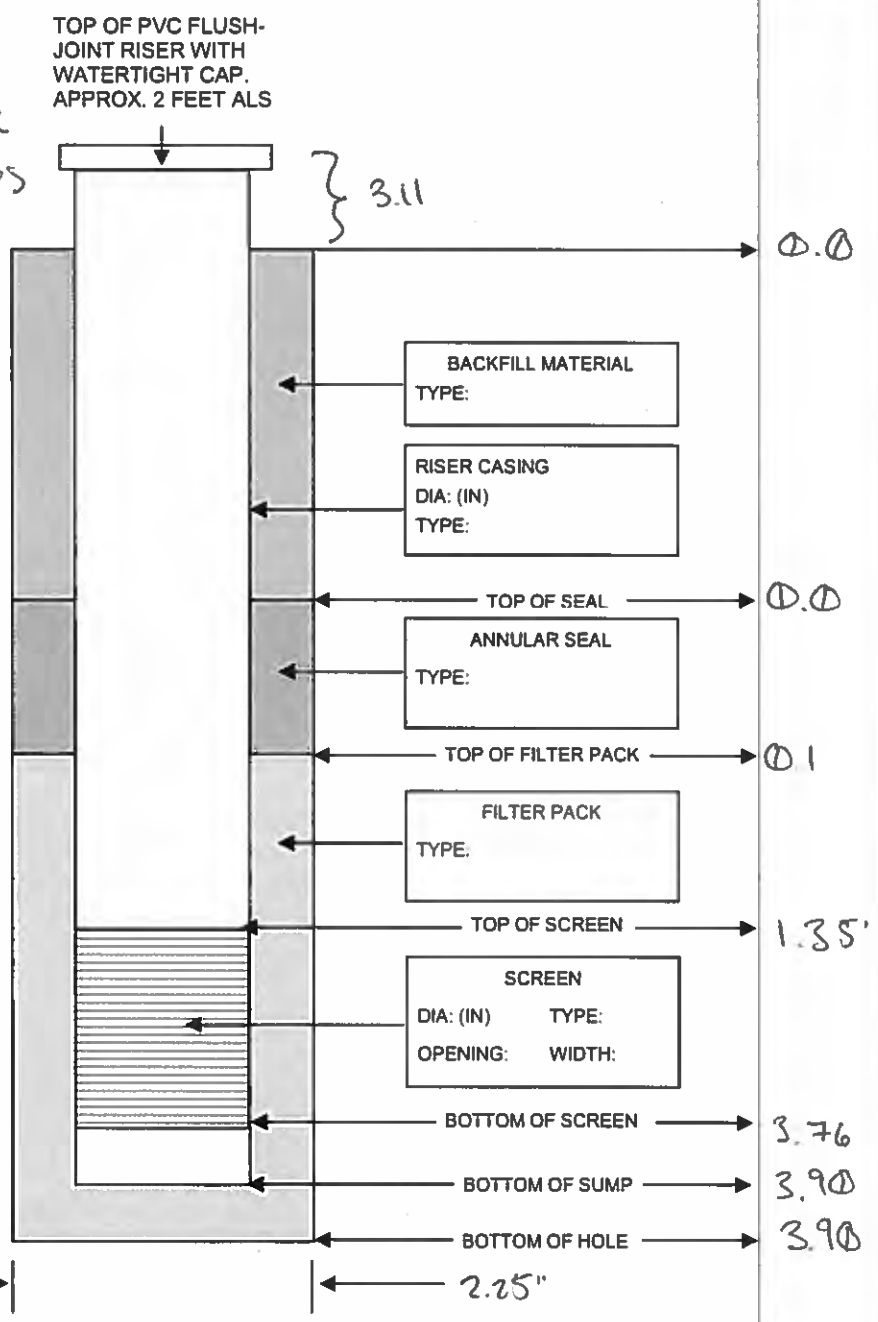
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	MW-4

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Trap and Skeet Range

WELL NUMBER: MW-4	**BEGIN:** 8/8/19 / 1702	**END:** 8/8/19 / 1720
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

~0.75 gallons potable water used to hydrate bentonite chips



DEPTH	ELEVATION
0.0	
0.0	
0.1	
1.35'	
3.76	
3.90	
3.90	

Recorded by: 8/8/19 QA performed by: 8/9/19

leidos

HTRW DRILLING LOG

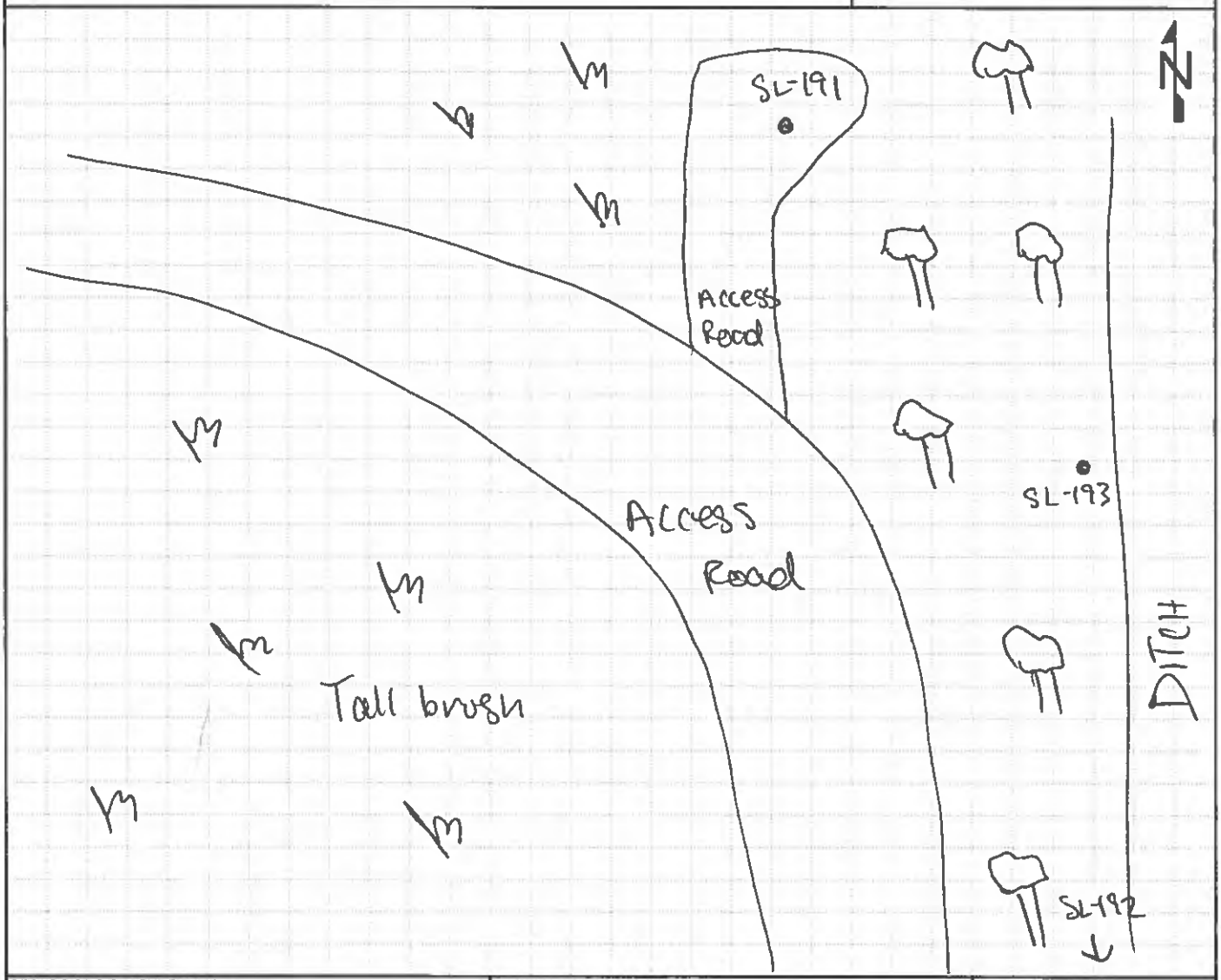
CLIENT: NASA	BOREHOLE NUMBER: SL-191	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Stellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/1/19 | 0942	COMPLETED: 8/1/19 | 1420
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: N/A	
13. DEPTH DRILLED INTO BEDROCK: 0.3'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.3'		

16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT, BENTONITE (circled) — SEMI-TEMPORARY MONITORING WELL — WELL ID: N/A

17. NOTES: BKG: Background; BGS: Below Ground Surface; PPM: Parts per Million; ▽: First Water Encountered; ▼: Static Water Level; NA: Not Applicable

LOCATION SKETCH/COMMENTS N/A — **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-191

8/1/19

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-191	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	
5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+	XRF SERIAL#: 041982	Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING Lead (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and some fine sand, 10YR 2/2, dry, soft		2460	Organic odor ECCLSB198 @ 1420 (0.5'-1')
	0.8'				2360	
	1	CL	Interbedded clay and sand; beds are very thin; clay is clay with little fine sand, 10YR 5/8 and 10YR 4/1 and 10YR 7/1, non-plastic, firm, damp; sand is fine to medium 10YR 7/1, poorly sorted	3.7/4	280	No odor ECCLSB199 @ 1425 (1'-1.5')
	2				30	
					30	
	3				20	
			10YR 2/2 and 10YR 5/8		50	
	3.7'					
	4	SH	weathered SHALE, fissile, non-consolidated material with rock powder between layers, silt, 10YR 2/2, iron staining		50	
	4.3	LS		0.3/0.3	40	
	5		LIMESTONE or SILTSTONE w/ lime cement, 10YR 7/1, massive, mica grains throughout		N/A	Bedrock Refusal
			BOH			
	6					
	7					
	8					
	9					
	10					

SS 8/1/19

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/1/19	8/2/19	SL-191

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-5 / SL-191	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4') DT325 Rods (3")	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/2/19 | 1106 COMPLETED: 8/2/19 | 1138	
	10. DEPTH GROUNDWATER ENCOUNTERED: NA	
11. OVERBURDEN THICKNESS: 4.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: Dry (8/5/19)	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb (SL-191)	
15. TOTAL DEPTH OF BOREHOLE: 4.0'		

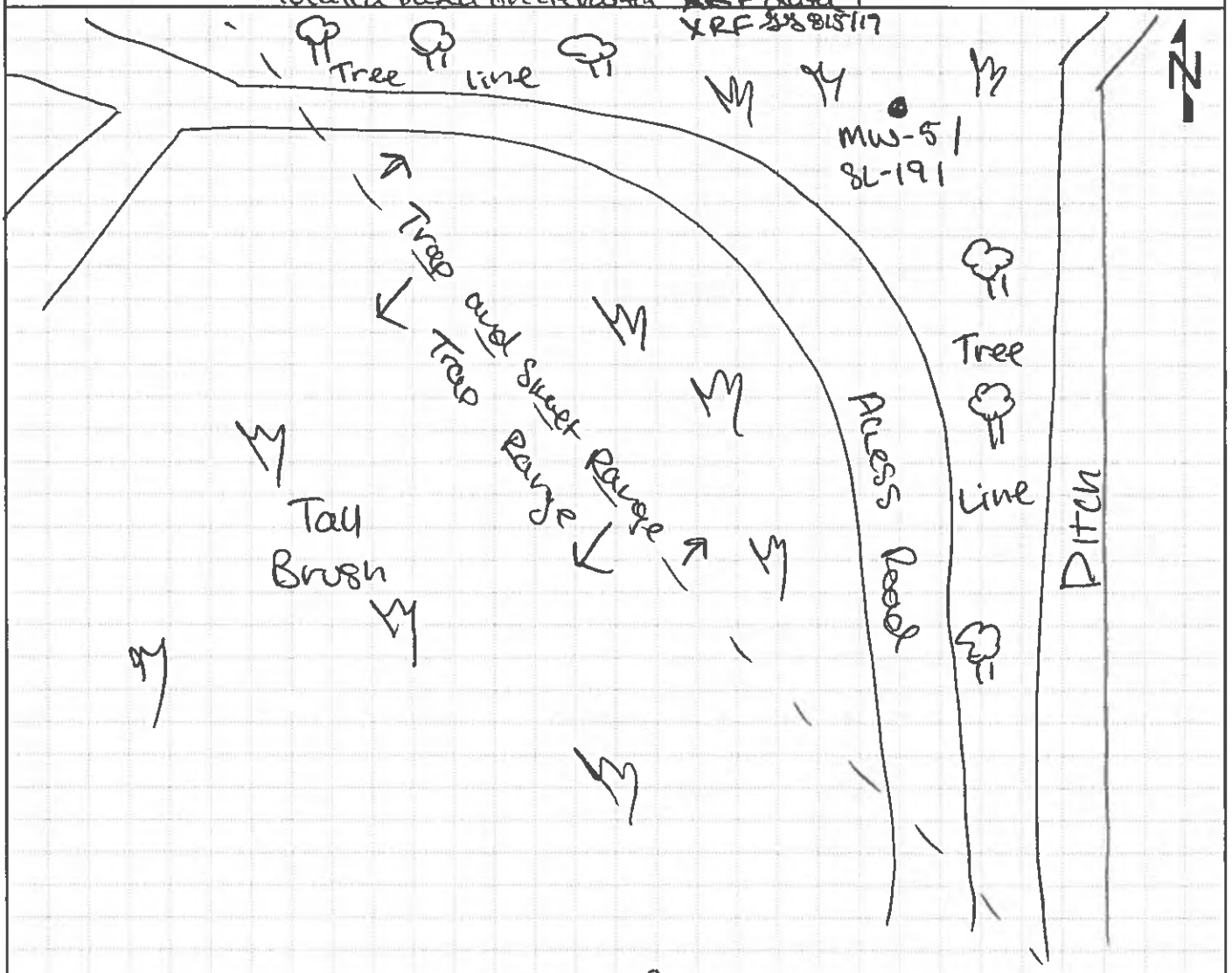
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE (SEMI-TEMPORARY MONITORING WELL) WELL ID: MW-5

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: MW-5 placed where SL-191 is located based on elevation ~~XRF~~ data XRF 8/8/19 SCALE: None



GEOLOGIST SIGNATURE/DATE: 8/2/19	QA/QC SIGNATURE/DATE: 8/6/19	BOREHOLE NUMBER: MW-5 / SL-191

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-6	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shallhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Trap and Skeet Range	
	9. DRILL DATE/TIME: STARTED 8/7/19 | 1125 COMPLETED 8/8/19 | 1655	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 3.9	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: Dry 8/8/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 3.9'		

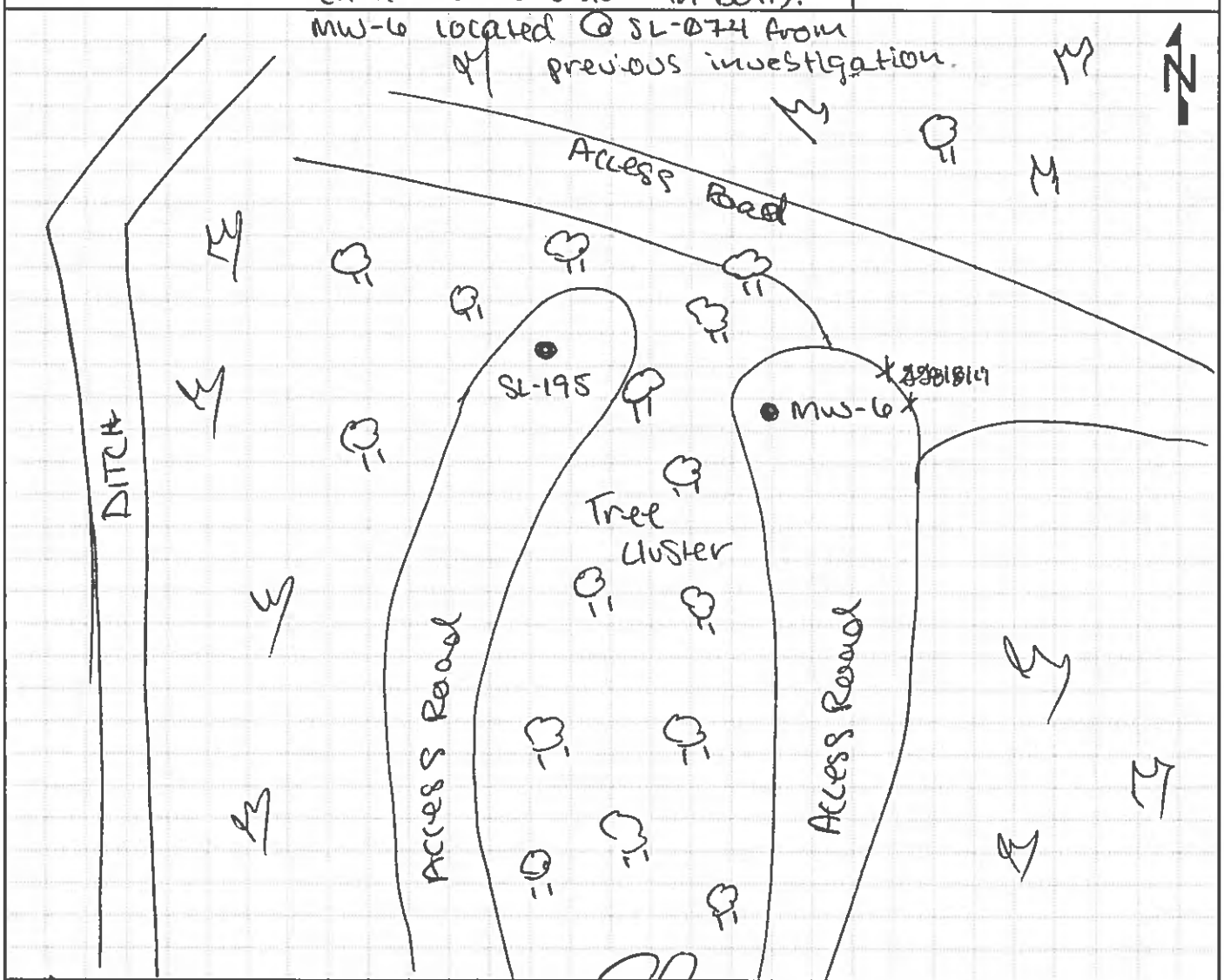
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-6

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: Well installed in pilot boring from 8/7 (little water and stuff in BOH). SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/9/19	MW-6

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-6	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF Pb-Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.2	OL	Peat, organic material and sand			organic odor
	0.5'	ML	SILT and SAND, fine, 10YR 2/2, moist, nonplastic, soft		10700	
	1		SAND and little silt, subrounded, fine, 10YR 4/4			
		SM	10YR 2/2	3.5	5830	
	2		10YR 4/4	3.7		
	2.5'		SAND and some clay, fine, subrounded, 10YR 4/1 and 10YR 5/8 mottled, damp to moist, non-plastic, soft		40	
	3	SC				
			weathered SHALE, fissile, broken rock, dry, 10YR 2/2, iron staining		40	NO odor, iron staining, Bedrock Refusal @ 3.9'
	4		BOH			
	5					
	6					
	7					
	8		MS 8/7/19			
	9					
	10					

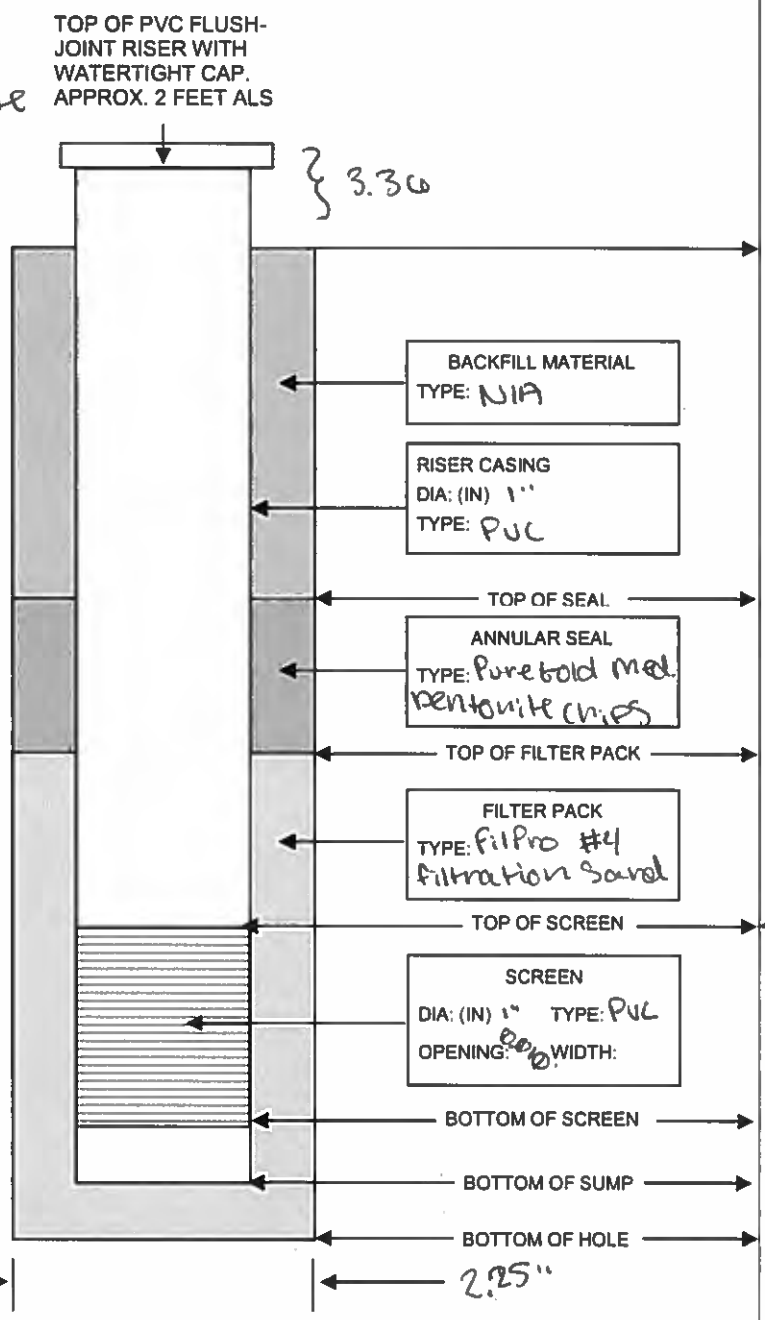
GEOLOGIST SIGNATURE/DATE: 8/7/19	QA/QC SIGNATURE/DATE: 8/8/19	BOREHOLE NUMBER: MW-6

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Trap and Skeet Range

WELL NUMBER: MW-6	**BEGIN:** 8/8/19 | 1035	**END:** 8/8/19 | 1050
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

~0.75 gallons used to hydrate bentonite chips



DEPTH	ELEVATION

Recorded by: [signature] 8/8/19 QA performed by: [signature] 8/8/19

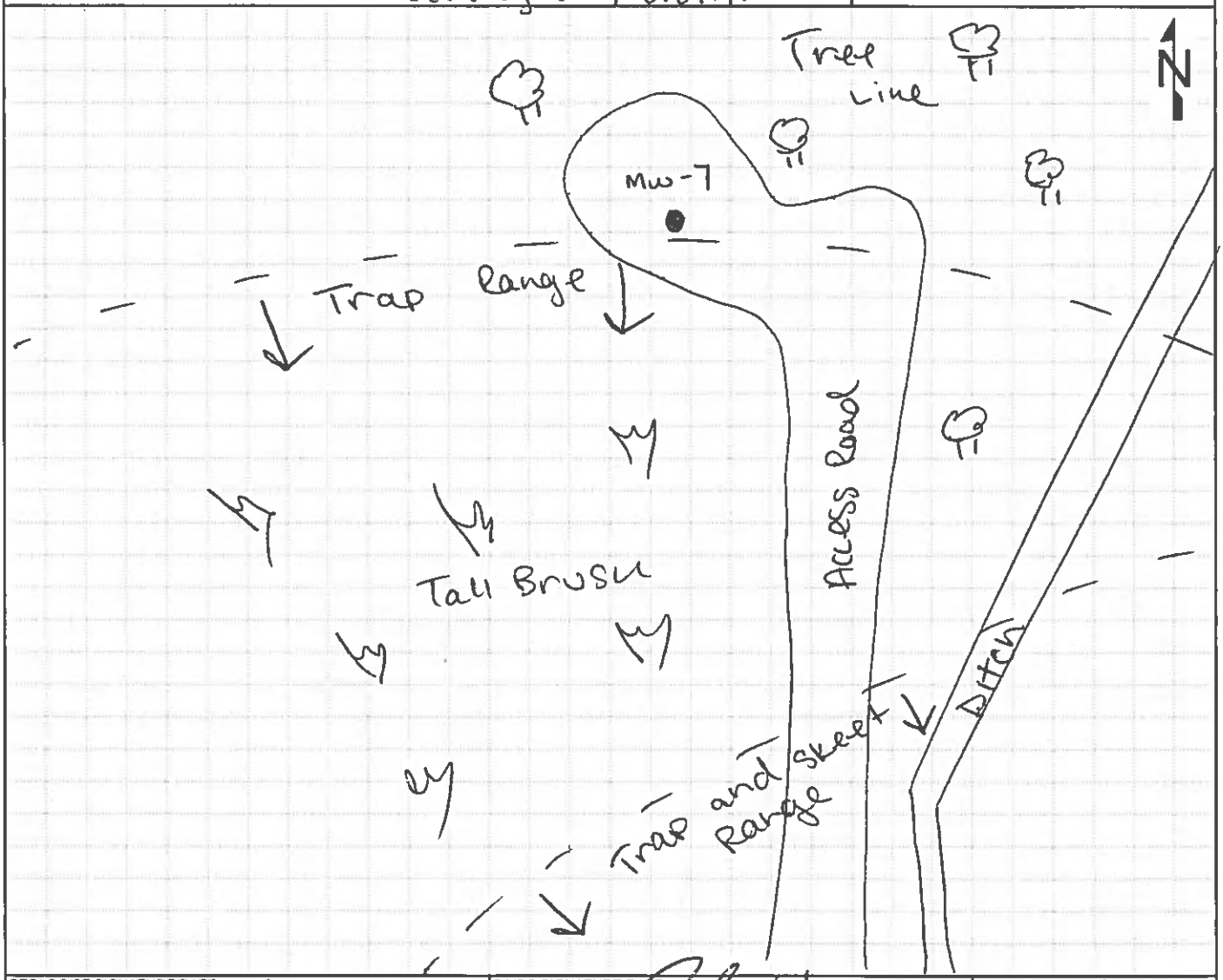
leidos

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-7	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4') DT 325 Rods (3")	8. BOREHOLE LOCATION: Trap Range	
	9. DRILL DATE/TIME: STARTED: 8/7/19 1005 COMPLETED: 8/8/19 1007	
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 9.3'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: Dry 8/8/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 9.3'		
16. DISPOSITION OF BOREHOLE: Pre-Packtal 5' Screen		
BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL	WELL ID: MW-7	
17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million ▽: First Water Encountered ▼: Static Water Level NA: Not Applicable		

LOCATION SKETCH/COMMENTS Install pre packed 5' screen in new boring (3") 8/8/19.

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/14/19	MW-7

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	MW-7

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) RXF for Pb	REMARKS (Sample IDs/Depths/Etc.)
		SM	SILT and some fine sand, sub-angular, 10YR 3/3, damp/moist, non-plastic, soft		20	organic odor,
	1	SM	SAND and little silt, fine, sub-rounded, 10YR 4/6, moist, soft non-plastic	3.2/4	ND	NO odor
	2	FILL	Gravel with sand and clay, limestone and shell (0.10" to 10") poorly sorted, dry			Gravel, sand, clay fill, dry
	3	CL	CLAY and trace fine sand, 10YR 6/1 and 10YR 7/6 mottling, dry to damp, firm, non plastic, laminated tight clay		ND	
	4				ND	
	5		Calcite mineralization, 10YR 7/1		ND	Calcite mineral growth - see photos
	6	CL	No sand, laminated tight clay.	4/4	ND	
	7				ND	
	8				ND	
	9			1.3/1.3	ND	ND = NON-DETECT w/ XRF 10/8/19
	9.3		very little limestone pieces, broken BOH	10YR 5/1		Bedrock refusal @ 9.3'
	10					

SR 8/7/19

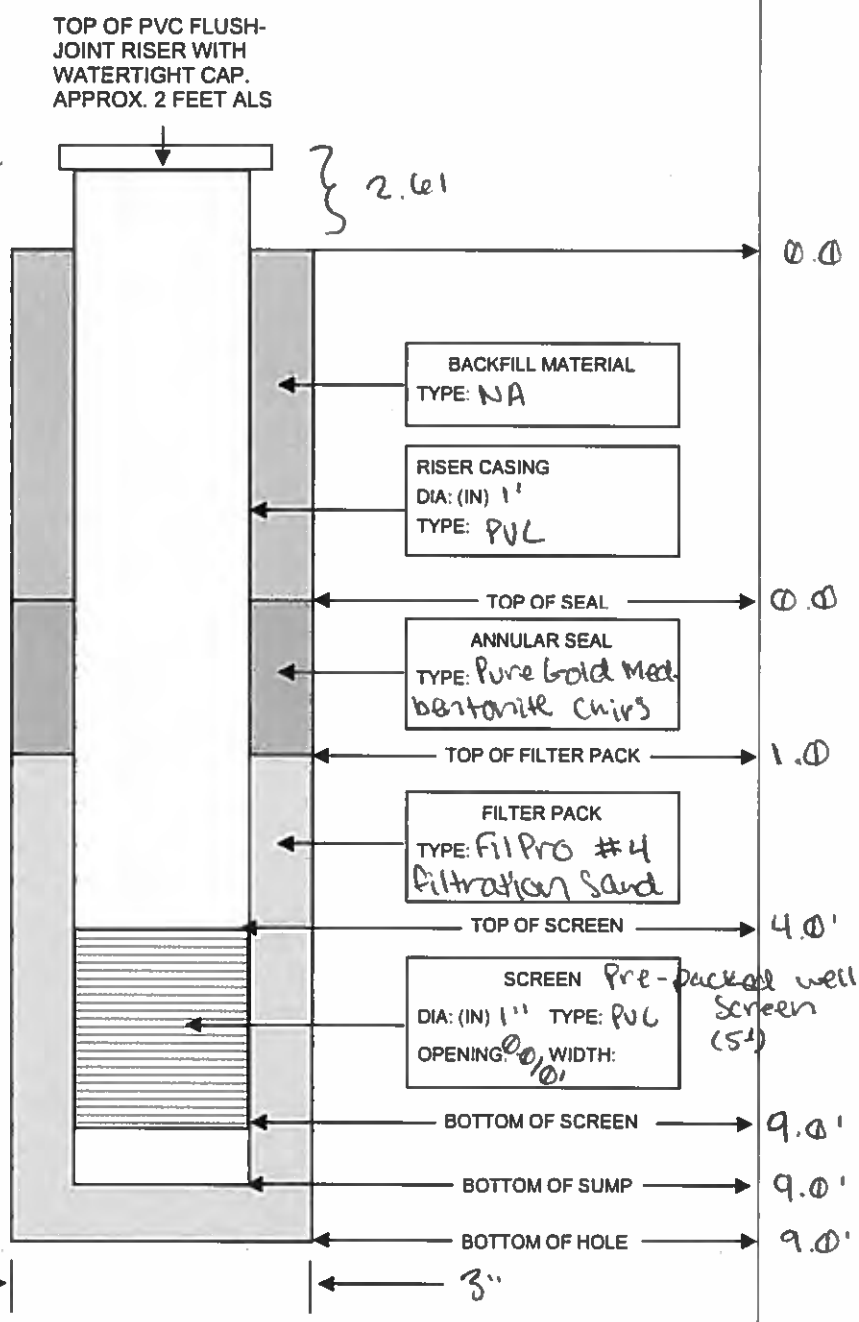
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/15/19	MW-7

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Trap Range

WELL NUMBER: MW-9	**BEGIN:** 8/8/19 | 1540	**END:** 8/8/19 | 1605
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

approx 1 gallon potable water used to hydrate bentonite



DEPTH	ELEVATION

Recorded by: [signature] 8/8/19 QA performed by: [signature] 8/8/19

leidos

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-8	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Pletale liner (4') ~~DT 325 Rods (3")~~ 8/8/19	8. BOREHOLE LOCATION: Skeet Range	
	9. DRILL DATE/TIME STARTED: 8/7/19 | 1219	COMPLETED: 8/8/19 | 1741
	10. DEPTH GROUNDWATER ENCOUNTERED: 3.5'	
11. OVERBURDEN THICKNESS: 6.0'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: Dry 8/8/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 6.0'		

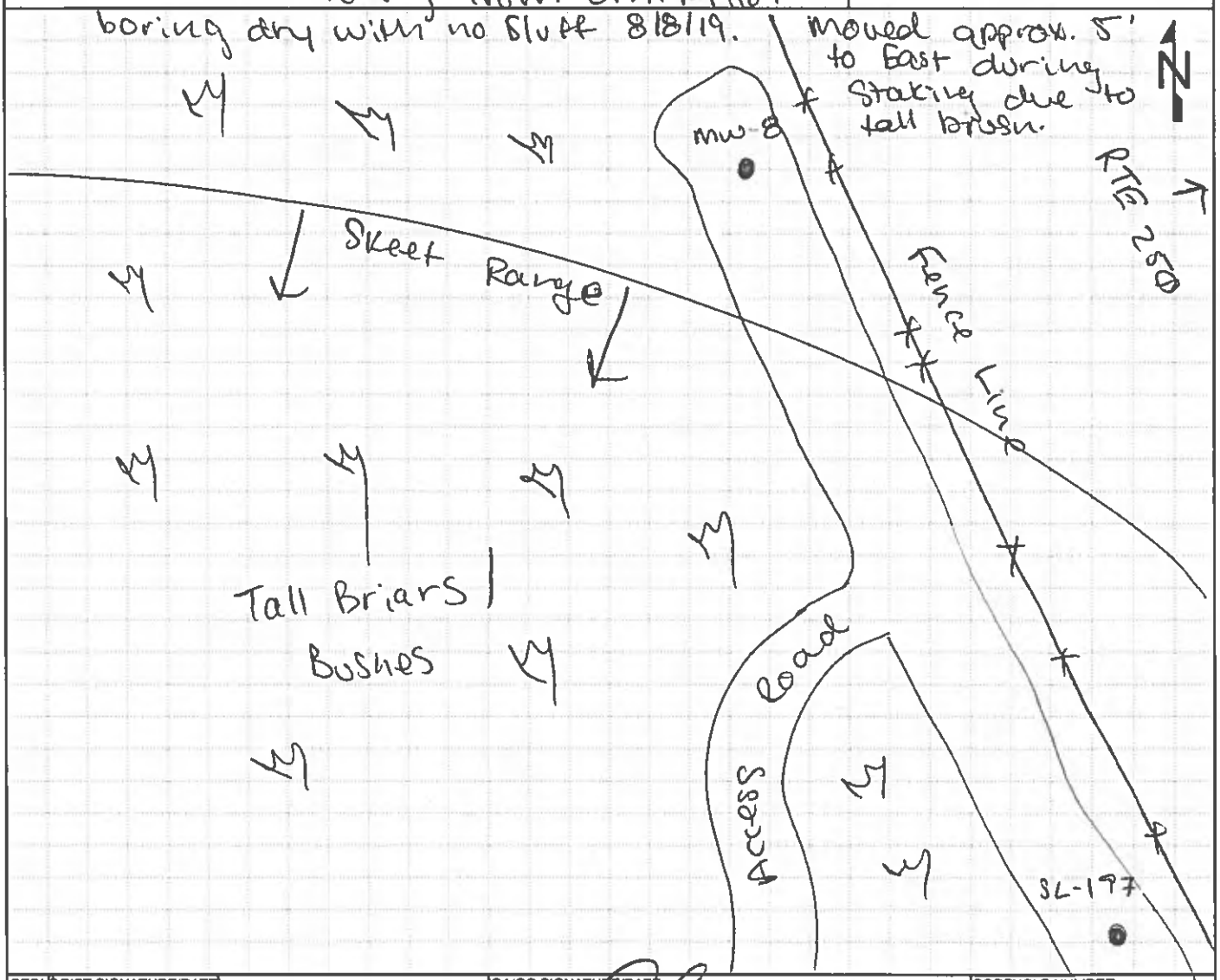
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE (SEMI-TEMPORARY MONITORING WELL) WELL ID: MW-8

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS Install temp well in pilot boring from 8/7/19. Pilot boring dry with no sluff 8/8/19. Moved approx. 5' to East during staking due to tall brush. SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/14/19	MW-8

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	MW-8

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

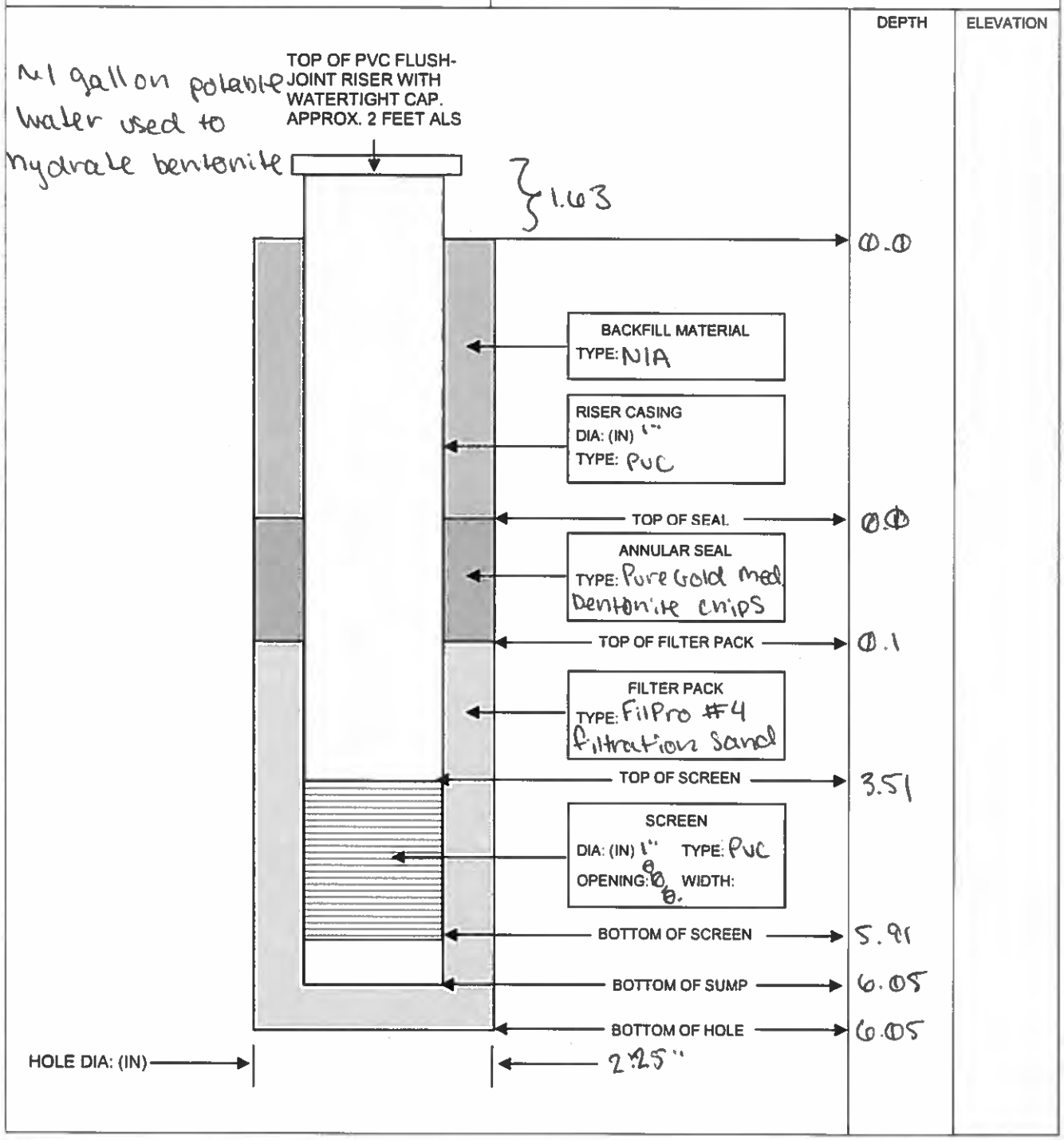
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	ML	SILT and SAND, fine, 10YR2/1, moist, soft, non-plastic		30	organic odor (slight)
	1.2'		SAND and trace SILT, 10YR5/6, fine, sub-rounded, damp	3.0/4.0	ND	NO odor
	2	SC	wet		ND	
	3					
	▽		saturated @ 3.5'		ND	groundwater @ 3.5'
	4					
	4.8'	CL	CLAY and trace SHALE chips, (0.10" to 0.25") 10YR4/2, wet, high plasticity	1.0/2.0	ND	
	5	LS	weathered LIMESTONE, 10YR5/2, dry, limestone fragments, pulverized rock 8/7/19		ND	
	6					Bedrock refusal @ 6.0'
	7		BOH			
	8					ND = NON DETECT w/ XRF TR 8/15/19
	9		MR 8/7/19			
	10					

GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/15/19	MW-8

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Skeet Range

WELL NUMBER: MW-8	**BEGIN:** 8/8/19 | 1730	**END:** 8/8/19 | 1741
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL



Recorded by: [signature] 8/8/19 QA performed by: [signature] 8/19/19

leidos

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: ~~SL~~ 8/6/19 MW-9	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Greg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate Liner (4") DT 325 Rods (3")	8. BOREHOLE LOCATION: Rifle Range	
	9. DRILL DATE/TIME: STARTED: 8/6/19 1024 COMPLETED: 8/8/19 1429	
	10. DEPTH GROUNDWATER ENCOUNTERED: ~~N/A~~ 3.5'	
11. OVERBURDEN THICKNESS: 4.6'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: 3.05' 8/9/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.6'		

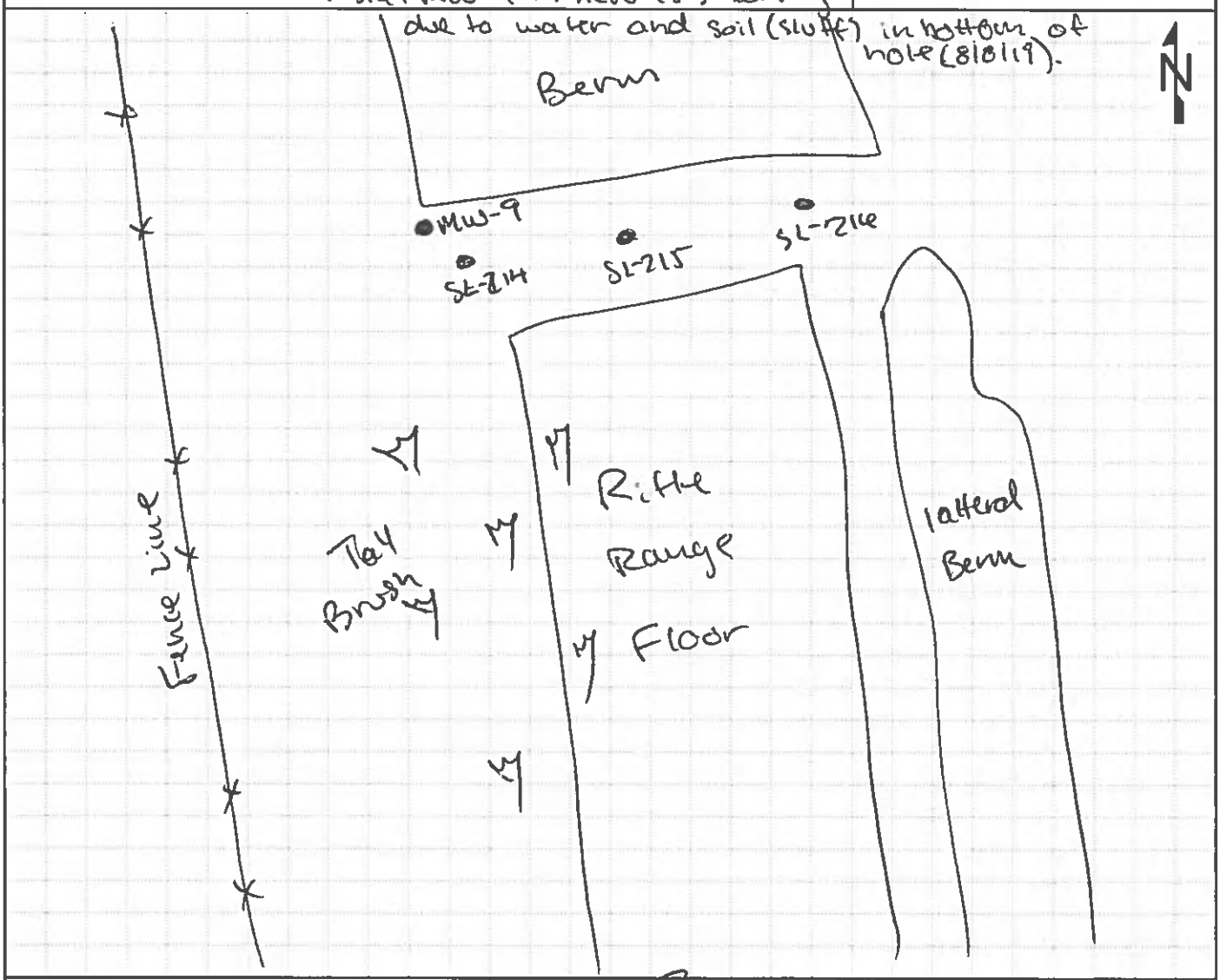
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE (SEMI-TEMPORARY MONITORING WELL) WELL ID: MW-9

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: Pilot boring for proposed MW-9. Install MW-9 in new (3") boring due to water and soil (sluff) in bottom of hole (8/6/19). SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/8/19	MW-9

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-9	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	1	SM	SAND and some SILT and little clay, trace SHALE fragments (0.25 to 1"), 10YR 3/4, fine to medium sand, poorly sorted, damp.		450	organic odor ↓ No odor
	2	CL	CLAY and little fine sand, 10YR 2/1, damp, non-plastic, firm	3.8/4	1570	
	2.5 / 3	CL	clay and fine sand, 10YR 5/6 and 10YR 4/1, damp, non plastic		90	
	▽ 4		wet, low plasticity		60	groundwater @3.5'
	4.6'	SM	dry AS 8/6/19 weathered SHALE, ~~damp~~, 10YR 2/1 fissile broken fragments, silt and broken rock between layers	0.6/0.6	20	↓ Bedrock Refusal @ 4.6'
	5		BOH			
	6					
	7					
	8		AS 8/6/19			
	9					
	10					

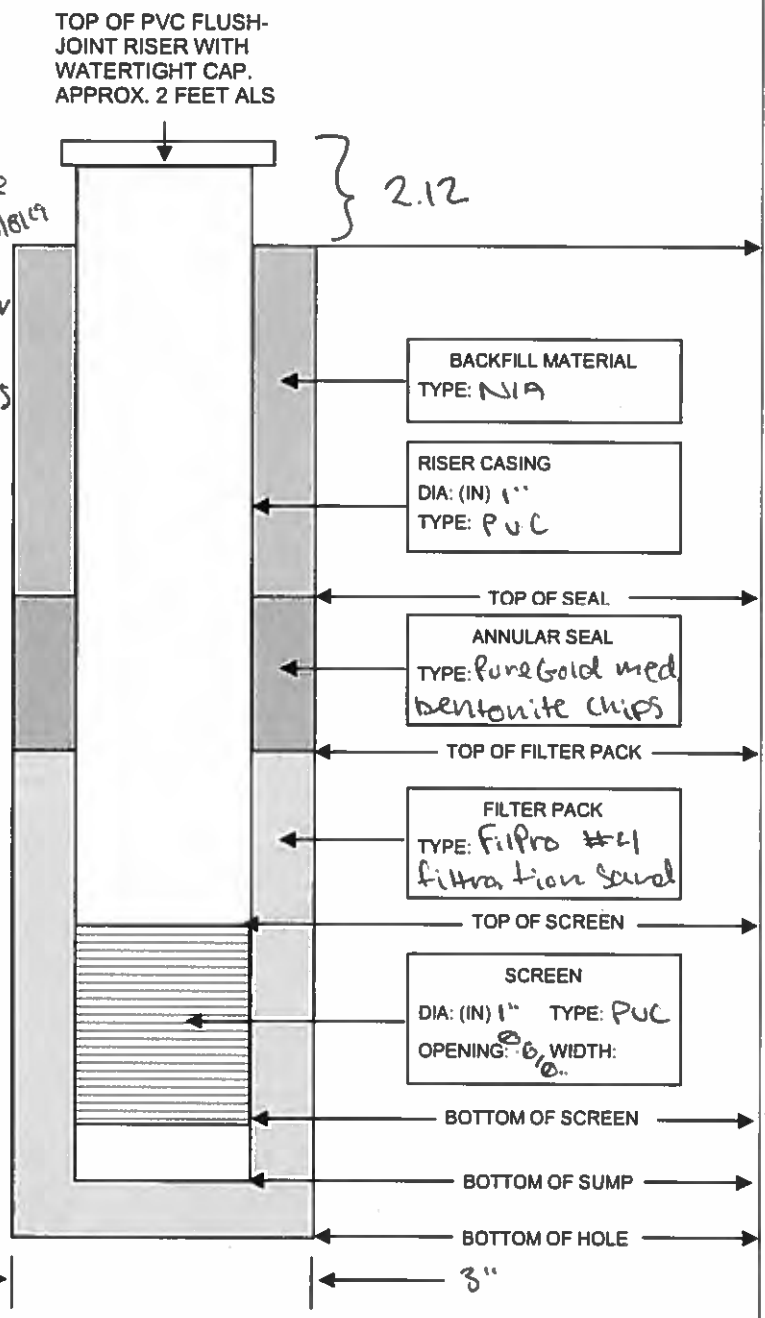
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/6/19	8/15/19	MW-9

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Rifle Range

WELL NUMBER: MW-9	**BEGIN:** 8/8/19 | 1402	**END:** 8/8/19 | 1429
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

1 gallon potable water used to hydrate bentonite chips. 0.5' ~~dry~~ ~~chips hydrated~~ 8/8/19 chips above filter pack and 0.5' pre-hydrated chips to surface.



DEPTH	ELEVATION

Recorded by: [signature] 8/8/19 QA performed by: [signature] 8/19/19

leidos

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-233 / MW-10	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (west)	
	9. DRILL DATE/TIME STARTED: 8/7/19 / 0808	COMPLETED: 8/8/19 / 1354
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: 4.2' 8/8/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): VOC, SVOCs, PAHs, TAL Metals, Arsenic, FR Metals, Antimony, Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

16. DISPOSITION OF BOREHOLE

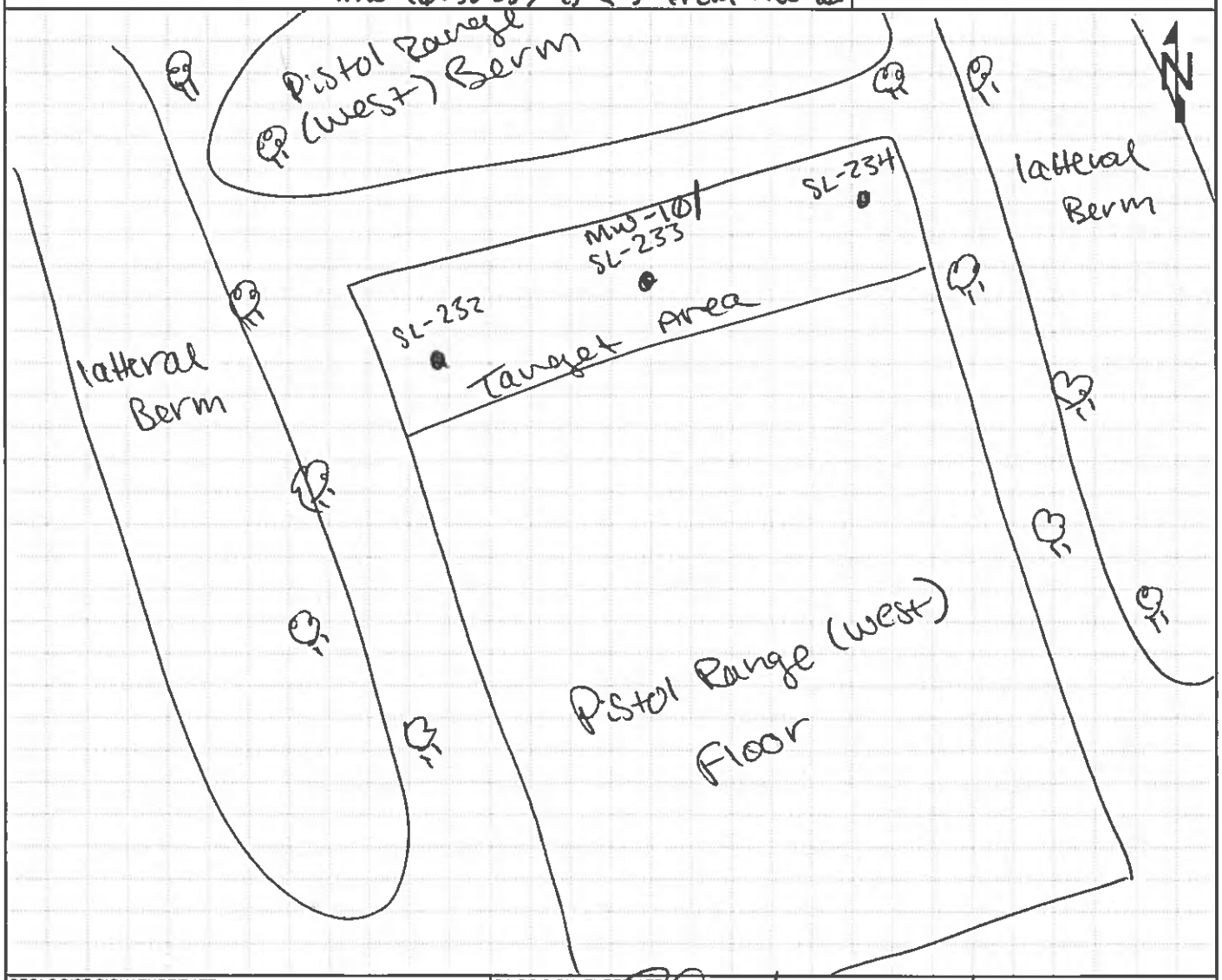
BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-10

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: Use SL-233 as pilot boring for MW-10. SL-233 is < 5' from MW-10

SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	SL-233 / MW-10

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-233 / MW-10	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM) XRF for Pb	REMARKS (Sample IDs/Depths/Etc.)
	0.1'	OL	Organic topsoil, silt and little fine sand, 10YR 2/1, wet		2800	organic odor
	1	FILL	Gravel 0/1, Gravel (0.10" to 1") and sand and some silt, fine to coarse, 10YR 7/1 and 10YR 3/2, poorly sorted, wet		3680	ECCLSL0262 @ 1600/8/7/19 (1'-1.5')
	1.9'	SM	SAND and some clay and trace gravel (0.10"-0.25"), fine sand, poorly sorted, 10YR 3/2, damp, firm to soft	4/4	980	ECCLSL0263 @ 1600 8/7/19 (1.5'-2')
	2.5'	CL	CLAY and sand, fine, 10YR 5/1 and 10YR 5/6 mottled, damp, firm, non plastic		90	
	3	CL	CLAY and trace sand, 10YR 5/1 and 10YR 5/6 mottled, damp, soft nonplastic		30	No odor
	4				170	
	4.5'	SH	Weathered SHALE, dry, fissile, angular pieces of rock, 10YR 2/1	0.5/0.5	30	
					90	
					20	Bedrock refusal @ 4.5'
	5		BOH			
	6					
	7					
	8					
	9					
	10					

XR 8/7/19

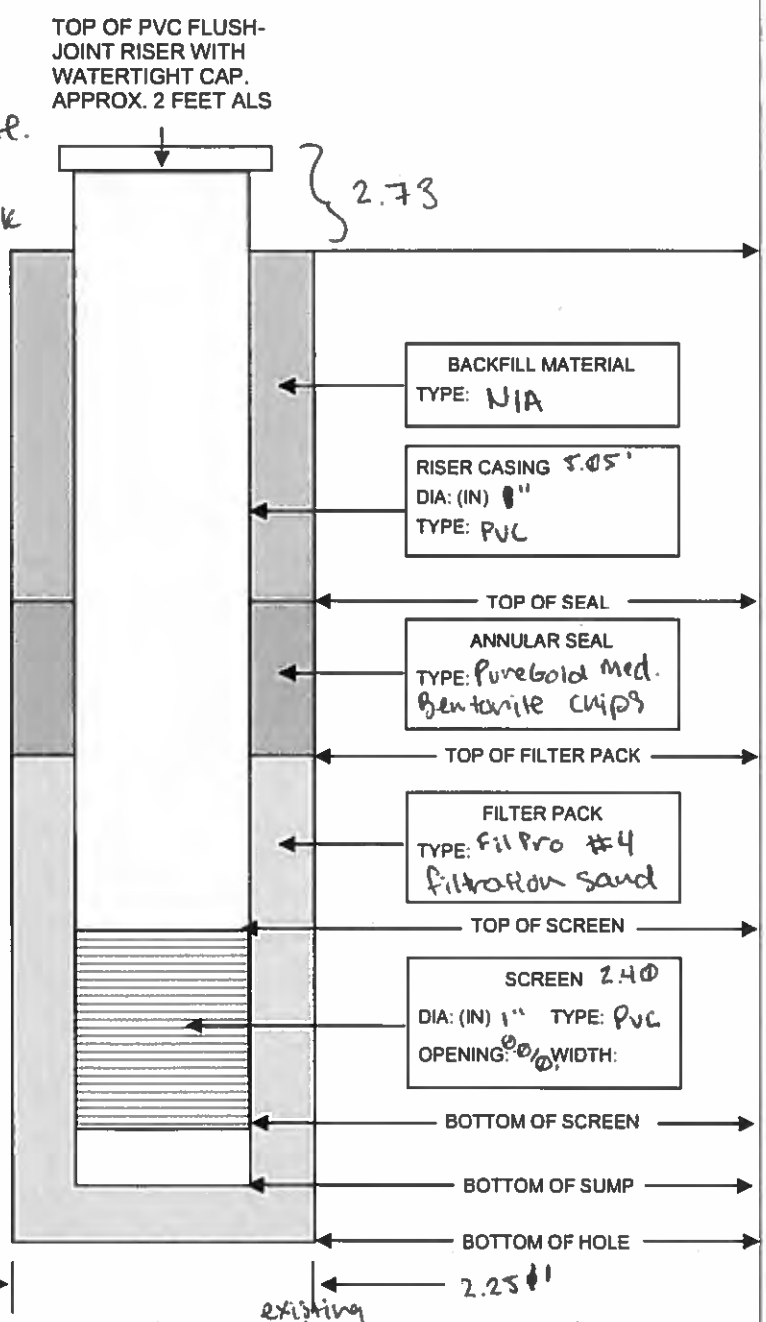
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/9/19	SL-233 / MW-10

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Pistol Range (west)

WELL NUMBER: MW-10	**BEGIN:** 8/8/19 | 1837	**END:** 8/8/19 | 1354
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

approx 1 gall on water used to hydrate bentonite. 0.5' dry chips above filter pack and 0.5' pre-hydrated chips to surface.



DEPTH	ELEVATION

Install in existing boring from 8/7/19

Recorded by: 8/8/19 QA performed by: 8/19/19

leidos

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: SL-245 / MW-11	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregg Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Pistol Range (East)	
	9. DRILL DATE/TIME: STARTED: 8/7/19 / 0830 COMPLETED: 8/8/19 / 1333	
	10. DEPTH GROUNDWATER ENCOUNTERED: ~~N/A~~ 3.5'	
11. OVERBURDEN THICKNESS: 4.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: 4.0	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs SL-245 TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 4.5'		

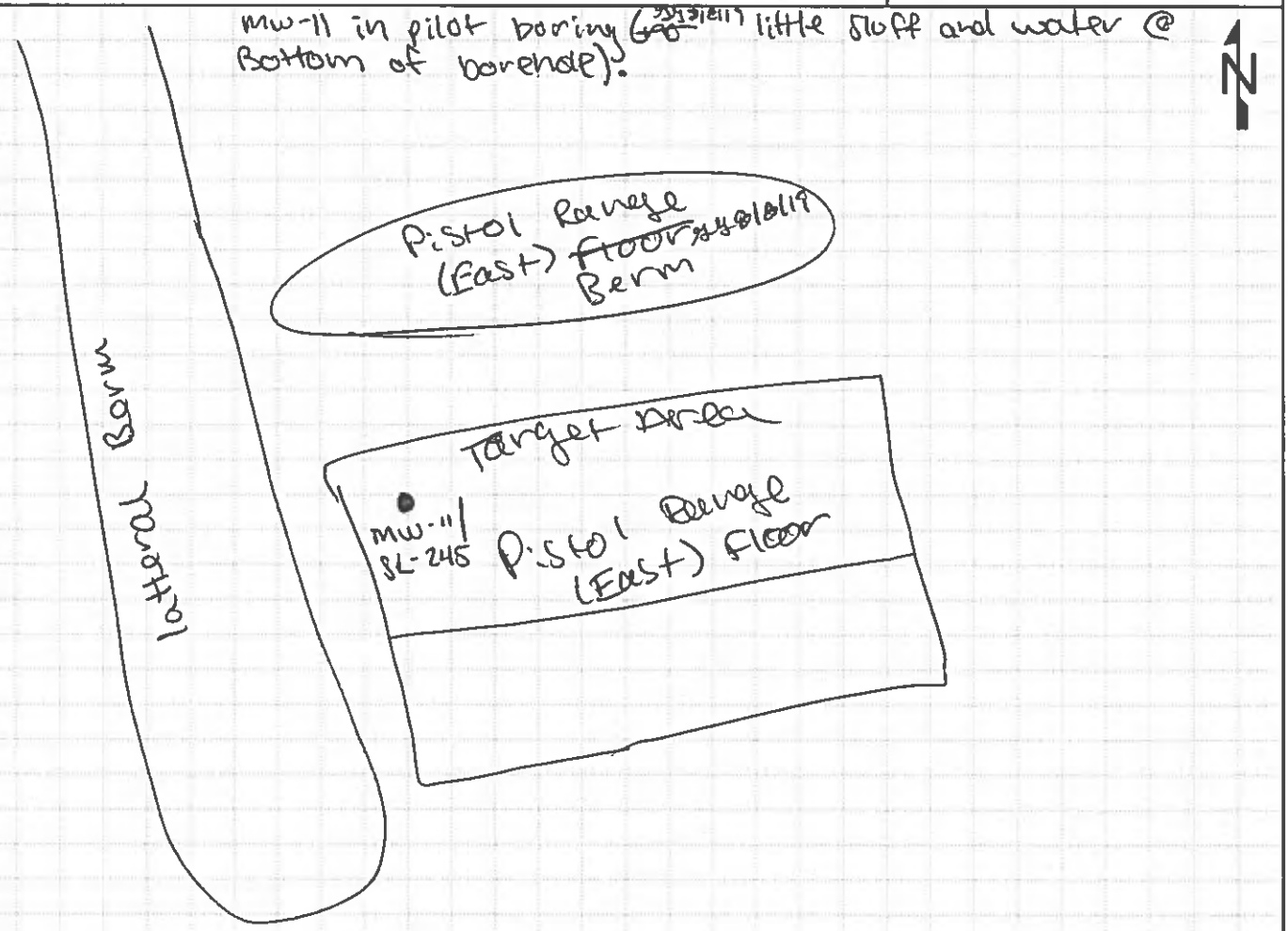
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE SEMI-TEMPORARY MONITORING WELL WELL ID: MW-11

17. NOTES BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS Use SL-245 as pilot boring for MW-11. SL-245 <5' from MW-11. Install MW-11 in pilot boring (~~8/8/19~~ little sluff and water @ Bottom of borehole). **SCALE:** None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/8/19	8/15/19	SL-245 / MW-11

HTRW DRILLING LOG

CLIENT	BOREHOLE NUMBER
NASA	SL-245 | MW-11

1. COMPANY NAME	2. DRILLING SUBCONTRACTOR	SHEET 2 OF 2
Leidos	Geo-Environmental Drilling	

3. PROJECT	4. DIRECTION OF BOREHOLE
ECCL Firing Range Removal Site Evaluation	VERTICAL

5. NOTES XRF MAKE/MODEL: NITON XL3t GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
	0.3'	OL	Organic topsoil, SILT and little clay and trace fine sand, 10YR 2/1, wet, non plastic, soft		4910	organic odor
	1	FILL	Gravel fill, Gravel (0.10" to 0.25"), sand, and silt, fine to coarse, 10YR 3/2 and 10YR 7/1, damp		5420	ECCLSL0278@ 1150/8/8/19 (0.5-1)
	1.5'			2.8 / 4	110	ECCLSL0279@ 1155 | 8/8/19 (1-1.5
	2	SM	SAND and little CLAY, 10YR 3/2, 10YR 4/6, fine sand, damp to wet, soft, non-plastic		40	
	2.3'	CL	CLAY and trace fine sand, 10YR 2/1, wet, trace shale frags (0.10" to 0.5"), soft, low plasticity		50	
	3				60	strong organic odor
	▽		very soft, low to moderate plasticity SATURATED 8/8/19		80	saturated@3.5'
	3.8'				110	
	4	SH	weathered shale, dry, fissile broken material	0.5 / 0.5	20	Bedrock Refusal @4.5'
	4.5'		Bottom			
	5					
	6					
	7					
	8		8/7/19			
	9					
	10					

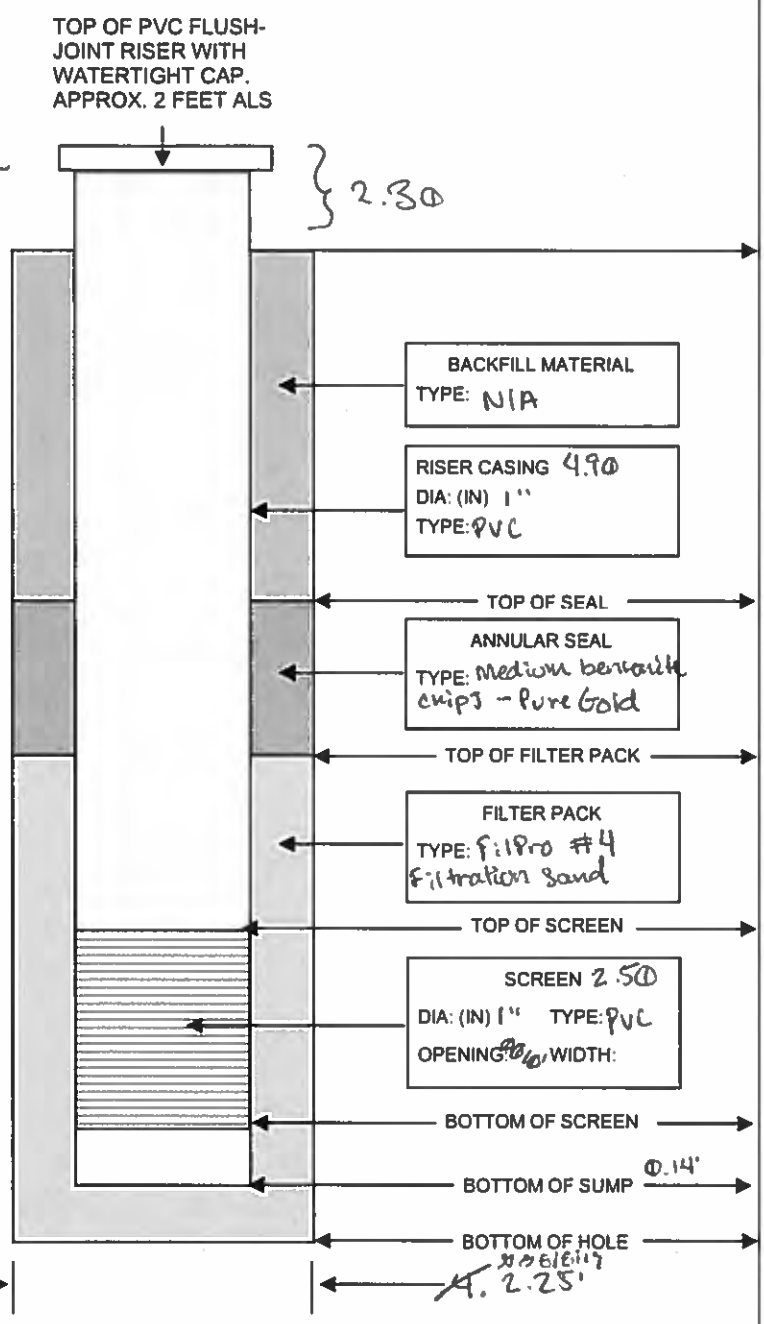
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/19/19	SL-245 | MW-11

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Pistol Range (East)

WELL NUMBER: MW-11	**BEGIN:** 8/8/19 / 1305	**END:** 8/8/19 / 1333
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

0.5 gallon potable water used to hydrate bentonite chips / 0.5 gallons to hydrate chips before put in top of borehole



DEPTH	ELEVATION

Recorded by: 8/8/19 QA performed by: 8/9/19

leidos

HTRW DRILLING LOG

CLIENT: NASA		BOREHOLE NUMBER: MW-12
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 1 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. LOCATION: NASA Plum Brook Station, Sandusky, Ohio	
5. NAME OF DRILLER: Gregory Shellhammer	6. MAKE/MODEL OF DRILL: Geoprobe 7730 DT	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT: Acetate liner (4')	8. BOREHOLE LOCATION: Rifle and Pistol Ranges	
	9. DRILL DATE/TIME STARTED: 8/7/19 | 0902	COMPLETED: 8/8/19 | 1455
	10. DEPTH GROUNDWATER ENCOUNTERED: N/A	
11. OVERBURDEN THICKNESS: 3.5'	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION: 2.2' 8/8/19	
13. DEPTH DRILLED INTO BEDROCK: 0'	14. CHEMICAL SAMPLES (circle): None VOC SVOCs PAHs TAL Metals Arsenic FR Metals Antimony Pb	
15. TOTAL DEPTH OF BOREHOLE: 3.5'		

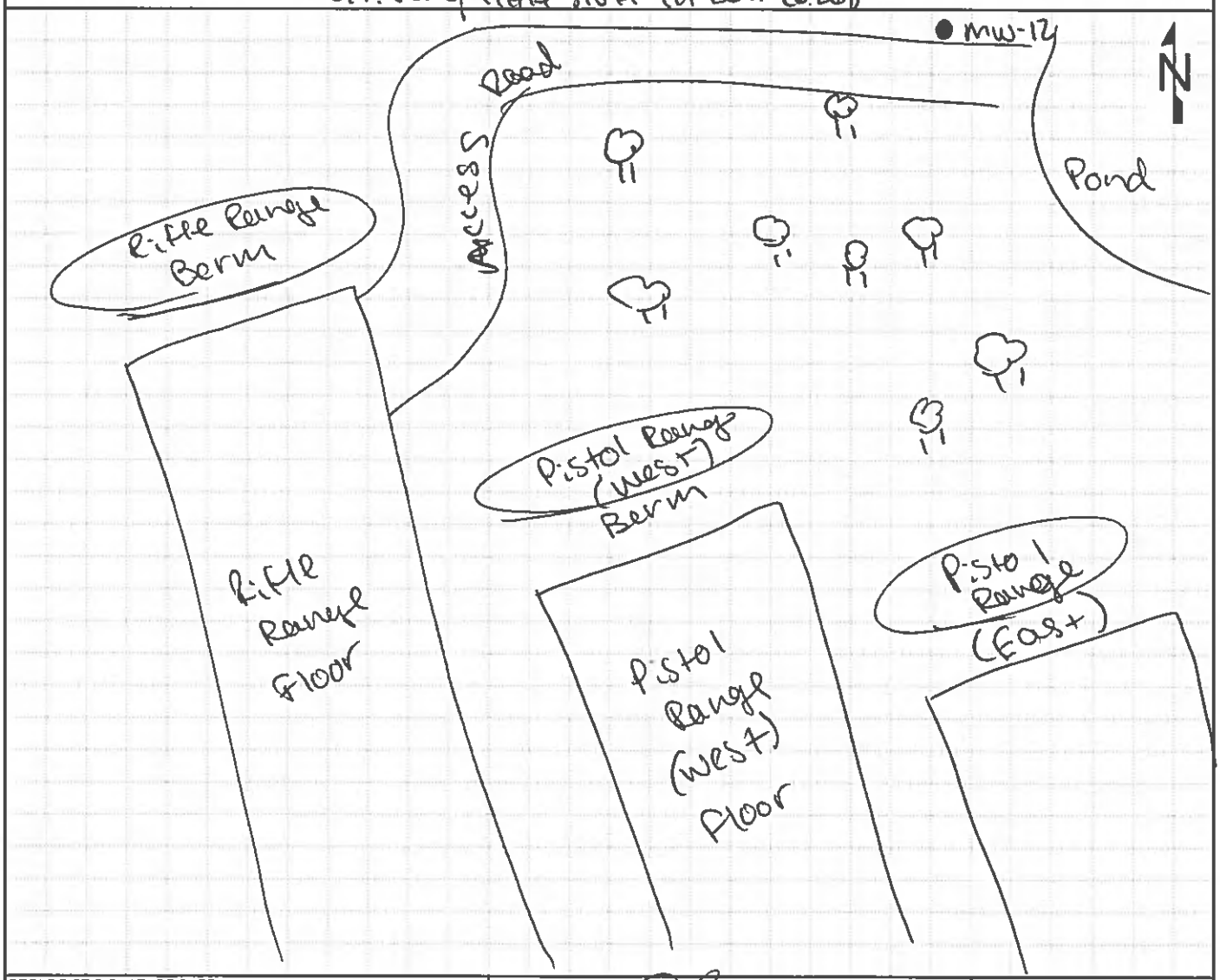
16. DISPOSITION OF BOREHOLE

BACKFILL TYPE: GROUT BENTONITE (SEMI-TEMPORARY MONITORING WELL) WELL ID: MW-12

17. NOTES: BKG: Background BGS: Below Ground Surface PPM: Parts per Million

▽ : First Water Encountered ▼ : Static Water Level NA: Not Applicable

LOCATION SKETCH/COMMENTS: Well installed in pilot boring from 8/7. very little sluff in BOH (0.20') SCALE: None



GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/8/19	MW-12

HTRW DRILLING LOG

CLIENT: NASA	BOREHOLE NUMBER: MW-12	
1. COMPANY NAME: Leidos	2. DRILLING SUBCONTRACTOR: Geo-Environmental Drilling	SHEET 2 OF 2
3. PROJECT: ECCL Firing Range Removal Site Evaluation	4. DIRECTION OF BOREHOLE: VERTICAL	

5. NOTES: XRF MAKE/MODEL: NITON XL3+ GOLDD+ XRF SERIAL#: 041982 Colors from Munsell Soil Color Chart, 2009 Year Revised

XRF for Pb

ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Sample IDs/Depths/Etc.)
		OL	Organic topsoil, SILT and little clay and trace fine sand, 10YR 5/2, low plasticity, wet		30	Organic odor
	1	SM	SAND and little CLAY, fine sand, subrounded, 10YR 6/1 and 10 YR 5/8 mottled, low plasticity, moist	3.8 / 3.5	10	
	2					
	3	SH	weathered SHALE, damp, fissile, broken, angular fragments of rock, 10YR 2/1, little iron staining (SHALE EXPANDED IN LINER)		20	Bedrock / NO odor
	3.5'				40	Bedrock refusal @ 3.5'
	4		BOH			
	5					
	6					
	7					
	8					
	9					
	10					

BLS 8/7/19

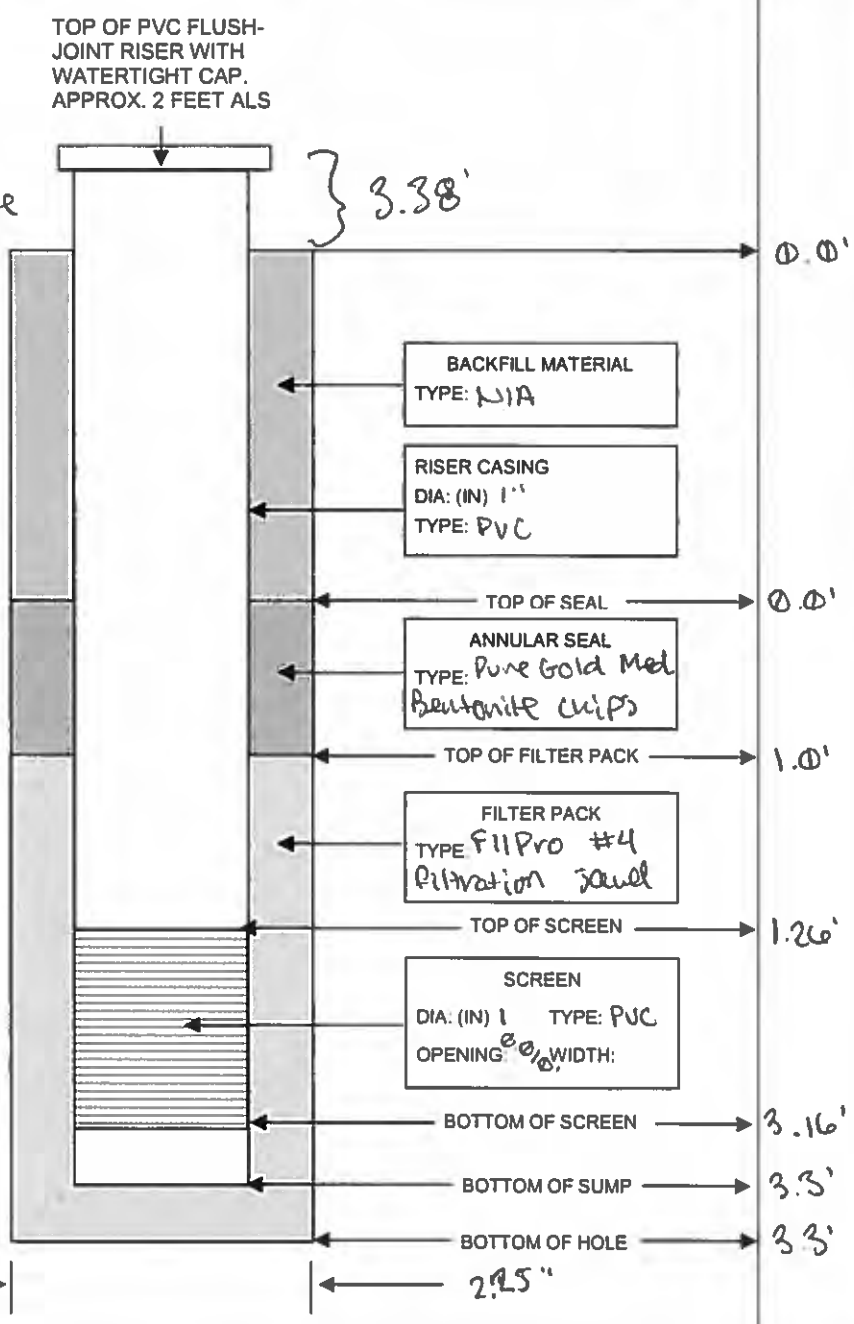
GEOLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE	BOREHOLE NUMBER
8/7/19	8/15/19	MW-12

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: ECCL Firing Range Removal Site Evaluation **SITE:** Pistol and Rifle Ranges

WELL NUMBER: MW-12	**BEGIN:** 8/8/19 / 1445	**END:** 8/8/19 / 1455
COORDINATES: N: E:	**REFERENCE POINT:**	**ELEVATION:** MSL

Use approx 0.75 gall water to hydrate bentonite chips



DEPTH	ELEVATION
0.0'	
0.0'	
1.0'	
1.26'	
3.16'	
3.3'	
3.3'	

Recorded by: [signature] 8/8/19 QA performed by: [signature] 8/6/19

leidos

AUGUST 2019
GROUNDWATER SAMPLE LOGS

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leidos ECCL Firing Range Well Development Form

Well ID Number: MW-1 Date (mm/dd/yy): 08/19/19

Personnel Rich Sprinzl, Lindsey Moyer Purge Start Time: NA End Time: NA

Water Quality Meter: NA Serial #: NA Calibrated: NA

Water Level Meter: Solinst 100' WL Meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- ☐ Disposable Bailer
- ☐ Bladder Pump
- ☐ Other (specify) _____

Depth To Water: ND ft. from measuring point

Total Depth Of Well: 7.19 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

One Well Volume: NA gallons

h = height of water column in feet

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
			RS 8/19/19								
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Well is dry/water not detected on 8/19/19 (located at SI boring SL-028) Rechecked 8/20/19 and still dry → Abandoned temp well by removing casing (PVC) + backfilled with hydrated bentonite chips.

Recorded By: RS 8/19/19 + 8/20/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-2 Date (mm/dd/yy): 08/20/19

Personnel Rich Sprinzl, Lindsey Moyer Purge Start Time: 0847 End Time: 0850

Water Quality Meter: Horiba U-52 Serial #: 24310/18107 Calibrated: 8/20/19

Water Level Meter: Solinst 100' WL meter Serial #: 212350 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method: ☒ Disposable Bailer ☐ Bladder Pump ☐ Other (specify)

Depth To Water: 7.21 ft. from measuring point

Total Depth Of Well: 7.39 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: 0.0072 gallons (27mL)

Date	Time	mL Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
08/20/19	0847	<20mL	NM	NM	NM	NM	NM	NM	<20mL	0	Sediment slurry. No water quality readings. Well went dry.
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Initial/minimal water column mostly slurry (sediment) and no water recharge after few minutes. Well bailed dry. Rechecked WL on 8/21/19 – WL=8.27' BTOC (only ~0.11' water – mostly slurry – Inadequate water volume to properly develop + sample this location – Abandoned temp well on 8/21/19 (PVC casing removed + backfilled with hydrated bentonite chips

Recorded By: RSm 08/20/19 + 8/21/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-3 Date (mm/dd/yy): 08/19/19

Personnel Rich Sprinzl, Lindsey Moyer Purge Start Time: NA End Time: NA

Water Quality Meter: NA Serial #: NA Calibrated: NA

Water Level Meter: Solinst 100' WL Meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- ☐ Disposable Bailer
- ☐ Bladder Pump
- ☐ Other (specify) _____

Depth To Water: ND ft. from measuring point

Total Depth Of Well: 6.16 ft. from measuring point

Well Diameter: 2 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: NA gallons

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
	RS 8/19/19										
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Installed near SL-009 (SI Soil Boring with elevated lead). Well is dry/water not detected on 8/19/19. Rechecked 8/20/19 and still dry → Abandoned temp well by removing PVC casing + backfilled with hydrated bentonite chips.

Recorded By: [signature] 8/19/19 + 8/20/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-4 Date (mm/dd/yy): 08/19/19

Personnel Rich Sprinzl, Lindsey Mayer Purge Start Time: NA End Time: NA

Water Quality Meter: NA Serial #: NA Calibrated: NA

Water Level Meter: Solinst 100' WL Meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- ☐ Disposable Bailer
- ☐ Bladder Pump
- ☐ Other (specify) _____

Depth To Water: ND ft. from measuring point

Total Depth Of Well: 7.20 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: NA gallons

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
		RS	8/19/19								
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Installed temp well at SI Boring SL-046. Well is dry/water not detected on 8/19/19. Rechecked 8/20/19 and still dry. → Abandoned temp well by removing PVC casing + Backfilled with hydrated Bentonite Chips.

Recorded By: [signature] 8/19/19 + 8/20/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-5 Date (mm/dd/yy): 08/19/19

Personnel Rich Sprinzl, Lindsey Moyer Purge Start Time: NA End Time: NA

Water Quality Meter: NA Serial #: NA Calibrated: NA

Water Level Meter: Solinst 100' WL meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- ☐ Disposable Bailer
- ☐ Bladder Pump
- ☐ Other (specify) _____

Depth To Water: ND ft. from measuring point

Total Depth Of Well: 5.81 ft. from measuring point

Well Diameter: 2 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

One Well Volume: NA gallons

h = height of water column in feet

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
			RS 8/19/19								
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Installed at Boring SL-191 on 8/2/19. 8/19/19 - well is dry/no water detected. 8/20/19 - Rechecked and still dry/ND. Abandoned well on 8/20/19 by removing PVC casing + Backfilled w/ hydrated Bentonite Chips

Recorded By: RS 08/19/19 + 08/20/19 (Signature and Date)

QA Checked By: 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-6 Date (mm/dd/yy): 08/19/19

Personnel Rich Sprinzl, Lindsey Mayer Purge Start Time: NA End Time: NA

Water Quality Meter: NA Serial #: NA Calibrated: NA

Water Level Meter: Solinst 100' WL meter Serial #: 212350 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- ☐ Disposable Bailer
- ☐ Bladder Pump
- ☐ Other (specify) _____

Depth To Water: ND ft. from measuring point

Total Depth Of Well: 7.31 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: NA gallons

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
		RS 8/19/19									
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Installed Temp Well @ SI Boring SL-074 (max lead concentration) on 8/7/19 8/19/19 - Well is dry / ND 8/20/19 - Rechecked well & still dry/ND. → Abandoned temp well by removing PVC casing + Backfilled w/ hydrated Bentonite Chips.

Recorded By: [signature] 8/19/19 & 8/20/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-7 Date (mm/dd/yy): 08/20/19

Personnel Rich Sprinz / Lindsey Moyer Purge Start Time: 0907 End Time: 0910

Water Quality Meter: Horiba U-52 Serial #: 24130/18107 Calibrated: 08/20/19

Water Level Meter: Solinst 100' WL meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- [x] Disposable Bailer
- [ ] Bladder Pump
- [ ] Other (specify)

Depth To Water: 11.94 ft. from measuring point

Total Depth Of Well: 11.67 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: 0.0092 gallons (~35mL)

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
08/20/19	0907	0	—	—	—	—	—	—	0	0	very cloudy/brown insufficient volume for readings
↓	0910	~70mL	—	—	—	—	—	—	~70mL	~2	well bailed dry
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Initial recovery was very cloudy water (limited <15mL in 1st bailer) Well went dry after ~2 well volumes removed. Rechecked WL on 8/21/19, WL=11.49ft → Insufficient water volume to properly develop or collect sample per SAP → Abandoned temp well by removing casing + Backfilled w/ Bentonite Chips (hydrated). Installed well on 8/7/19 downgradient of trap range.

Recorded By: RS 8/20/19 (Signature and Date)

QA Checked By: 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-8 Date (mm/dd/yy): 08/19/19

Personnel RichSprinzl, LindseyMayer Purge Start Time: NA End Time: NA

Water Quality Meter: NA Serial #: NA Calibrated: NA

Water Level Meter: Solinst 100' Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- ☐ Disposable Bailer
- ☐ Bladder Pump
- ☐ Other (specify) _____

Depth To Water: ND ft. from measuring point

Total Depth Of Well: 7.39 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: NA gallons

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
		RS 8/19/19									
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: Installed in pilot boring northeast of Skeet Range. 8/19/19 - well is dry/ND. 8/20/19 - Rechecked well - still dry/ND → Abandoned temp well by removing PVC casing & backfilled with hydrated Bentonite chips.

Recorded By: RS 8/19/19 + 8/20 (Signature and Date)

QA Checked By: 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-9 Date (mm/dd/yy): 08/19/19

Personnel: Rich Spring, Lindsey Mayer Purge Start Time: 1815 End Time: 1822

Water Quality Meter: Horiba U-52 Serial #: 24310/18107 Calibrated: 8/19/19

Water Level Meter: Solinst 100' wl meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- [x] Disposable Bailer
- [ ] Bladder Pump
- [ ] Other (specify)

Depth To Water: 5.86 ft. from measuring point

Total Depth Of Well: ~~7.79~~ 7.41 ft. from measuring point @ 8/19/19

Well Diameter: ↓ inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: ~~0.011~~ 0.062 @ 8/19/19 gallons (292 mL)

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
8/19/19	1817	300	2.54	21.50	149	5.43	0.986	>800	300	0	Very turbid WL=6.92'
↓	1822	300	1.80	20.37	126	5.29	0.978	>800	600	1	very turbid Bailed Dry WL=7.39'
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

@ 8/19/19

Field Observations/Site Conditions During Purging: Surged with Bailer - well went dry during 1st wellvolume. Allow well to recharge/stabilize for 48 hours prior to sampling.

Installed on 8/6/19 at SI Boring SL-088.

Recorded By: R Spring 8/19/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Purge Form

Well ID Number: MW-9 Date (mm/dd/yy): 08/21/19

Personnel Rich Sprinzl, Lindsey Moyer Purge Start Time: 0925 End Time: 0940

Water Quality Meter: Horiba U-52 Serial #: 24310/18107 Calibrated: 8/21/19

Water Level Meter: Solinst 100' WL Meter Serial #: 212380 Calibrated: NA

Pump: GeoPump Peristaltic Pump Serial #: 17379 Calibrated: NA

Purge Method: ☐ Disposable Bailer ☐ Bladder Pump ☒ Other (specify) Peristaltic Pump

Depth To Water: 5.86 ft. from measuring point Total Depth Of Well: 7.41 ft. from measuring point

Well Diameter: 1 inches h_{wc} = 1.55' water WV = 0.062 gal (235 mL)

Date	Time	Volume Removed	Temp (°C)	Dissolved Oxygen (mg/L)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity	Total Volume Removed	Water Level (ft btoc)	Comments
8/21/19	0931	400mL	22.22	1.15	109	6.01	1.00	>800	400mL	6.69	Initial drop 6.15', Constant Drawdown at lowest flow rate, Turbid/orange/brown color ~90mL/min
8/21/19	0934	~220mL	21.81	0.42	92	5.83	0.996	>800	670mL	7.07	Flow same. More turbid, Drawdown continued
8/21/19	0937	~220mL	21.65	0.49	65	5.99	0.988	7800	940mL	7.21	Same as above
8/21/19	0940	~220mL	20.42	0.68	66	5.92	1.02	>800	1210mL	ND	Well purged dry.
			±0.5°C	10% or ±0.2	±10 mV	±0.1 SU	±3%	±10% or < 10			

12/13/19

Sample Method: ☐ Bladder Pump ☐ Disposable Bailer ☒ Other (specify) peristaltic pump

Sample ID: ECCLGW0909. Sample Date/ Time: 8/21/19 @ 1245 Analyses FR Metals + PAHs (Unfiltered + Filtered)

Field Observations/Site Conditions During Purging: Well purged dry, Allow recharge for >1hr/<24hr. Multiple recharge cycles in order to get enough volume. Due to high turbidity, filtered samples were also collected.

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary:

Recorded By: [signature] 8/21/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-10 Date (mm/dd/yy): 08/20/19

Personnel: Rich Spring, Lindsey Moyer Purge Start Time: 0927 End Time: 0930

Water Quality Meter: NA Serial #: NA Calibrated: NA

Water Level Meter: Solinst 100' WL meter ~~NA~~ Serial #: 212380 ~~NA~~ Calibrated: ~~NA~~

Pump: NA Serial #: NA Calibrated: NA

Purge Method: [X] Disposable Bailer [ ] Bladder Pump [ ] Other (specify)

Depth To Water: 7.22 ft. from measuring point

Total Depth Of Well: 7.32 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: 0.004 gallons ~15mL

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
8/20/19	0927	0	NM						0	0	very thick sediment/slurry insufficient volume for readings
↓	0930	<15mL	NM						<15mL	<1	well bailed dry
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

(15) 8/20/19

Field Observations/Site Conditions During Purging: ~0.10' water. probe covered in sediment slurry, 1st bailer - all mud/slurry stuck in bailer (thick sediment), Well went dry, insufficient water to develop or collect sample. Rechecked 8/21/19: <0.10'
Abandoned well by removing casing + backfilled w/ hydrated Bentonite Chips
Installed temp well on 8/7/19 @ Boring SL-120 (Pistol Range-West)

Recorded By: RS 08/20/19 (Signature and Date)

QA Checked By: 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-11 Date (mm/dd/yy): 08/20/19

Personnel Rich Sprinzl, Lindsey Moyer Purge Start Time: 0943 End Time: 0949

Water Quality Meter: Horiba U-52 Serial #: 24130/18107 Calibrated: 8/20/19

Water Level Meter: Solinst 100' WL meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method:
- [x] Disposable Bailer
- [ ] Bladder Pump
- [ ] Other (specify) _____

Depth To Water: 6.71 ft. from measuring point

Total Depth Of Well: 7.15 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: 0.0176 gallons ~67mL

Date	Time	Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume Removed	Well Volumes Removed	Comments
08/20/19	0943	0	NM						0	0	very thick sediment slurry No water quality readings
	0946	~70mL	NM						~70mL	1	
	0949	~140mL	NM						~140mL	~2	Well went dry.
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

8/20/19

Field Observations/Site Conditions During Purging: WL probe covered in mud/sediment. 1st bailer recovery was very thick sediment slurry. Well went dry after ~2 well volumes, insufficient water volume for water quality readings. Let well sit overnight + recheck recharge.

Recorded By: [signature] 8/20/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Purge Form

Well ID Number: MW-11 Date (mm/dd/yy): 08/21/19

Personnel Rich Sprinzl, Lindsey Moyer Purge Start Time: 1010 End Time: 1020

Water Quality Meter: Horiba U-52 Serial #: 24130/18107 Calibrated: 8/21/19

Water Level Meter: Solinst 100' WL Meter Serial #: 212380 Calibrated: NA

Pump: Geopump Peristaltic Pump Serial #: 17379 Calibrated: NA

Purge Method: ☐ Disposable Bailer ☐ Bladder Pump ☒ Other (specify) Peristaltic Pump

Depth To Water: 6.70 ft. from measuring point Total Depth Of Well: 7.15 ft. from measuring point

Well Diameter: 1 inches

Date	Time	Volume Removed	Temp (°C)	Dissolved Oxygen (mg/L)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity	Total Volume Removed	Water Level (ft btoc)	Comments
8/21/19	1018	0	NM	→					0	6.70	No flow - adjust tubing + increase rate until minimal flow
8/21/19	1020	~90mL	NM	→					~90mL	ND	well went dry
			±0.5°C	10% or ±0.2	±10 mV	±0.1 SU	±3%	±10% or < 10			

8/21/19

Sample Method: ☐ Bladder Pump ☐ Disposable Bailer ☒ Other (specify) peristaltic pump

Sample ID: NA Sample Date/ Time: NA Analyses NA

Field Observations/Site Conditions During Purging: No flow for several minutes; well went dry. let recharge; @1305, WL ~ 6.71 'BTOC → Insufficient water volume recharging to ~~[illegible]~~ collect sample. Abandoned well (pull casing) + Backfilled w/hydrated Bentonite.

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary:

Recorded By: RS 8/21/19 (Signature and Date) QA Checked By: 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-12 Date (mm/dd/yy): 08/19/19

Personnel: Rich Sprinzl, Lindsey Moyer Purge Start Time: 1528 End Time: 1705

Water Quality Meter: Horiba U-52 Serial #: 24310/18107 Calibrated: 8/19/19

Water Level Meter: Solinst 100' WL Meter Serial #: 212380 Calibrated: NA

Pump: NA Serial #: NA Calibrated: NA

Purge Method: ☒ Disposable Bailer ☐ Bladder Pump ☐ Other (specify)

Depth To Water: 5.00 ft. from measuring point

Total Depth Of Well: 6.74 ft. from measuring point

Well Diameter: 1 inches

Well Volume Calculation

0.16 * h = gallons (1 well volume for 2" well)

0.04 * h = gallons (1 well volume for 1" well)

h = height of water column in feet

One Well Volume: 0.069 gallons (262 ml)

Date	Time	(mL) Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	ORP Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Total Volume (mL) Removed	Well Volumes Removed	Comments
8/19/19	1531	400 ml 0	2.75	24.25	292	3.88	2.30	>800	0	0	very turbid, Brown lots of sediment
	1538	1	2.13	22.71	332	3.72	0.935	>800	400 ml	1	very turbid, Brown lots of sediment
	1542	2	2.34	22.14	346	3.62	0.909	>800	800 ml	2	"
	1550	3	2.90	24.22	297	3.84	0.903	>800	1200 ml	3	"
	1555	4	3.03	22.86	332	3.74	0.931	>800	1600 ml	4	"
	1558	5	3.53	22.67	341	3.69	0.943	>800	2000 ml	5	" WL=5.53' BTOC
	1601	6	3.01	22.71	339	3.66	0.947	>800	2400 ml	6	"
	1604	7	2.91	22.56	341	3.67	0.943	>800	2800 ml	7	" WL=5.65' BTOC
	1610	↓ 8	2.97	22.64	343	3.68	0.943	>800	3200 ml	8	"
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Field Observations/Site Conditions During Purging: very turbid/lots of fine sediment throughout 1st hour of developing/bailing then water became less turbid/clearly. Parameters stabilized but still turbid water. Let sit for 48 hours prior to purging/sampling. Installed temp well on 8/7/19 Downgradient of Pistol + Rifle Ranges, west of East Pond.

Recorded By: RSprinzl 8/19/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

leidos ECCL Firing Range Well Development Form

Well ID Number: MW-12 Date (mm/dd/yy): 08/19/19

Date	Time	(mL) Volume Removed	Dissolved Oxygen (mg/L)	Temp (°C)	ORP Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity	Total Volume Removed	Water Level (ft btoc)	Comments
8/19/19	1612	400 mL	3.23	22.66	334	3.70	0.939	>800	7200	5.66	Very turbid, brown Some fine sediment in cup
	1615	400 mL	3.18	22.4	341	3.69	0.946	>800	8000	5.66	
	1618	400 mL	3.28	22.58	343	3.67	0.942	>800	8400	5.69	
	1622	400 mL	3.24	22.45	353	3.68	0.939	>800	8800	5.73	
	1625	400 mL	2.83	22.13	362	3.67	0.938	>800	9200	5.75	
	1628	400 mL	3.06	22.79	350	3.70	0.924	>800	5600	5.75	Slightly less turbid in Bailer
	1632	400 mL	2.84	22.35	361	3.70	0.943	>800	6000	5.70	
	1635	400 mL	2.99	22.25	341	3.65	0.941	>800	6400	5.76	
	1640	400 mL	2.98	22.30	327	3.61	0.942	>800	6800	5.80	
	1643	400 mL	3.16	22.06	357	3.64	0.947	>800	7200	5.80	
	1646	400 mL	3.19	22.35	363	3.65	0.932	>800	7600	5.80	
	1651	400 mL	2.50	22.26	378	3.60	0.943	>800	8000	5.83	
	1655	400 mL	2.90	22.21	386	3.59	0.939	714 8/19/19	8400	5.89	less turbid
	1700	400 mL	2.93	22.18	368	3.62	0.939 8/19/19	653	8800	5.91	
	1705	400 mL	2.91	22.17	386	3.63	0.938	>800	9200	5.94	Stabilized (ok per AMS)
				±0.5°C	±10 mV	±0.1 SU	±3%	±10% or < 10			

Recorded By: RS 8/19/19 (Signature and Date)

QA Checked By: 12/15/19 (Signature and Date)

leidos ECCL Firing Range Well Purge Form

Well ID Number: MW-12 Date (mm/dd/yy): 08/21/19

Personnel: Rich Sprinzl, Lindsey Moyer Purge Start Time: 1046 End Time: 1117

Water Quality Meter: Horiba U-52 Serial #: 24310/18107 Calibrated: 8/21/19

Water Level Meter: Solinst 100' WL Meter Serial #: 212380 Calibrated: NA

Pump: Geopump Peristaltic Pump Serial #: 17379 Calibrated: NA

Purge Method: ☐ Disposable Bailer ☐ Bladder Pump ☒ Other (specify) Peristaltic Pump

Depth To Water: 5.48 ft. from measuring point Total Depth Of Well: 6.74 ft. from measuring point

Well Diameter: 1 inches h_{wc}=1.26 wv_1=0.050gal/189mL

Date	Time	Volume Removed	Temp (°C)	Dissolved Oxygen (mg/L)	Eh (mV)	pH (Std.Units)	Specific Conductivity (mS/cm)	Turbidity	Total Volume Removed	Water Level (ft btoc)	Comments
08/21/19	1052	400mL	24.07	2.08	327	3.66	0.864	64.8	400mL	5.67	Flow ~90mL/min (lowest to pump) slightly cloudy
	1057	450mL	22.39	0.41	413	3.59	0.987	75.5	850mL	5.75	
	1102	450mL	21.88	0.32	415	3.53	1.01	0.0	1300mL	5.81	Clear water, Drawdown at min flowrate (90mL/min)
	1107	450mL	21.85	0.25	410	3.63	1.01	0.0	1750mL	5.85	
	1112	450mL	21.77	0.12	410	3.64	1.01	0.0	2200mL	5.87	
	1117	450	22.01	0.11	414	3.59	1.01	0.0	2650mL	5.87	Flow (90mL/min, lowest pump setting) Parameters Stabilized (AMS)
											Sample collected @ 1120
			±0.5°C	10% or ±0.2	±10 mV	±0.1 SU	±3%	±10% or < 10			

Sample Method: ☐ Bladder Pump ☐ Disposable Bailer ☒ Other (specify) peristaltic pump

Sample ID: ECCLGW0012 + MS/MSD, ECCLGW0001 Sample Date/ Time: 8/21/19 1120 Analyses: Firing Range Metals, PAHs

Field Observations/Site Conditions During Purging: water initially slightly cloudy then cleared up.

Sampling Procedure Followed: ☒ Yes ☐ No If no, why was deviation necessary:

Recorded By: [signature] 8/21/19 (Signature and Date)

QA Checked By: [signature] 12/13/19 (Signature and Date)

ECCL - Monitoring Well Construction and Water Level Measurements

Well ID	Well Diameter	Corresponding Boring ID	Boring Installation Date	Boring Installation Time	Well Installation Date	Well Installation Time	Water Level (BTOC) 8/5/19	Water Level (BGS) 8/8/19	Riser Height (AGS)	Water Level (BTOC) 8/9/19	Depth to Bottom (BTOC) 8/9/19
MW-1	1"	SL-028	8/7/2019	1100	8/8/2019	1629	N/A	Dry	3.13	Dry	7.19
MW-2	1"	N/A	8/7/2019	1255	8/8/2019	1750	N/A	3.65	3.18	6.96	7.38
MW-3	2"	SL-009	8/2/2019	950	8/2/2019	1041	Dry	Dry	2.39	Dry	6.16
MW-4	1"	SL-046	8/7/2019	1152	8/8/2019	1720	N/A	3.69	3.11	7.19	7.2
MW-5	2"	SL-191	8/2/2019	1106	8/2/2019	1138	Dry	Dry	1.83	Dry	5.81
MW-6	1"	SL-074	8/7/2019	1125	8/8/2019	1655	N/A	Dry	3.36	Dry	7.31
MW-7	1"	N/A	8/7/2019	1005	8/8/2019	1607	N/A	Dry	2.61	Dry	11.67
MW-8	1"	N/A	8/7/2019	1219	8/8/2019	1741	N/A	Dry	1.63	Dry	7.39
MW-9	1"	SL-088	8/6/2019	1024	8/8/2019	1429	N/A	3.05	2.12	5.7	7.79
MW-10	1"	SL-120	8/7/2019	808	8/8/2019	1354	N/A	4.2	2.73	7.1	7.32
MW-11	1"	SL-145	8/7/2019	830	8/8/2019	1333	N/A	4	2.3	6.34	7.15
MW-12	1"	N/A	8/7/2019	902	8/8/2019	1455	N/A	2.2	3.38	5.92	6.74

Notes

8/8/19 water levels collected before well installation on locations except MW-3 and MW-5

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Appendix C

Analytical Data

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Table C-1. Results for Metals in Soil Samples at ECCL Drainage Ditch

Station	ECCL-SD-004	ECCL-SD-007	ECCL-SD-008	ECCL-SDSW-001
Sample ID	**ECCLSD004**	**ECCLSD007**	**ECCLSD008**	**ECCLSD001**
Sample Type	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.5**	**0.0–1.5**	**0.0–1.5**	**0.0–1.8**
Date	**06/09/16**	**06/10/16**	**06/10/16**	**06/10/16**
Analyte (mg/kg)				
Metals				
Antimony	<5.9 U	2.6 J	4.3	1 J
Arsenic	9.3	19	28	12
Copper	67	120	170	110
Iron	26000 J	16000 J	30000 J	9500
Lead	100 J	200 J	380 J	200
Tin	<5.1 U	<17 U	<20 U	<15 U
Zinc	320	94	79	36

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

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Table C-2. Results for SVOCs in Soil Samples at ECCL Drainage Ditch

Station	ECCL-SD-004	ECCL-SD-007	ECCL-SD-008	ECCL-SDSW-001
Sample ID	ECCLSD004	ECCLSD007	ECCLSD008	ECCLSD001
Sample Type	GR	GR	GR	GR
Depth (ft)	0.0–1.5	0.0–1.5	0.0–1.5	0.0–1.8
Date	06/09/16	06/10/16	06/10/16	06/10/16
Analyte (mg/kg)				
Organics-Semivolatile				
1,1'-Biphenyl	<0.099 U	<0.09 U	0.0089 J	<0.083 U
1,2,4,5-Tetrachlorobenzene	<0.2 U	<0.18 U	<0.21 U	<0.17 U
2,3,4,6-Tetrachlorophenol	<3.2 U	<2.9 U	<3.4 U	<2.7 U
2,4,5-Trichlorophenol	<0.3 U	<0.27 U	<0.32 U	<0.25 U
2,4,6-Trichlorophenol	<0.3 U	<0.27 U	<0.32 U	<0.25 U
2,4-Dichlorophenol	<0.3 U	<0.27 U	<0.32 U	<0.25 U
2,4-Dimethylphenol	<0.3 UJ	<0.27 U	<0.32 U	<0.25 U
2,4-Dinitrophenol	<0.65 U	<0.6 U	<0.71 U	<0.55 U
2,4-Dinitrotoluene	<0.4 U	<0.36 U	<0.43 U	<0.33 U
2,6-Dinitrotoluene	<0.4 U	<0.36 U	<0.43 U	<0.33 U
2-Chloronaphthalene	<0.099 U	<0.09 U	<0.11 U	<0.083 U
2-Chlorophenol	<0.099 U	<0.09 U	<0.11 U	<0.083 U
2-Methyl-4,6-dinitrophenol	<0.3 U	<0.27 U	<0.32 U	<0.25 U
2-Methylnaphthalene	<0.013 U	<0.012 U	0.094	0.0063 J
2-Methylphenol	<0.4 U	<0.36 U	<0.43 U	<0.33 U
2-Nitrobenzenamine	<0.4 U	<0.36 U	<0.43 U	<0.33 U
2-Nitrophenol	<0.099 U	<0.09 U	<0.11 U	<0.083 U
3,3'-Dichlorobenzidine	<0.2 U	<0.18 U	<0.21 U	<0.17 U
3-Nitrobenzenamine	<0.4 U	<0.36 U	<0.43 U	<0.33 U
4-Bromophenyl phenyl ether	<0.099 U	<0.09 U	<0.11 U	<0.083 U
4-Chloro-3-methylphenol	<0.3 UJ	<0.27 U	<0.32 U	<0.25 U
4-Chlorobenzenamine	<0.3 U	<0.27 U	<0.32 U	<0.25 U
4-Chlorophenyl phenyl ether	<0.099 U	<0.09 U	<0.11 U	<0.083 U
4-Nitrobenzenamine	<0.4 U	<0.36 U	<0.43 U	<0.33 U
4-Nitrophenol	<0.65 U	<0.6 U	<0.71 U	<0.55 U

Table C-2. Results for SVOCs in Soil Samples at ECCL Drainage Ditch (Continued)

Station	ECCL-SD-004	ECCL-SD-007	ECCL-SD-008	ECCL-SDSW-001
Sample ID	ECCLSD004	ECCLSD007	ECCLSD008	ECCLSD001
Sample Type	GR	GR	GR	GR
Depth (ft)	0.0–1.5	0.0–1.5	0.0–1.5	0.0–1.8
Date	06/09/16	06/10/16	06/10/16	06/10/16
Acenaphthene	<0.013 U	<0.012 U	<0.014 U	<0.011 U
Acenaphthylene	<0.013 U	0.01 J	<0.014 U	<0.011 U
Acetophenone	<0.2 U	<0.18 U	<0.21 U	<0.17 U
Anthracene	<0.013 U	0.0098 J	<0.014 U	<0.011 U
Atrazine	<0.4 U	<0.36 U	<0.43 U	<0.33 U
Benz(*a*)anthracene	0.0094 J	0.061	0.0098 J	0.025
Benzaldehyde	0.029 J	0.079 J	<0.21 U	<0.17 U
Benzo(*a*)pyrene	0.012 J	0.051	0.013 J	0.034
Benzo(*b*)fluoranthene	<0.013 U	0.091	0.022	0.034
Benzo(*g,h,i*)perylene	<0.013 U	0.02	<0.014 U	0.018
Benzo(*k*)fluoranthene	<0.013 U	0.027	<0.014 U	0.011
Bis(2-chloroethoxy)methane	<0.2 U	<0.18 U	<0.21 U	<0.17 U
Bis(2-chloroethyl) ether	<0.2 U	<0.18 U	<0.21 U	<0.17 U
Bis(2-chloroisopropyl) ether	<0.2 U	<0.18 U	<0.21 U	<0.17 U
Bis(2-ethylhexyl)phthalate	0.087 J	<0.13 U	<0.15 U	<0.12 U
Butyl benzyl phthalate	<0.14 U	<0.13 U	<0.15 U	<0.12 U
Caprolactam	<0.65 U	<0.6 U	<0.71 U	<0.55 U
Carbazole	<0.099 U	<0.09 U	<0.11 U	<0.083 U
Chrysene	0.016	0.084	0.035	0.052
Di-*n*-butyl phthalate	<0.14 U	0.041 J	0.05 J	0.033 J
Di-*n*-octylphthalate	<0.14 U	<0.13 U	<0.15 U	<0.12 U
Dibenz(*a,h*)anthracene	<0.013 U	<0.012 U	<0.014 U	<0.011 U
Dibenzofuran	<0.099 U	0.037 J	0.057 J	0.015 J
Diethyl phthalate	<0.14 U	<0.13 U	<0.15 U	<0.12 U
Dimethyl phthalate	<0.14 U	<0.13 U	<0.15 U	<0.12 U
Fluoranthene	0.023	0.12	<0.014 U	0.019
Fluorene	<0.013 U	<0.012 U	<0.014 U	<0.011 U

Table C-2. Results for SVOCs in Soil Samples at ECCL Drainage Ditch (Continued)

Station	ECCL-SD-004	ECCL-SD-007	ECCL-SD-008	ECCL-SDSW-001
Sample ID	ECCLSD004	ECCLSD007	ECCLSD008	ECCLSD001
Sample Type	GR	GR	GR	GR
Depth (ft)	0.0–1.5	0.0–1.5	0.0–1.5	0.0–1.8
Date	06/09/16	06/10/16	06/10/16	06/10/16
Hexachlorobenzene	<0.013 U	<0.012 U	<0.014 U	<0.011 U
Hexachlorobutadiene	<0.099 U	<0.09 U	<0.11 U	<0.083 U
Hexachlorocyclopentadiene	<0.65 U	<0.6 U	<0.71 U	<0.55 U
Hexachloroethane	<0.099 U	<0.09 U	<0.11 U	<0.083 U
Indeno(1,2,3-*cd*)pyrene	<0.013 U	0.018	<0.014 U	0.011
Isophorone	<0.099 U	<0.09 U	<0.11 U	<0.083 U
N-Nitroso-di-*n*-propylamine	<0.099 U	<0.09 U	<0.11 U	<0.083 U
N-Nitrosodiphenylamine	<0.099 U	<0.09 U	<0.11 U	<0.083 U
Naphthalene	<0.013 U	<0.012 U	0.02	<0.011 U
Nitrobenzene	<0.2 U	<0.18 U	<0.21 U	<0.17 U
Pentachlorophenol	<0.3 U	<0.27 U	<0.32 U	<0.25 U
Phenanthrene	0.0092 J	0.063	0.1	0.011
Phenol	0.069 J	0.041 J	<0.11 U	<0.083 U
Pyrene	0.015	0.17	0.026	0.029
m+p Methylphenol	<0.79 U	<0.72 U	<0.86 U	<0.66 U

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
SVOC = semivolatile organic compound.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

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Table C-3. Results for Metals in Soil Samples at ECCL Former Clubhouse and Garage

Station	ECCL-SL-169	ECCL-SL-170	ECCL-SL-171	ECCL-SL-172
Sample ID	ECCLSL0169/ECCLSL9018	ECCLSL0170	ECCLSL0171	ECCLSL0172
Sample Type	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0
Date	07/29/19	07/29/19	07/29/19	07/29/19
Analyte (mg/kg)				
Metals				
Aluminum	19500	5000	7300	8300
Antimony	<. R	<1.8 U	<2.1 U	<1.6 U
Arsenic	16	6.7	11	13
Barium	76	37	51	80
Beryllium	5.15	<0.45 U	<0.51 U	0.65
Cadmium	<2.35 U	<0.45 U	<0.51 U	<0.41 U
Calcium	11500 J	91000	14000	14000
Chromium	14	8.6	9.6	10
Cobalt	61.5	4.4	6	17
Iron	39000	11000	25000	16000
Lead	45	38	22	90
Magnesium	1800	9200	4000	2700
Manganese	375 J	240	270	1800
Mercury	<0.145 U	<0.11 U	<0.12 U	<0.12 U
Nickel	135	14	23	19
Potassium	<2350 U	860	1100	960
Selenium	<9.2 U	<1.8 U	<2.1 U	<3.2 U
Silver	<4.7 U	<0.91 U	<1 U	<0.81 U
Sodium	<2350 U	<450 U	<510 U	<410 U
Thallium	<2.7 U	<1.8 U	<2.1 U	3.4

Table C-3. Results for Metals in Soil Samples at ECCL Former Clubhouse and Garage (Continued)

Station	ECCL-SL-169	ECCL-SL-170	ECCL-SL-171	ECCL-SL-172
Sample ID	ECCLSL0169/ECCLSL9018	ECCLSL0170	ECCLSL0171	ECCLSL0172
Sample Type	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0
Date	07/29/19	07/29/19	07/29/19	07/29/19
Vanadium	31	12	16	23
Zinc	275 J	56	43	50

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-4. Results for SVOCs in Soil Samples at ECCL Former Clubhouse and Garage

Station	ECCL-SL-169	ECCL-SL-170	ECCL-SL-171	ECCL-SL-172
Sample ID	ECCLSL0169/ECCLSL9018	ECCLSL0170	ECCLSL0171	ECCLSL0172
Sample Type	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0
Date	07/29/19	07/29/19	07/29/19	07/29/19
Analyte (mg/kg)				
Organics-Semivolatile				
1,1'-Biphenyl	<0.215 U	<0.052 U	<0.059 U	<0.059 U
1,2,4,5-Tetrachlorobenzene	<0.425 U	<0.1 U	<0.12 U	<0.12 U
2,3,4,6-Tetrachlorophenol	<6.8 U	<1.7 U	<1.9 U	<1.9 U
2,4,5-Trichlorophenol	<0.635 U	<0.16 U	<0.18 U	<0.18 U
2,4,6-Trichlorophenol	<0.635 U	<0.16 U	<0.18 U	<0.18 U
2,4-Dichlorophenol	<0.635 U	<0.16 U	<0.18 U	<0.18 U
2,4-Dimethylphenol	<0.635 U	<0.16 U	<0.18 U	<0.18 U
2,4-Dinitrophenol	<1.4 U	<0.34 U	<0.39 U	<0.39 U
2,4-Dinitrotoluene	<0.87 U	<0.21 U	<0.24 U	<0.24 U
2,6-Dinitrotoluene	<0.87 U	<0.21 U	<0.24 U	<0.24 U
2-Chloronaphthalene	<0.215 U	<0.052 U	<0.059 U	<0.059 U
2-Chlorophenol	<0.215 U	<0.052 U	<0.059 U	<0.059 U
2-Methyl-4,6-dinitrophenol	<1.4 U	<0.34 U	<0.39 U	<0.39 U
2-Methylnaphthalene	<0.0635 U	0.037	<0.018 U	<0.018 U
2-Methylphenol	<0.87 U	<0.21 U	<0.24 U	<0.24 U
2-Nitrobenzenamine	<0.87 U	<0.21 U	<0.24 U	<0.24 U
2-Nitrophenol	<0.215 U	<0.052 U	<0.059 U	<0.059 U
3,3'-Dichlorobenzidine	<0.425 U	<0.1 U	<0.12 U	<0.12 U
3-Nitrobenzenamine	<0.87 U	<0.21 U	<0.24 U	<0.24 U
4-Bromophenyl phenyl ether	<0.215 U	<0.052 U	<0.059 U	<0.059 U
4-Chloro-3-methylphenol	<0.635 U	<0.16 U	<0.18 U	<0.18 U
4-Chlorobenzenamine	<0.635 U	<0.16 U	<0.18 U	<0.18 U
4-Chlorophenyl phenyl ether	<0.215 U	<0.052 U	<0.059 U	<0.059 U
4-Nitrobenzenamine	<0.87 U	<0.21 U	<0.24 U	<0.24 U

Table C-4. Results for SVOCs in Soil Samples at ECCL Former Club House (Continued)

Station	ECCL-SL-169	ECCL-SL-170	ECCL-SL-171	ECCL-SL-172
Sample ID	ECCLSL0169/ECCLSL9018	ECCLSL0170	ECCLSL0171	ECCLSL0172
Sample Type	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0
Date	07/29/19	07/29/19	07/29/19	07/29/19
4-Nitrophenol	<1.4 U	<0.34 U	<0.39 U	<0.39 U
Acenaphthene	0.0905	<0.016 U	<0.018 U	<0.018 U
Acenaphthylene	0.175	<0.016 U	<0.018 U	<0.018 U
Acetophenone	<0.425 U	<0.1 U	<0.12 U	<0.12 U
Anthracene	0.465	0.016	<0.018 U	<0.018 U
Atrazine	<0.87 U	<0.21 U	<0.24 U	<0.24 U
Benz(*a*)anthracene	2 J	0.077	<0.018 U	0.063
Benzaldehyde	<0.425 U	<0.1 U	<0.12 U	<0.12 U
Benzo(*a*)pyrene	1.8	0.084	<0.018 U	0.061
Benzo(*b*)fluoranthene	2.7 J	0.13	0.018	0.048
Benzo(*g,h,i*)perylene	0.995	0.067	<0.018 U	0.037
Benzo(*k*)fluoranthene	1.07	0.04	<0.018 U	<0.018 U
Bis(2-chloroethoxy)methane	<0.425 U	<0.1 U	<0.12 U	<0.12 U
Bis(2-chloroethyl) ether	<0.425 U	<0.1 U	<0.12 U	<0.12 U
Bis(2-chloroisopropyl) ether	<0.425 U	<0.1 U	<0.12 U	<0.12 U
Bis(2-ethylhexyl)phthalate	<0.295 U	<0.073 U	<0.083 U	<0.083 U
Butyl benzyl phthalate	<0.295 U	<0.073 U	<0.083 U	<0.083 U
Caprolactam	<1.4 U	<0.34 U	<0.39 U	<0.39 U
Carbazole	0.22	<0.052 U	<0.059 U	<0.059 U
Chrysene	2.1	0.1	<0.018 U	0.15
Di-*n*-butyl phthalate	<0.295 U	<0.073 U	<0.083 U	<0.083 U
Di-*n*-octylphthalate	<0.295 U	<0.073 U	<0.083 U	<0.083 U
Dibenz(*a,h*)anthracene	0.325	0.018	<0.018 U	<0.018 U
Dibenzofuran	<0.215 U	<0.052 U	<0.059 U	<0.059 U
Diethyl phthalate	<0.295 U	<0.073 U	<0.083 U	<0.083 U
Dimethyl phthalate	<0.295 U	<0.073 U	<0.083 U	<0.083 U
Fluoranthene	4.9 J	0.18	<0.018 U	0.02

Table C-4. Results for SVOCs in Soil Samples at ECCL Former Club House (Continued)

Station	ECCL-SL-169	ECCL-SL-170	ECCL-SL-171	ECCL-SL-172
Sample ID	**ECCLSL0169/ECCLSL9018**	**ECCLSL0170**	**ECCLSL0171**	**ECCLSL0172**
Sample Type	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**
Date	**07/29/19**	**07/29/19**	**07/29/19**	**07/29/19**
Fluorene	0.16	<0.016 U	<0.018 U	<0.018 U
Hexachlorobenzene	<0.0635 U	<0.016 U	<0.018 U	<0.018 U
Hexachlorobutadiene	<0.215 U	<0.052 U	<0.059 U	<0.059 U
Hexachlorocyclopentadiene	< R	<0.34 UJ	<0.39 UJ	<0.39 UJ
Hexachloroethane	<0.215 U	<0.052 U	<0.059 U	<0.059 U
Indeno(1,2,3-*cd*)pyrene	1.005	0.055	<0.018 U	<0.018 U
Isophorone	<0.215 U	<0.052 U	<0.059 U	<0.059 U
N-Nitroso-di-*n*-propylamine	<0.215 U	<0.052 U	<0.059 U	<0.059 U
N-Nitrosodiphenylamine	<0.215 U	<0.052 U	<0.059 U	<0.059 U
Naphthalene	<0.0635 U	0.069	<0.018 U	<0.018 U
Nitrobenzene	<0.425 U	<0.1 U	<0.12 U	<0.12 U
Pentachlorophenol	<0.635 UJ	<0.16 UJ	<0.18 UJ	<0.18 UJ
Phenanthrene	2.55 J	0.1	<0.018 U	<0.018 U
Phenol	<0.215 U	0.21	<0.059 U	<0.059 U
Pyrene	3.4 J	0.14	<0.018 U	0.028
m+p Methylphenol	<1.7 U	<0.42 U	<0.47 U	<0.48 U

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
SVOC = semivolatile organic compound.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

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Table C-5. Results for VOAs in Soil Samples at ECCL Former Clubhouse and Garage

Station	ECCL-SL-169	ECCL-SL-170
Sample ID	ECCLSL0169R/ECCLSL901	ECCLSL0170R
Sample Type	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0
Date	08/07/19	08/07/19
Analytes (mg/kg)		
Organics-Volatile		
1,1,1-Trichloroethane	<0.00605 U	<0.0051 UJ
1,1,2,2-Tetrachloroethane	<0.0059 U	<0.0051 R
1,1,2-Trichloro-1,2,2-trifluoroethane	<0.00605 U	<0.0051 UJ
1,1,2-Trichloroethane	<0.00605 U	<0.0051 UJ
1,1-Dichloroethane	<0.00605 U	<0.0051 UJ
1,1-Dichloroethene	<0.00605 U	<0.0051 UJ
1,2,4-Trichlorobenzene	<0.0059 U	<0.0051 UJ
1,2-Dibromo-3-chloropropane	<0.012 U	<0.01 R
1,2-Dichlorobenzene	<0.0059 U	<0.0051 R
1,2-Dichloroethane	<0.00605 U	<0.0051 UJ
1,2-Dichloropropane	<0.00605 U	<0.0051 UJ
1,3-Dichlorobenzene	<0.0059 U	<0.0051 R
1,4-Dichlorobenzene	<0.0059 U	<0.0051 R
2-Butanone	<0.024 U	<0.021 UJ
2-Hexanone	<0.024 U	<0.021 UJ
4-Methyl-2-pentanone	<0.024 U	<0.021 UJ
Acetone	0.205 J	0.2 J
Benzene	<0.00605 U	<0.0051 UJ
Bromodichloromethane	<0.00605 U	<0.0051 UJ
Bromoform	<0.0059 U	<0.0051 R
Bromomethane	<0.00605 U	<0.0051 UJ
Carbon disulfide	<0.00605 U	<0.0051 UJ
Carbon tetrachloride	<0.00605 U	<0.0051 UJ
Chlorobenzene	<0.00605 U	<0.0051 UJ

Table C-5. Results for VOAs in Soil Samples at ECCL Former Clubhouse and Garage (Continued)

Station	ECCL-SL-169	ECCL-SL-170
Sample ID	ECCLSL0169R/ECCLSL901	ECCLSL0170R
Sample Type	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0
Date	08/07/19	08/07/19
Chloroethane	<0.00605 U	<0.0051 UJ
Chloroform	<0.00605 U	<0.0051 UJ
Chloromethane	<0.00605 U	<0.0051 UJ
Cyclohexane	<0.012 U	<0.01 UJ
Dibromochloromethane	<0.00605 U	<0.0051 UJ
Dichlorodifluoromethane	<0.00605 U	<0.0051 UJ
Ethylbenzene	<0.00605 U	<0.0051 UJ
Ethylene Dibromide	<0.00605 U	<0.0051 UJ
Isopropylbenzene	<0.00605 U	<0.0051 UJ
Methyl acetate	<0.03 U	<0.026 UJ
Methyl tert-butyl ether	<0.00605 U	<0.0051 UJ
Methylcyclohexane	<0.012 U	0.012 J
Methylene chloride	<0.00605 U	<0.0051 UJ
Styrene	<0.00605 U	<0.0051 UJ
Tetrachloroethene	<0.00605 U	<0.0051 UJ
Toluene	<0.00605 U	0.011 J
Trichloroethene	<0.00605 U	<0.0051 UJ
Trichlorofluoromethane	<0.00605 U	<0.0051 UJ
Vinyl chloride	<0.00605 U	<0.0051 UJ
Xylene, Total	<0.012 U	<0.01 UJ
cis-1,2-Dichloroethene	<0.00605 U	<0.0051 UJ
cis-1,3-Dichloropropene	<0.00605 U	<0.0051 UJ

Table C-5. Results for VOAs in Soil Samples at ECCL Former Clubhouse and Garage (Continued)

Station	ECCL-SL-169	ECCL-SL-170
Sample ID	ECCLSL0169R/ECCLSL901	ECCLSL0170R
Sample Type	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0
Date	08/07/19	08/07/19
trans-1,2-Dichloroethene	<0.00605 U	<0.0051 UJ
trans-1,3-Dichloropropene	<0.00605 U	<0.0051 UJ

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
VOA = volatile organic analyte.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

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Table C-6. Results for Metals in Soil Samples at ECCL Pistol Range (East)

Station	ECCL-SL-142	ECCL-SL-143	ECCL-SL-144	ECCL-SL-145	ECCL-SL-146	ECCL-SL-147	ECCL-SL-148	ECCL-SL-149	ECCL-SL-150	ECCL-SL-151	ECCL-SL-152	ECCL-SL-153	ECCL-SL-245	ECCL-SL-246	ECCL-SL-246	ECCL-SL-247	ECCL-SL-247	ECCL-SL-248
Sample ID	**ECCLSL0142**	**ECCLSL0143**	**ECCLSL0144**	**ECCLSL0145**	**ECCLSL0146**	**ECCLSL0147**	**ECCLSL0148**	**ECCLSL0149**	**ECCLSL0150**	**ECCLSL0151**	**ECCLSL0152**	**ECCLSL0153**	**ECCLSL0279**	**ECCLSL0280**	**ECCLSL0281**	**ECCLSL0282**	**ECCLSL0283**	**ECCLSL0284**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–2.0**	**0.0–2.0**	**0.0–2.0**	**0.0–2.0**	**1.0–1.5**	**4.5–5.0**	**5.0–5.5**	**5.5–6.0**	**6.0–6.5**	**0.0–1.0**
Date	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**08/08/19**	**08/05/19**	**08/05/19**	**08/05/19**	**08/05/19**	**08/08/19**
Analyte (mg/kg)																		
Metals																		
Antimony	1.8 J	0.76 J	<2.1 U	1.8 J	0.98 J	1.5 J	5.9	2.3	1.9 J	4	460	6.6	NR	NR	NR	<2 U	<1.9 U	NR
Arsenic	4.4	6.6	8.9	18	20	19	18	20	17	22	30	25	NR	NR	NR	NR	NR	NR
Copper	100	60	33	60	78	55	140	67	100	100	270	160	NR	NR	NR	NR	NR	NR
Iron	10000	15000	20000	18000	18000	17000	24000	26000	17000	26000	20000	27000	NR	NR	NR	NR	NR	NR
Lead	140	22	13	630	90	350	1200	470	760	1500	35000	1300	45	1700	15	310	350	88000
Tin	<9.7 U	<10 U	<11 U	4.6 J	3.9 J	4.5 J	<10 U	<10 U	<11 U	<11 U	320	<9.5 U	NR	NR	NR	NR	NR	NR
Zinc	250	100	74	53	20	28 J	65	64	34	53	61	27	NR	NR	NR	NR	NR	NR

Table C-6. Results for Metals in Soil Samples at ECCL Pistol Range (East) – Continued

Station	ECCL-SL-249	ECCL-SL-250	ECCL-SL-252	ECCL-SL-272	ECCL-SL-273	ECCL-SL-154	ECCL-SL-155	ECCL-SL-156	ECCL-SL-157	ECCL-SL-158	ECCL-SL-159	ECCL-SL-160	ECCL-SL-161	ECCL-SL-162	ECCL-SL-163	ECCL-SL-164
Sample ID	**ECCLSL0285**	**ECCLSL0286**	**ECCLSL0288**	**ECCLSL0300**	**ECCLSL0304**	**ECCLSL0154/ECCLSL9017**	**ECCLSL0155**	**ECCLSL0156**	**ECCLSL0157**	**ECCLSL0158**	**ECCLSL0159**	**ECCLSL0160**	**ECCLSL0161/ECCLSL9016**	**ECCLSL0162**	**ECCLSL0163**	**ECCLSL0164**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**
Date	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**
Analyte (mg/kg)																
Metals																
Antimony	NR	NR	NR	NR	NR	3.15 J	64	5	1.8 J	0.56 J	0.58 J	1.1 J	3.25	6.6	1 J	2.9
Arsenic	NR	NR	NR	NR	NR	19	25	27	18	16	17	26	21.5	11	13	18
Copper	NR	NR	NR	NR	NR	130	540	580	44	34	40	57	120	150	36	92
Iron	NR	NR	NR	NR	NR	19500	19000	25000	20000	20000	18000 J	29000	27000	16000	20000	20000
Lead	470	210	15000	140	140	1900	17000	6100	630	64	160 J	110	765	1500	110	600
Tin	NR	NR	NR	NR	NR	<8.5 U	<13 U	<13 U	<12 U	<10 U	<11 U	3.4 J	4.15 J	7.3 J	3.4 J	<11 U
Zinc	NR	NR	NR	NR	NR	52	180	180	26	24	22	12	30.5	42	41	38

Table C-6. Results for Metals in Soil Samples at ECCL Pistol Range (East) – Continued

Station	ECCL-SL-165	ECCL-SL-166	ECCL-SL-167	ECCL-SL-168	ECCL-SL-242	ECCL-SL-244	ECCL-SL-245
Sample ID	**ECCLSL0165**	**ECCLSL0166**	**ECCLSL0167**	**ECCLSL0168**	**ECCLSL0276**	**ECCLSL0277**	**ECCLSL0278**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**	**0.0–1.0**	**0.0–1.0**	**0.5–1.0**
Date	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**08/08/19**	**08/08/19**	**08/08/19**
Analyte (mg/kg)							
Metals							
Antimony	3.7	1.7 J	0.55 J	1.3 J	<2.3 U	NR	NR
Arsenic	13	17	13	19	15	NR	NR
Copper	59	40	59	50	44	NR	NR
Iron	18000	23000	16000	24000	20000	NR	NR
Lead	950	320	230	200	170	130	4100
Tin	<9.6 U	<9.8 U	<9.3 U	3.8 J	<11 U	NR	NR
Zinc	59	54	44	56	65	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

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Table C-7. Results for SVOCs in Soil Samples at ECCL Pistol Range (East)

Station	ECCL-SL-142	ECCL-SL-143	ECCL-SL-144	ECCL-SL-145	ECCL-SL-146	ECCL-SL-147	ECCL-SL-148	ECCL-SL-149	ECCL-SL-150	ECCL-SL-151	ECCL-SL-152	ECCL-SL-153	ECCL-SL-154	ECCL-SL-155	ECCL-SL-156
Sample ID	**ECCLSL0142**	**ECCLSL0143**	**ECCLSL0144**	**ECCLSL0145**	**ECCLSL0146**	**ECCLSL0147**	**ECCLSL0148**	**ECCLSL0149**	**ECCLSL0150**	**ECCLSL0151**	**ECCLSL0152**	**ECCLSL0153**	**ECCLSL0154/ECCLSL9017**	**ECCLSL0155**	**ECCLSL0156**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–2.0**	**0.0–2.0**	**0.0–2.0**	**0.0–2.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**
Date	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**
Analytes (mg/kg)															
Organics-Semivolatile															
1,1'-Biphenyl	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	0.006 J	0.0042 J	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
1,2,4,5-Tetrachlorobenzene	<0.11 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.11 U	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.13 U
2,3,4,6-Tetrachlorophenol	<1.7 U	<1.8 U	<1.8 U	<1.9 U	<2 U	<2 U	<1.8 U	<1.8 U	<1.9 U	<1.8 U	<1.8 U	<4.7 U	<1.95 U	<1.9 U	<2.1 U
2,4,5-Trichlorophenol	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 U	<0.18 U	<0.2 U
2,4,6-Trichlorophenol	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 U	<0.18 U	<0.2 U
2,4-Dichlorophenol	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 U	<0.18 U	<0.2 U
2,4-Dimethylphenol	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 U	<0.18 U	<0.2 U
2,4-Dinitrophenol	<0.36 U	<0.37 U	<0.37 U	<0.4 U	<0.41 U	<0.41 U	<0.37 U	<0.38 U	<0.39 U	<0.38 U	<0.38 U	<0.96 U	<0.405 U	<0.39 U	<0.44 U
2,4-Dinitrotoluene	<0.22 U	<0.22 U	<0.23 U	0.034 J	<0.25 U	<0.25 U	<0.22 U	<0.23 U	<0.24 U	<0.23 U	<0.23 U	<0.58 U	<0.245 U	<0.24 U	<0.26 U
2,6-Dinitrotoluene	<0.22 U	<0.22 U	<0.23 U	<0.24 U	<0.25 U	<0.25 U	<0.22 U	<0.23 U	<0.24 U	<0.23 U	<0.23 U	<0.58 U	<0.245 U	<0.24 U	<0.26 U
2-Chloronaphthalene	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
2-Chlorophenol	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
2-Methyl-4,6-dinitrophenol	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 UJ	<0.18 U	<0.2 U
2-Methylnaphthalene	<0.0073 U	<0.0075 U	<0.0075 U	0.037	0.05	0.031	<0.0075 U	0.033	0.1	0.072	0.2	0.45	0.0215	0.022	0.023
2-Methylphenol	<0.22 U	<0.22 U	<0.23 U	<0.24 U	<0.25 U	<0.25 U	<0.22 U	<0.23 U	<0.24 U	<0.23 U	<0.23 U	<0.58 U	<0.245 U	<0.24 U	<0.26 U
2-Nitrobenzenamine	<0.22 U	<0.22 U	<0.23 U	<0.24 U	<0.25 U	<0.25 U	<0.22 U	<0.23 U	<0.24 U	<0.23 U	<0.23 U	<0.58 U	<0.245 U	<0.24 U	<0.26 U
2-Nitrophenol	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
3,3'-Dichlorobenzidine	<0.11 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	<0.12 R	<0.11 U	<0.11 U	<0.12 U	<0.11 U	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.13 U
3-Nitrobenzenamine	<0.22 U	<0.22 U	<0.23 U	<0.24 U	<0.25 U	<0.25 R	<0.22 U	<0.23 U	<0.24 U	<0.23 U	<0.23 U	<0.58 U	<0.245 U	<0.24 U	<0.26 U
4-Bromophenyl phenyl ether	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
4-Chloro-3-methylphenol	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.19 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 U	<0.18 U	<0.2 U
4-Chlorobenzenamine	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 U	<0.19 R	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 U	<0.18 U	<0.2 U
4-Chlorophenyl phenyl ether	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
4-Nitrobenzenamine	<0.22 U	<0.22 U	<0.23 U	<0.24 U	<0.25 U	<0.25 R	<0.22 U	<0.23 U	<0.24 U	<0.23 U	<0.23 U	<0.58 U	<0.245 U	<0.24 U	<0.26 U
4-Nitrophenol	<0.36 U	<0.37 U	<0.37 U	<0.4 U	<0.41 U	<0.41 U	<0.37 U	<0.38 U	<0.39 U	<0.38 U	<0.38 U	<0.96 U	<0.405 U	<0.39 U	<0.44 U
Acenaphthene	<0.0073 U	<0.0075 U	<0.0075 U	<0.0081 U	<0.0082 U	<0.0083 U	<0.0075 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0076 U	<0.019 U	<0.0081 U	<0.008 U	<0.0088 U
Acenaphthylene	<0.0073 U	<0.0075 U	<0.0075 U	<0.0081 U	<0.0082 U	<0.0083 U	<0.0075 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0076 U	<0.019 U	<0.0081 U	<0.008 U	<0.0088 U
Acetophenone	<0.11 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.11 U	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.13 U
Anthracene	<0.0073 U	<0.0075 U	<0.0075 U	0.0056 J	<0.0082 U	<0.0083 U	<0.0075 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0076 U	<0.019 U	<0.0081 U	<0.008 U	<0.0088 U
Atrazine	<0.22 U	<0.22 U	<0.23 U	<0.24 U	<0.25 U	<0.25 U	<0.22 U	<0.23 U	<0.24 U	<0.23 U	<0.23 U	<0.58 U	<0.245 U	<0.24 U	<0.26 U
Benz(*a*)anthracene	<0.0073 U	<0.0075 U	<0.0075 U	0.018	0.014	0.011	<0.0075 U	0.023	0.014	0.015	0.16	0.042	0.01185	0.018	0.0084 J
Benzaldehyde	<0.11 U	<0.11 U	<0.11 U	0.024 J	0.017 J	<0.12 U	<0.11 U	<0.11 U	0.025 J	0.11	<0.11 U	<0.29 U	0.145	0.015 J	0.026 J
Benzo(*a*)pyrene	<0.0073 U	<0.0075 U	<0.0075 U	0.023	0.021	0.016	<0.0075 U	0.029	0.016	0.021	0.18	0.064	0.017	0.025	0.012
Benzo(*b*)fluoranthene	<0.0073 U	<0.0075 U	<0.0075 U	0.03	0.032	0.021	<0.0075 U	0.041	0.028	0.027	0.13	0.085	0.0265	0.033	0.027
Benzo(*g,h,i*)perylene	<0.0073 U	<0.0075 U	<0.0075 U	0.015	0.019	0.013	<0.0075 U	0.021	0.014	0.02	0.085	0.042	0.014	0.01	<0.0088 U
Benzo(*k*)fluoranthene	<0.0073 U	<0.0075 U	<0.0075 U	0.015	0.011	0.0071 J	<0.0075 U	0.011	0.0085	0.0079	0.038	0.029	0.0103	0.012	0.011
Bis(2-chloroethoxy)methane	<0.11 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.11 U	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.13 U

Table C-7. Results for SVOCs in Soil Samples at ECCL Pistol Range (East) – Continued

Station	ECCL-SL-142	ECCL-SL-143	ECCL-SL-144	ECCL-SL-145	ECCL-SL-146	ECCL-SL-147	ECCL-SL-148	ECCL-SL-149	ECCL-SL-150	ECCL-SL-151	ECCL-SL-152	ECCL-SL-153	ECCL-SL-154	ECCL-SL-155	ECCL-SL-156
Sample ID	**ECCLSL0142**	**ECCLSL0143**	**ECCLSL0144**	**ECCLSL0145**	**ECCLSL0146**	**ECCLSL0147**	**ECCLSL0148**	**ECCLSL0149**	**ECCLSL0150**	**ECCLSL0151**	**ECCLSL0152**	**ECCLSL0153**	**ECCLSL0154/ECCLSL9017**	**ECCLSL0155**	**ECCLSL0156**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–2.0**	**0.0–2.0**	**0.0–2.0**	**0.0–2.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**
Date	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**
Bis(2-chloroethyl) ether	<0.11 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.11 U	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.13 U
Bis(2-chloroisopropyl) ether	<0.11 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.11 U	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.13 U
Bis(2-ethylhexyl)phthalate	0.65	0.036 J	0.024 J	<0.085 U	<0.086 U	<0.087 U	0.046 J	0.027 J	0.023 J	<0.08 U	0.031 J	0.06 J	0.029 J	0.028 J	0.026 J
Butyl benzyl phthalate	<0.076 U	<0.078 U	<0.079 U	<0.085 U	<0.086 U	<0.087 U	<0.078 U	<0.08 U	<0.083 U	<0.08 U	<0.08 U	<0.2 U	<0.085 U	<0.083 U	<0.092 U
Caprolactam	<0.36 U	<0.37 U	<0.37 U	<0.4 U	<0.41 U	<0.41 U	<0.37 U	0.059 J	<0.39 U	<0.38 U	<0.38 U	<0.96 U	<0.405 U	<0.39 U	<0.44 U
Carbazole	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
Chrysene	<0.0073 U	<0.0075 U	<0.0075 U	0.037	0.028	0.023	<0.0075 U	0.046	0.036	0.043	0.3	0.1	0.027	0.045	0.016
Di-*n*-butyl phthalate	<0.15 U	0.44	<0.079 U	0.19	<0.086 U	<0.087 U	0.018 J	0.059 J	0.024 J	0.025 J	<0.08 U	<0.2 U	<0.085 U	<0.083 U	<0.092 U
Di-*n*-octylphthalate	<0.076 U	<0.078 U	<0.079 U	<0.085 U	<0.086 U	<0.087 U	<0.078 U	<0.08 U	<0.083 U	<0.08 U	<0.08 U	<0.2 U	<0.085 U	<0.083 U	<0.092 U
Dibenz(*a,h*)anthracene	<0.0073 U	<0.0075 U	<0.0075 U	<0.0081 U	<0.0082 U	<0.0083 U	<0.0075 U	0.0063 J	<0.0079 U	<0.0076 U	<0.0076 U	<0.019 U	<0.0081 U	<0.008 U	<0.0088 U
Dibenzofuran	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
Diethyl phthalate	<0.076 U	0.032 J	<0.079 U	0.044 J	<0.086 U	<0.087 U	<0.078 U	<0.08 U	<0.083 U	<0.08 U	<0.08 U	<0.2 U	<0.085 U	<0.083 U	<0.092 U
Dimethyl phthalate	<0.076 U	<0.078 U	<0.079 U	<0.085 U	<0.086 U	<0.087 U	<0.078 U	<0.08 U	<0.083 U	<0.08 U	<0.08 U	<0.2 U	<0.085 U	<0.083 U	<0.092 U
Fluoranthene	<0.0073 U	<0.0075 U	<0.0075 U	0.03	0.027	0.016	<0.0075 U	0.024	0.023	0.019	0.084	0.067	0.019	0.022	<0.0088 U
Fluorene	<0.0073 U	<0.0075 U	<0.0075 U	<0.0081 U	<0.0082 U	<0.0083 U	<0.0075 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0076 U	<0.019 U	<0.0081 U	<0.008 U	<0.0088 U
Hexachlorobenzene	<0.0073 U	<0.0075 U	<0.0075 U	<0.0081 U	<0.0082 U	<0.0083 U	<0.0075 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0076 U	<0.019 U	<0.0081 U	<0.008 U	<0.0088 U
Hexachlorobutadiene	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
Hexachlorocyclopentadiene	<0.36 U	<0.37 U	<0.37 U	<0.4 U	<0.41 U	<0.41 R	<0.37 U	<0.38 U	<0.39 U	<0.38 U	<0.38 U	<0.96 U	<0.405 UJ	<0.39 U	<0.44 U
Hexachloroethane	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
Indeno(1,2,3-*cd*)pyrene	<0.0073 U	<0.0075 U	<0.0075 U	0.0098	0.01	<0.0083 U	<0.0075 U	0.015	0.011	0.01	0.031	0.025	<0.0081 U	<0.008 U	<0.0088 U
Isophorone	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	0.03 J	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
N-Nitroso-di-*n*-propylamine	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
N-Nitrosodiphenylamine	0.38	0.67	<0.056 U	0.52	0.054 J	0.15	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
Naphthalene	<0.0073 U	<0.0075 U	<0.0075 U	0.011	0.011	0.0087	<0.0075 U	0.01	0.024	0.016	0.054	0.15	<0.0081 U	0.0081	0.01
Nitrobenzene	<0.11 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.11 U	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.13 U
Pentachlorophenol	<0.16 U	<0.17 U	<0.17 U	<0.18 U	<0.18 UJ	<0.19 R	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.17 U	<0.44 U	<0.18 U	<0.18 U	<0.2 U
Phenanthrene	<0.0073 U	0.0069 J	<0.0075 U	0.053	0.042	0.025	<0.0075 U	0.026	0.06	0.04	0.099	0.17	0.025	0.029	0.023
Phenol	<0.054 U	<0.056 U	<0.056 U	<0.061 U	<0.062 U	<0.062 U	<0.056 U	<0.057 U	<0.059 U	<0.057 U	<0.057 U	<0.15 U	<0.061 U	<0.06 U	<0.066 U
Pyrene	<0.0073 U	0.0085	<0.0075 U	0.037	0.031	0.025	<0.0075 U	0.025	0.037	0.028	0.16	0.086	0.0245	0.023	0.035
m+p Methylphenol	<0.44 U	<0.45 U	<0.45 U	<0.49 U	<0.49 U	<0.5 U	<0.45 U	<0.46 U	<0.47 U	<0.45 U	<0.46 U	<1.2 U	<0.485 U	<0.48 U	<0.53 U

Table C-7. Results for SVOCs in Soil Samples at ECCL Pistol Range (East) – Continued

Station	ECCL-SL-157	ECCL-SL-158	ECCL-SL-159	ECCL-SL-160	ECCL-SL-161	ECCL-SL-162	ECCL-SL-163	ECCL-SL-164	ECCL-SL-165	ECCL-SL-166	ECCL-SL-167	ECCL-SL-168	ECCL-SL-242	ECCL-SL-244	ECCL-SL-245	ECCL-SL-245
Sample ID	**ECCLSL0157**	**ECCLSL0158**	**ECCLSL0159**	**ECCLSL0160**	**ECCLSL0161/ECCLSL9016**	**ECCLSL0162**	**ECCLSL0163**	**ECCLSL0164**	**ECCLSL0165**	**ECCLSL0166**	**ECCLSL0167**	**ECCLSL0168**	**ECCLSL0276**	**ECCLSL0277**	**ECCLSL0278**	**ECCLSL0279**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–1.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**	**0.0–1.0**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**
Date	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**
Analyte (mg/kg)																
Organics-Semivolatile																
1,1'-Biphenyl	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	0.0079 J	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.115 U	<0.55 U	<0.11 U	<0.48 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	<2 U	<2 U	<1.9 U	<2 U	<1.85 U	<8.8 U	<1.8 U	<7.6 U	<1.8 U	<1.8 U	<1.8 U	<2 U	NR	NR	NR	NR
2,4,5-Trichlorophenol	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.175 U	<0.83 U	<0.17 U	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	NR	NR	NR	NR
2,4,6-Trichlorophenol	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.175 U	<0.83 U	<0.17 U	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	NR	NR	NR	NR
2,4-Dichlorophenol	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.175 U	<0.83 U	<0.17 U	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	NR	NR	NR	NR
2,4-Dimethylphenol	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.175 U	<0.83 U	<0.17 U	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	NR	NR	NR	NR
2,4-Dinitrophenol	<0.41 U	<0.4 U	<0.4 U	<0.41 U	<0.385 U	<1.8 U	<0.36 U	<1.6 U	<0.38 U	<0.37 U	<0.38 U	<0.4 U	NR	NR	NR	NR
2,4-Dinitrotoluene	<0.25 U	<0.24 U	<0.24 U	<0.25 U	<0.23 U	<1.1 U	<0.22 U	<0.95 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	NR	NR	NR	NR
2,6-Dinitrotoluene	<0.25 U	<0.24 U	<0.24 U	<0.25 U	<0.23 U	<1.1 U	<0.22 U	<0.95 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	NR	NR	NR	NR
2-Chloronaphthalene	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
2-Chlorophenol	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.175 U	<0.83 U	<0.17 U	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	NR	NR	NR	NR
2-Methylnaphthalene	0.0089	0.0055 J	0.0056 J	0.0061 J	0.088	0.37	0.17	0.43	0.052	0.16	0.42	0.14	NR	NR	NR	NR
2-Methylphenol	<0.25 U	<0.24 U	<0.24 U	<0.25 U	<0.23 U	<1.1 U	<0.22 U	<0.95 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	NR	NR	NR	NR
2-Nitrobenzenamine	<0.25 U	<0.24 U	<0.24 U	<0.25 U	<0.23 U	<1.1 U	<0.22 U	<0.95 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	NR	NR	NR	NR
2-Nitrophenol	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
3,3'-Dichlorobenzidine	<0.13 U	<0.12 U	<0.12 R	<0.12 U	<0.115 U	<0.55 U	<0.11 U	<0.48 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	NR	NR	NR	NR
3-Nitrobenzenamine	<0.25 U	<0.24 U	<0.24 R	<0.25 U	<0.23 U	<1.1 U	<0.22 U	<0.95 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	NR	NR	NR	NR
4-Bromophenyl phenyl ether	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
4-Chloro-3-methylphenol	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.175 U	<0.83 U	<0.17 U	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	NR	NR	NR	NR
4-Chlorobenzenamine	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.175 U	<0.83 U	<0.17 U	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
4-Nitrobenzenamine	<0.25 U	<0.24 U	<0.24 UJ	<0.25 U	<0.23 U	<1.1 U	<0.22 U	<0.95 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	NR	NR	NR	NR
4-Nitrophenol	<0.41 U	<0.4 U	<0.4 U	<0.41 U	<0.385 U	<1.8 U	<0.36 U	<1.6 U	<0.38 U	<0.37 U	<0.38 U	<0.4 U	NR	NR	NR	NR
Acenaphthene	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U	<0.0077 U	<0.037 U	<0.0074 U	<0.032 U	<0.0076 U	<0.0075 U	<0.0077 U	<0.0082 U	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Acenaphthylene	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U	<0.0077 U	0.027 J	<0.0074 U	<0.032 U	0.037	0.041	0.033	0.012	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Acetophenone	0.012 J	0.011 J	0.013 J	<0.12 U	<0.115 U	<0.55 U	<0.11 U	<0.48 U	0.013 J	<0.11 U	<0.12 U	<0.12 U	NR	NR	NR	NR
Anthracene	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U	<0.0077 U	0.019 J	<0.0074 U	<0.032 U	0.018	0.02	0.019	0.0082	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Atrazine	<0.25 U	<0.24 U	<0.24 U	<0.25 U	<0.23 U	<1.1 U	<0.22 U	<0.95 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	NR	NR	NR	NR
Benz(a)anthracene	0.0068 J	0.0075 J	0.011	0.0059 J	0.0094	0.09	0.011	0.03 J	0.12	0.1	0.065	0.033	<0.019 U	<0.019 U	0.052	<0.018 U
Benzaldehyde	0.061 J	0.027 J	0.067 J	<0.12 U	0.0825 J	0.47 J	<0.11 U	<0.48 U	0.1 J	<0.11 U	0.24	<0.12 U	NR	NR	NR	NR
Benzo(*a*)pyrene	0.0096	0.0092	0.015	0.0064 J	0.0107	0.1	0.0098	<0.032 U	0.15	0.13	0.089	0.039	<0.019 U	<0.019 U	0.055	<0.018 U
Benzo(*b*)fluoranthene	0.014	0.015	0.023	0.0099	0.0165	0.2	0.012	<0.032 U	0.21	0.25	0.15	0.057	<0.019 U	0.024	0.037	<0.018 U
Benzo(*g,h,i*)perylene	0.0091	0.0083	0.012	<0.0083 U	0.0084	0.11	<0.0074 U	<0.032 U	0.07	0.052	0.042	0.025	<0.019 U	<0.019 U	0.037	<0.018 U
Benzo(*k*)fluoranthene	0.0044 J	0.0053 J	0.0079 J	0.0056 J	0.0075	0.076	<0.0074 U	<0.032 U	0.091	0.088	0.06	0.019	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Bis(2-chloroethoxy)methane	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.115 U	<0.55 U	<0.11 U	<0.48 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	NR	NR	NR	NR

Table C-7. Results for SVOCs in Soil Samples at ECCL Pistol Range (East) – Continued

Station	ECCL-SL-157	ECCL-SL-158	ECCL-SL-159	ECCL-SL-160	ECCL-SL-161	ECCL-SL-162	ECCL-SL-163	ECCL-SL-164	ECCL-SL-165	ECCL-SL-166	ECCL-SL-167	ECCL-SL-168	ECCL-SL-242	ECCL-SL-244	ECCL-SL-245	ECCL-SL-245
Sample ID	**ECCLSL0157**	**ECCLSL0158**	**ECCLSL0159**	**ECCLSL0160**	**ECCLSL0161/ECCLSL9016**	**ECCLSL0162**	**ECCLSL0163**	**ECCLSL0164**	**ECCLSL0165**	**ECCLSL0166**	**ECCLSL0167**	**ECCLSL0168**	**ECCLSL0276**	**ECCLSL0277**	**ECCLSL0278**	**ECCLSL0279**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–1.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**	**0.0–1.0**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**
Date	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/15/16**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**
Bis(2-chloroethyl) ether	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.115 U	<0.55 U	<0.11 U	<0.48 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.115 U	<0.55 U	<0.11 U	<0.48 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	<0.088 U	<0.085 U	<0.085 U	<0.087 U	<0.081 U	<0.39 U	<0.077 U	<0.33 U	0.048 J	0.038 J	<0.081 U	<0.086 U	NR	NR	NR	NR
Butyl benzyl phthalate	<0.088 U	<0.085 U	<0.085 U	<0.087 U	<0.081 U	<0.39 U	<0.077 U	<0.33 U	<0.08 U	<0.078 U	<0.081 U	<0.086 U	NR	NR	NR	NR
Caprolactam	<0.41 U	<0.4 U	<0.4 U	<0.41 U	<0.385 U	<1.8 U	<0.36 U	<1.6 U	<0.38 U	<0.37 U	<0.38 U	<0.4 U	NR	NR	NR	NR
Carbazole	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
Chrysene	0.012	0.011	0.018	0.0077 J	0.0255	0.18	0.034	0.08	0.15	0.13	0.096	0.057	<0.019 U	0.033	0.085	0.02
Di-*n*-butyl phthalate	<0.088 U	<0.085 U	0.022 J	<0.087 U	<0.081 U	<0.39 U	<0.077 U	<0.33 U	<0.08 U	<0.078 U	<0.081 U	<0.086 U	NR	NR	NR	NR
Di-*n*-octylphthalate	<0.088 U	<0.085 U	<0.085 U	<0.087 U	<0.081 U	<0.39 U	<0.077 U	<0.33 U	<0.08 U	<0.078 U	<0.081 U	<0.086 U	NR	NR	NR	NR
Dibenz(*a,h*)anthracene	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U	<0.0077 U	<0.037 U	<0.0074 U	<0.032 U	<0.0076 U	<0.0075 U	<0.0077 U	<0.0082 U	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Dibenzofuran	<0.063 U	<0.061 U	<0.061 U	<0.062 U	0.014 J	<0.28 U	0.017 J	<0.24 U	0.012 J	0.019 J	0.024 J	0.017 J	NR	NR	NR	NR
Diethyl phthalate	<0.088 U	<0.085 U	<0.085 U	<0.087 U	<0.081 U	<0.39 U	<0.077 U	<0.33 U	<0.08 U	<0.078 U	<0.081 U	<0.086 U	NR	NR	NR	NR
Dimethyl phthalate	<0.088 U	<0.085 U	<0.085 U	<0.087 U	<0.081 U	<0.39 U	<0.077 U	<0.33 U	<0.08 U	<0.078 U	<0.081 U	<0.086 U	NR	NR	NR	NR
Fluoranthene	0.014	0.017	0.025	0.0083	0.0135	0.084	0.012	0.042	0.17	0.17	0.13	0.049	0.027	0.023	0.022	<0.018 U
Fluorene	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U	<0.0077 U	<0.037 U	<0.0074 U	<0.032 U	<0.0076 U	<0.0075 U	<0.0077 U	<0.0082 U	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Hexachlorobenzene	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U	<0.0077 U	<0.037 U	<0.0074 U	<0.032 U	<0.0076 U	<0.0075 U	<0.0077 U	<0.0082 U	NR	NR	NR	NR
Hexachlorobutadiene	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
Hexachlorocyclopentadiene	<0.41 U	<0.4 U	<0.4 R	<0.41 U	<0.385 U	<1.8 U	<0.36 U	<1.6 U	<0.38 U	<0.37 U	<0.38 U	<0.4 U	NR	NR	NR	NR
Hexachloroethane	<0.063 U	<0.061 U	<0.061 UJ	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	0.0075 J	0.0067 J	0.011	<0.0083 U	<0.0077 U	0.057	<0.0074 U	<0.032 U	0.058	0.06	0.041	0.019	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Isophorone	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
N-Nitrosodiphenylamine	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	0.25	NR	NR	NR	NR
Naphthalene	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U	0.03	0.15	0.048	0.13	0.033	0.064	0.16	0.053	<0.019 U	<0.019 U	<0.019 U	<0.018 U
Nitrobenzene	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.115 U	<0.55 U	<0.11 U	<0.48 U	<0.11 U	<0.11 U	<0.12 U	<0.12 U	NR	NR	NR	NR
Pentachlorophenol	<0.19 U	<0.18 U	<0.18 U	<0.19 UJ	<0.175 U	<0.83 UJ	<0.17 UJ	<0.71 U	<0.17 U	<0.17 U	<0.17 U	<0.18 UJ	NR	NR	NR	NR
Phenanthrene	0.011	0.0096	0.014	0.012	0.044	0.16	0.067	0.17	0.064	0.11	0.14	0.046	<0.019 U	0.02	0.023	0.023
Phenol	<0.063 U	<0.061 U	<0.061 U	<0.062 U	<0.0575 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U	NR	NR	NR	NR
Pyrene	0.011	0.013	0.019	0.012	0.0245	0.097	0.017	0.052	0.15	0.16	0.12	0.049	0.019	0.031	0.038	<0.018 U
m+p Methylphenol	<0.5 U	<0.49 U	<0.48 U	<0.5 U	<0.465 U	<2.2 U	<0.44 U	<1.9 U	<0.46 U	<0.45 U	<0.46 U	<0.49 U	NR	NR	NR	NR

Table C-7. Results for SVOCs in Soil Samples at ECCL Pistol Range (East) – Continued

Station	ECCL-SL-246	ECCL-SL-246	ECCL-SL-247	ECCL-SL-247	ECCL-SL-248	ECCL-SL-249
Sample ID	ECCLSL0280	ECCLSL0281	ECCLSL0282	ECCLSL0283	ECCLSL0284	ECCLSL0285
Sample Type	GR	GR	GR	GR	GR	GR
Depth (ft)	4.5–5.0	5.0–5.5	5.5–6.0	6.0–6.5	0.0–1.0	0.0–1.0
Date	08/05/19	08/05/19	08/05/19	08/05/19	08/08/19	08/08/19
Analyte (mg/kg)						
Organics-Semivolatile						
1,1'-Biphenyl	NR	NR	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	NR	NR	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	NR	NR	NR	NR	NR	NR
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR	NR
2,4,6-Trichlorophenol	NR	NR	NR	NR	NR	NR
2,4-Dichlorophenol	NR	NR	NR	NR	NR	NR
2,4-Dimethylphenol	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	NR	NR	NR	NR	NR	NR
2,4-Dinitrotoluene	NR	NR	NR	NR	NR	NR
2,6-Dinitrotoluene	NR	NR	NR	NR	NR	NR
2-Chloronaphthalene	NR	NR	NR	NR	NR	NR
2-Chlorophenol	NR	NR	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	NR	NR	NR	NR	NR	NR
2-Methylnaphthalene	NR	NR	NR	NR	NR	NR
2-Methylphenol	NR	NR	NR	NR	NR	NR
2-Nitrobenzenamine	NR	NR	NR	NR	NR	NR
2-Nitrophenol	NR	NR	NR	NR	NR	NR
3,3'-Dichlorobenzidine	NR	NR	NR	NR	NR	NR
3-Nitrobenzenamine	NR	NR	NR	NR	NR	NR
4-Bromophenyl phenyl ether	NR	NR	NR	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	NR	NR	NR	NR
4-Chlorobenzenamine	NR	NR	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	NR	NR	NR	NR	NR	NR
4-Nitrobenzenamine	NR	NR	NR	NR	NR	NR
4-Nitrophenol	NR	NR	NR	NR	NR	NR
Acenaphthene	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.018 U
Acenaphthylene	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.018 U
Acetophenone	NR	NR	NR	NR	NR	NR
Anthracene	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.018 U
Atrazine	NR	NR	NR	NR	NR	NR
Benz(*a*)anthracene	0.056	<0.018 U	<0.017 U	<0.017 U	0.11	<0.018 U
Benzaldehyde	NR	NR	NR	NR	NR	NR
Benzo(*a*)pyrene	0.061	<0.018 U	<0.017 U	<0.017 U	0.14	0.018
Benzo(*b*)fluoranthene	0.095	<0.018 U	<0.017 U	<0.017 U	0.14	0.023
Benzo(*g,h,i*)perylene	0.04	<0.018 U	<0.017 U	<0.017 U	0.096	<0.018 U
Benzo(*k*)fluoranthene	0.027	<0.018 U	<0.017 U	<0.017 U	0.035	<0.018 U
Bis(2-chloroethoxy)methane	NR	NR	NR	NR	NR	NR

Table C-7. Results for SVOCs in Soil Samples at ECCL Pistol Range (East) – Continued

Station	ECCL-SL-246	ECCL-SL-246	ECCL-SL-247	ECCL-SL-247	ECCL-SL-248	ECCL-SL-249
Sample ID	**ECCLSL0280**	**ECCLSL0281**	**ECCLSL0282**	**ECCLSL0283**	**ECCLSL0284**	**ECCLSL0285**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**4.5–5.0**	**5.0–5.5**	**5.5–6.0**	**6.0–6.5**	**0.0–1.0**	**0.0–1.0**
Date	**08/05/19**	**08/05/19**	**08/05/19**	**08/05/19**	**08/08/19**	**08/08/19**
Bis(2-chloroethyl) ether	NR	NR	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	NR	NR	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	NR	NR	NR	NR	NR	NR
Butyl benzyl phthalate	NR	NR	NR	NR	NR	NR
Caprolactam	NR	NR	NR	NR	NR	NR
Carbazole	NR	NR	NR	NR	NR	NR
Chrysene	0.11	<0.018 U	<0.017 U	<0.017 U	0.18	0.028
Di-*n*-butyl phthalate	NR	NR	NR	NR	NR	NR
Di-*n*-octylphthalate	NR	NR	NR	NR	NR	NR
Dibenz(*a,h*)anthracene	<0.017 U	<0.018 U	<0.017 U	<0.017 U	0.023	<0.018 U
Dibenzofuran	NR	NR	NR	NR	NR	NR
Diethyl phthalate	NR	NR	NR	NR	NR	NR
Dimethyl phthalate	NR	NR	NR	NR	NR	NR
Fluoranthene	0.086	<0.018 U	<0.017 U	<0.017 U	0.064	0.018
Fluorene	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.018 U
Hexachlorobenzene	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	NR	NR	NR	NR	NR	NR
Hexachlorocyclopentadiene	NR	NR	NR	NR	NR	NR
Hexachloroethane	NR	NR	NR	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	0.027	<0.018 U	<0.017 U	<0.017 U	0.043	<0.018 U
Isophorone	NR	NR	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	NR	NR	NR	NR	NR	NR
N-Nitrosodiphenylamine	NR	NR	NR	NR	NR	NR
Naphthalene	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.018 U
Nitrobenzene	NR	NR	NR	NR	NR	NR
Pentachlorophenol	NR	NR	NR	NR	NR	NR
Phenanthrene	0.038	<0.018 U	<0.017 U	<0.017 U	0.043	<0.018 U
Phenol	NR	NR	NR	NR	NR	NR
Pyrene	0.078	<0.018 U	<0.017 U	<0.017 U	0.096	0.022
m+p Methylphenol	NR	NR	NR	NR	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.
SVOC = semivolatile organic compound.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-8. Results for Metals in Soil Samples at ECCL Pistol Range (West)

Station	ECCL-SD-009	ECCL-SL-115	ECCL-SL-116	ECCL-SL-117	ECCL-SL-118	ECCL-SL-119	ECCL-SL-120	ECCL-SL-121	ECCL-SL-122	ECCL-SL-123	ECCL-SL-124	ECCL-SL-125	ECCL-SL-126	ECCL-SL-127	ECCL-SL-128
Sample ID	**ECCLSD009**	**ECCLSL0115**	**ECCLSL0116**	**ECCLSL0117**	**ECCLSL0118**	**ECCLSL0119**	**ECCLSL0120**	**ECCLSL0121**	**ECCLSL0122**	**ECCLSL0123**	**ECCLSL0124/ECCLSL9014**	**ECCLSL0125**	**ECCLSL0126**	**ECCLSL0127**	**ECCLSL0128**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–2.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**
Date	**06/10/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**
Analyte (mg/kg)															
Metals															
Antimony	4.3 J	<2.1 U	<2.7 U	1 J	7.8	53 J	6.9	53	6.5	8.6	30.5	3.2	9.1	24	20
Arsenic	18	6.3	7.7	14	9.7	12	6	14	8.1	18	12	6.8	9.3	17	19
Copper	230	8700	88	660	190	470	96	550	250	190	385	240	310	820	620
Iron	21000	8300	10000	19000	15000	14000 J	12000	18000	14000	23000	17000	13000	16000	19000	22000
Lead	250	33	27	110	1600	7200	1300	12000	940	1500	8800	990	1100	6000	6100
Tin	<28 U	<11 U	<14 U	<13 U	5.4 J	<15 U	<9.4 U	35	<9.4 U	<10 U	<12.75 U	<9.6 U	<9.6 U	<11 U	<11 U
Zinc	45	1300	150	440	69	600	69	63	31	48	34	26	130	260	140

Table C-8. Results for Metals in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-129	ECCL-SL-130	ECCL-SL-131	ECCL-SL-132	ECCL-SL-133	ECCL-SL-134	ECCL-SL-135	ECCL-SL-136	ECCL-SL-137	ECCL-SL-138	ECCL-SL-139	ECCL-SL-140	ECCL-SL-141	ECCL-SL-225
Sample ID	**ECCLSL0129**	**ECCLSL0130**	**ECCLSL0131**	**ECCLSL0132**	**ECCLSL0133**	**ECCLSL0134/ECCLSL9013**	**ECCLSL0135**	**ECCLSL0136**	**ECCLSL0137**	**ECCLSL0138**	**ECCLSL0139**	**ECCLSL0140**	**ECCLSL0141/ECCLSL9015**	**ECCLSL0255/ECCLSL9026**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–3.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.5**	**0.0–3.0**	**0.0–1.0**
Date	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/14/16**	**08/08/19**
Analyte (mg/kg)														
Metals														
Antimony	31	1.1 J	0.94 J	4.4	4.5	7.6	2.8	0.82 J	0.58 J	1.3 J	2.6	3.8 J	0.695 J	<1.95 U
Arsenic	16	12	21	13	17	12.5	19	17	15	29	18	26 J	19.5	12
Copper	1200	76	34	220	72	110	69	36	32	55	87	91 J	55.5	25
Iron	20000	15000	19000	16000	23000	18500	25000	21000	21000	28000	25000	28000 J	21500	18000
Lead	9000	310	230	1100	820	2700	600	41	55	280	680	930 J	44	76.5
Tin	<14 U	<12 U	<14 U	<8.9 U	<8.8 U	<10.4 U	<9.3 U	<9.9 U	<11 U	4.3 J	5.2 J	6.9 J	<10.4 U	<9.8 U
Zinc	120	28	27	24	66	59.5	56	57	60	59	56	47 J	13.5	34.5

Table C-8. Results for Metals in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-226	ECCL-SL-229	ECCL-SL-230	ECCL-SL-231	ECCL-SL-232	ECCL-SL-232	ECCL-SL-233	ECCL-SL-233	ECCL-SL-234	ECCL-SL-234	ECCL-SL-236	ECCL-SL-236
Sample ID	**ECCLSL0256**	**ECCLSL0258/ECCLSL9028**	**ECCLSL0259**	**ECCLSL0275**	**ECCLSL0260**	**ECCLSL0261/ECCLSL9027**	**ECCLSL0262**	**ECCLSL0263/ECCLSL9029**	**ECCLSL0264**	**ECCLSL0265**	**ECCLSL0266**	**ECCLSL0267**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**1.0–1.5**	**1.5–2.0**	**1.0–1.5**	**1.5–2.0**	**0.5–1.0**	**1.0–1.5**	**3.0–3.5**	**3.5–4.0**
Date	**08/06/19**	**08/07/19**	**08/07/19**	**08/07/19**	**08/08/19**	**08/08/19**	**08/07/19**	**08/07/19**	**08/08/19**	**08/08/19**	**08/06/19**	**08/06/19**
Analyte (mg/kg)												
Metals												
Antimony	<2.2 UJ	NR	NR	57	2	<1.9 U	2.9	<2 U	<2.4 U	<2.4 UJ	<1.9 U	<1.9 U
Arsenic	19 J	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Copper	51 J	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Iron	24000 J	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lead	30 J	390	2100	29000	460	26	520	48.5	240	45 J	150	5.1
Tin	<11 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	69 J	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-8. Results for Metals in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-237	ECCL-SL-237	ECCL-SL-238	ECCL-SL-239	ECCL-SL-241	ECCL-SL-243	ECCL-SL-265	ECCL-SL-266
Sample ID	**ECCLSL0268**	**ECCLSL0269**	**ECCLSL0270**	**ECCLSL0271**	**ECCLSL0273**	**ECCLSL0274/ECCLSL9030**	**ECCLSL0305**	**ECCLSL0306**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**3.0–3.5**	**3.5–4.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**
Date	**08/06/19**	**08/06/19**	**08/07/19**	**08/07/19**	**08/06/19**	**08/06/19**	**08/08/19**	**08/08/19**
Analyte (mg/kg)								
Metals								
Antimony	<1.9 U	<2.1 U	NR	NR	<2.2 U	<2.15 U	NR	NR
Arsenic	NR	NR	NR	NR	7.7	19.5	NR	NR
Copper	NR	NR	NR	NR	67	44	NR	NR
Iron	NR	NR	NR	NR	6400	29500	NR	NR
Lead	55	25	1100	3100	29	56.5	930	730
Tin	NR	NR	NR	NR	<11 U	<11 U	NR	NR
Zinc	NR	NR	NR	NR	16	31	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West)

Station	ECCL-SD-009	ECCL-SL-115	ECCL-SL-116	ECCL-SL-117	ECCL-SL-118	ECCL-SL-119	ECCL-SL-120	ECCL-SL-121	ECCL-SL-122	ECCL-SL-123	ECCL-SL-124	ECCL-SL-125	ECCL-SL-126	ECCL-SL-127	ECCL-SL-128
Sample Id	**ECCLSD009**	**ECCLSL0115**	**ECCLSL0116**	**ECCLSL0117**	**ECCLSL0118**	**ECCLSL0119**	**ECCLSL0120**	**ECCLSL0121**	**ECCLSL0122**	**ECCLSL0123**	**ECCLSL0124/ECCLSL9014**	**ECCLSL0125**	**ECCLSL0126**	**ECCLSL0127**	**ECCLSL0128**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–2.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**
Date	**06/10/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**
Analyte (mg/kg)															
Organics-Semivolatile															
1,1'-Biphenyl	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	0.0072 J	<0.059 U	<0.058 U	0.013 J	<0.06 U
1,2,4,5-Tetrachlorobenzene	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 U	<0.11 U	<0.28 U	<0.12 U	<0.12 U	<0.115 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
2,3,4,6-Tetrachlorophenol	<4.4 U	<1.8 U	<2.3 U	<2.2 U	<1.7 U	<1.8 U	<1.7 U	<4.4 U	<1.9 U	<1.9 U	<1.8 U	<1.9 U	<1.8 U	<1.9 U	<1.9 U
2,4,5-Trichlorophenol	<0.41 U	<0.17 U	<0.22 U	<0.2 U	<0.16 U	<0.17 U	<0.16 U	<0.41 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.18 U
2,4,6-Trichlorophenol	<0.41 U	<0.17 U	<0.22 U	<0.2 U	<0.16 U	<0.17 U	<0.16 U	<0.41 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.18 U
2,4-Dichlorophenol	<0.41 U	<0.17 U	<0.22 U	<0.2 U	<0.16 U	<0.17 U	<0.16 U	<0.41 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.18 U
2,4-Dimethylphenol	<0.41 U	<0.17 U	<0.22 U	<0.2 U	<0.16 U	<0.17 U	<0.16 U	<0.41 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.17 UJ	<0.18 U	<0.18 U
2,4-Dinitrophenol	<0.91 U	<0.38 U	<0.47 U	<0.44 U	<0.36 U	<0.38 U	<0.36 U	<0.91 U	<0.38 U	<0.38 U	<0.375 U	<0.39 U	<0.38 U	<0.39 U	<0.4 U
2,4-Dinitrotoluene	<0.55 U	<0.23 U	<0.29 U	<0.27 U	<0.22 U	<0.23 U	<0.22 U	<0.55 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U
2,6-Dinitrotoluene	<0.55 U	<0.23 U	<0.29 U	<0.27 U	<0.22 U	<0.23 U	<0.22 U	<0.55 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U
2-Chloronaphthalene	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
2-Chlorophenol	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
2-Methyl-4,6-dinitrophenol	<0.41 U	<0.17 UJ	<0.22 UJ	<0.2 UJ	<0.16 U	<0.17 UJ	<0.16 U	<0.41 U	<0.17 U	<0.17 UJ	<0.17 UJ	<0.18 U	<0.17 U	<0.18 U	<0.18 U
2-Methylnaphthalene	<0.018 U	<0.0077 U	<0.0096 U	<0.009 U	0.13	0.073	0.048	0.3	0.033	0.14	0.265	0.12	0.079	0.3	0.35
2-Methylphenol	<0.55 U	<0.23 U	<0.29 U	<0.27 U	<0.22 U	<0.23 U	<0.22 U	<0.55 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U
2-Nitrobenzenamine	<0.55 U	<0.23 U	<0.29 U	<0.27 U	<0.22 U	<0.23 U	<0.22 U	<0.55 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U
2-Nitrophenol	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
3,3'-Dichlorobenzidine	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 R	<0.11 U	<0.28 U	<0.12 U	<0.12 U	<0.115 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
3-Nitrobenzenamine	<0.55 U	<0.23 U	<0.29 U	<0.27 U	<0.22 U	<0.23 R	<0.22 U	<0.55 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U
4-Bromophenyl phenyl ether	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
4-Chloro-3-methylphenol	<0.41 U	<0.17 U	<0.22 U	<0.2 U	<0.16 U	<0.17 U	<0.16 U	<0.41 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.17 UJ	<0.18 U	<0.18 U
4-Chlorobenzenamine	<0.41 U	<0.17 U	<0.22 U	<0.2 U	<0.16 U	<0.17 R	<0.16 U	<0.41 U	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.18 U
4-Chlorophenyl phenyl ether	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
4-Nitrobenzenamine	<0.55 U	<0.23 U	<0.29 U	<0.27 U	<0.22 U	<0.23 R	<0.22 U	<0.55 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U
4-Nitrophenol	<0.91 U	<0.38 U	<0.47 U	<0.44 U	<0.36 U	<0.38 U	<0.36 U	<0.91 U	<0.38 U	<0.38 U	<0.375 U	<0.39 U	<0.38 U	<0.39 U	<0.4 U
Acenaphthene	<0.018 U	<0.0077 U	<0.0096 U	<0.009 U	<0.0072 U	<0.0076 U	<0.0072 U	<0.018 U	<0.0077 U	<0.0077 U	<0.0076 U	<0.0078 U	<0.0077 U	0.045	<0.008 U
Acenaphthylene	<0.018 U	<0.0077 U	<0.0096 U	<0.009 U	<0.0072 U	<0.0076 U	<0.0072 U	0.054	<0.0077 U	<0.0077 U	<0.0076 U	<0.0078 U	0.017	<0.0079 U	<0.008 U
Acetophenone	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 U	<0.11 U	<0.28 U	<0.12 U	<0.12 U	<0.115 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Anthracene	<0.018 U	<0.0077 U	<0.0096 U	<0.009 U	<0.0072 U	<0.0076 U	<0.0072 U	0.17	<0.0077 U	<0.0077 U	0.0078	<0.0078 U	0.029	0.03	<0.008 U
Atrazine	<0.55 U	<0.23 U	<0.29 U	<0.27 U	<0.22 U	<0.23 U	<0.22 U	<0.55 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.23 U	<0.24 U	<0.24 U
Benz(*a*)anthracene	<0.018 U	0.0073 J	<0.0096 U	0.14	0.051	0.068	0.09	0.68	<0.0077 U	0.02	0.0435	0.018	0.069	0.1	0.04
Benzaldehyde	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 U	<0.11 U	<0.28 U	<0.12 U	0.091 J	<0.115 U	<0.12 U	<0.12 U	0.076 J	<0.12 U
Benzo(*a*)pyrene	<0.018 U	0.0074 J	<0.0096 U	0.27	0.078	0.096	0.14	0.33	0.0082	0.024	0.055	0.02	0.088	0.11	0.056
Benzo(*b*)fluoranthene	0.0097 J	0.02	0.021	0.35	0.073	0.1	0.15	1.4	0.011	0.038	0.075	0.025	0.17	0.18	0.07
Benzo(*g,h,i*)perylene	<0.018 U	<0.0077 U	<0.0096 U	0.12	0.036	0.043	0.075	0.13	<0.0077 U	0.012	0.0235	0.013	0.038	0.053	0.029
Benzo(*k*)fluoranthene	<0.018 U	<0.0077 U	0.0086 J	0.15	0.023	0.027	0.056	0.6	<0.0077 U	0.012	0.0255	0.0065 J	0.071	0.067	0.022
Bis(2-chloroethoxy)methane	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 U	<0.11 U	<0.28 U	<0.12 U	<0.12 U	<0.115 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SD-009	ECCL-SL-115	ECCL-SL-116	ECCL-SL-117	ECCL-SL-118	ECCL-SL-119	ECCL-SL-120	ECCL-SL-121	ECCL-SL-122	ECCL-SL-123	ECCL-SL-124	ECCL-SL-125	ECCL-SL-126	ECCL-SL-127	ECCL-SL-128
Sample Id	**ECCLSD009**	**ECCLSL0115**	**ECCLSL0116**	**ECCLSL0117**	**ECCLSL0118**	**ECCLSL0119**	**ECCLSL0120**	**ECCLSL0121**	**ECCLSL0122**	**ECCLSL0123**	**ECCLSL0124/ECCLSL9014**	**ECCLSL0125**	**ECCLSL0126**	**ECCLSL0127**	**ECCLSL0128**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–2.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.0**
Date	**06/10/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**
Bis(2-chloroethyl) ether	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 U	<0.11 U	<0.28 U	<0.12 U	<0.12 U	<0.115 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Bis(2-chloroisopropyl) ether	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 U	<0.11 U	<0.28 U	<0.12 U	<0.12 U	<0.115 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Bis(2-ethylhexyl)phthalate	<0.19 U	<0.081 U	<0.1 U	2.2	<0.12 U	<0.08 U	<0.076 U	<0.19 U	<0.12 U	<0.081 U	<0.108 U	<0.087 U	<0.081 U	<0.13 U	<0.49 U
Butyl benzyl phthalate	<0.19 U	<0.081 U	<0.1 U	<0.094 U	0.81	<0.08 U	<0.076 U	<0.19 U	<0.081 U	<0.081 U	0.024 J	<0.082 U	<0.081 U	<0.083 U	<0.084 U
Caprolactam	<0.91 U	<0.38 U	<0.47 U	<0.44 U	<0.36 U	<0.38 U	<0.36 U	<0.91 U	<0.38 U	<0.38 U	<0.375 U	<0.39 U	<0.38 U	<0.39 U	<0.4 U
Carbazole	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
Chrysene	<0.018 U	0.014	0.014	0.19	0.12	0.16	0.19	3.9	0.015	0.049	0.0965	0.051	0.15	0.21	0.098
Di-*n*-butyl phthalate	0.052 J	0.055 J	0.044 J	0.057 J	0.25	0.083	0.058 J	<0.19 U	0.025 J	0.025 J	0.029 J	0.025 J	0.017 J	0.054 J	0.03 J
Di-*n*-octylphthalate	<0.19 U	<0.081 U	<0.1 U	<0.094 U	<0.076 U	<0.08 U	<0.076 U	<0.19 U	<0.081 U	<0.081 U	<0.08 U	<0.082 U	<0.081 U	<0.083 U	<0.084 U
Dibenz(*a,h*)anthracene	<0.018 U	<0.0077 U	<0.0096 U	0.04	<0.0072 U	<0.0076 U	<0.0072 U	<0.018 U	<0.0077 U	<0.0077 U	<0.0076 U	<0.0078 U	<0.0077 U	<0.0079 U	<0.008 U
Dibenzofuran	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	0.019 J	<0.059 U	<0.058 U	0.053 J	<0.06 U
Diethyl phthalate	<0.19 U	<0.081 U	<0.1 U	<0.094 U	<0.076 U	0.046 J	0.042 J	<0.19 U	<0.081 U	<0.081 U	<0.08 U	<0.082 U	<0.081 U	<0.083 U	<0.084 U
Dimethyl phthalate	<0.19 U	<0.081 U	<0.1 U	<0.094 U	<0.076 U	<0.08 U	<0.076 U	<0.19 U	<0.081 U	<0.081 U	<0.08 U	<0.082 U	<0.081 U	<0.083 U	<0.084 U
Fluoranthene	0.012 J	0.018	0.011	0.12	0.04	0.066	0.081	2.1	<0.0077 U	0.03	0.055	0.016	0.034	0.31	0.043
Fluorene	<0.018 U	<0.0077 U	<0.0096 U	<0.009 U	<0.0072 U	<0.0076 U	<0.0072 U	<0.018 U	<0.0077 U	<0.0077 U	<0.0076 U	<0.0078 U	<0.0077 U	<0.0079 U	<0.008 U
Hexachlorobenzene	<0.018 U	<0.0077 U	<0.0096 U	<0.009 U	<0.0072 U	<0.0076 U	<0.0072 U	<0.018 U	<0.0077 U	<0.0077 U	<0.0076 U	<0.0078 U	<0.0077 U	<0.0079 U	<0.008 U
Hexachlorobutadiene	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
Hexachlorocyclopentadiene	<0.91 U	<0.38 UJ	<0.47 UJ	<0.44 UJ	<0.36 U	<0.38 R	<0.36 U	<0.91 U	<0.38 U	<0.38 UJ	<0.375 UJ	<0.39 U	<0.38 U	<0.39 U	<0.4 U
Hexachloroethane	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
Indeno(1,2,3-*cd*)pyrene	<0.018 U	<0.0077 U	<0.0096 U	0.11	0.018	<0.0076 U	0.049	0.1	<0.0077 U	<0.0077 U	0.017	<0.0078 U	0.039	0.039	0.016
Isophorone	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
N-Nitroso-di-*n*-propylamine	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
N-Nitrosodiphenylamine	<0.14 U	0.076	<0.072 U	0.16	0.11	0.28	0.16	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
Naphthalene	<0.018 U	<0.0077 U	<0.0096 U	<0.009 U	0.045	0.02	0.012	0.085	0.0085	0.043	0.071	0.039	0.028	0.1	0.11
Nitrobenzene	<0.28 U	<0.12 U	<0.14 U	<0.13 U	<0.11 U	<0.11 U	<0.11 U	<0.28 U	<0.12 U	<0.12 U	<0.115 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Pentachlorophenol	<0.41 U	<0.17 U	<0.22 U	<0.2 U	<0.16 U	<0.17 R	<0.16 U	<0.41 UJ	<0.17 U	<0.17 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.18 U
Phenanthrene	0.028	0.012	<0.0096 U	0.02	0.06	0.043	0.054	0.26	0.032	0.066	0.11	0.045	0.027	0.24	0.13
Phenol	<0.14 U	<0.058 U	<0.072 U	<0.067 U	<0.054 U	<0.057 U	<0.054 U	<0.14 U	<0.058 U	<0.058 U	<0.0575 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U
Pyrene	0.012 J	0.015	0.0099	0.16	0.077	0.067	0.12	1.6	0.018	0.039	0.072	0.026	0.049	0.27	0.083
m+p Methylphenol	<1.1 U	<0.46 U	<0.57 U	<0.54 U	<0.43 U	<0.46 U	<0.43 U	<1.1 U	<0.46 U	<0.46 U	<0.455 U	<0.47 U	<0.46 U	<0.47 U	<0.48 U

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-129	ECCL-SL-130	ECCL-SL-131	ECCL-SL-132	ECCL-SL-133	ECCL-SL-134	ECCL-SL-135	ECCL-SL-136	ECCL-SL-137	ECCL-SL-138	ECCL-SL-139	ECCL-SL-140	ECCL-SL-141	ECCL-SL-225
Sample Id	**ECCLSL0129**	**ECCLSL0130**	**ECCLSL0131**	**ECCLSL0132**	**ECCLSL0133**	**ECCLSL0134/ECCLSL9013**	**ECCLSL0135**	**ECCLSL0136**	**ECCLSL0137**	**ECCLSL0138**	**ECCLSL0139**	**ECCLSL0140**	**ECCLSL0141/ECCLSL9015**	**ECCLSL0255/ECCLSL9026**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–3.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.5**	**0.0–3.0**	**0.0–1.0**
Date	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/14/16**	**08/08/19**
Analyte (mg/kg)														
Organics-Semivolatile														
1,1'-Biphenyl	<0.23 U	<0.061 U	<0.071 U	0.014 J	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
1,2,4,5-Tetrachlorobenzene	<0.46 U	<0.12 U	<0.14 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.24 U	<0.11 U	<0.12 U	<0.12 U	NR
2,3,4,6-Tetrachlorophenol	<7.3 U	<1.9 U	<2.3 U	<1.8 U	<1.9 U	<1.8 U	<1.9 U	<1.8 U	<1.9 U	<3.9 U	<1.8 U	<2 U	<1.9 U	NR
2,4,5-Trichlorophenol	<0.68 U	<0.18 U	<0.21 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.36 U	<0.17 U	<0.18 U	<0.18 U	NR
2,4,6-Trichlorophenol	<0.68 U	<0.18 U	<0.21 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.36 U	<0.17 U	<0.18 U	<0.18 U	NR
2,4-Dichlorophenol	<0.68 U	<0.18 U	<0.21 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.36 U	<0.17 U	<0.18 U	<0.18 U	NR
2,4-Dimethylphenol	<0.68 U	<0.18 U	<0.21 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.36 U	<0.17 U	<0.18 U	<0.18 U	NR
2,4-Dinitrophenol	<1.5 U	<0.4 U	<0.47 U	<0.37 U	<0.39 U	<0.37 U	<0.39 U	<0.38 U	<0.39 U	<0.8 U	<0.37 U	<0.41 U	<0.39 U	NR
2,4-Dinitrotoluene	<0.91 U	<0.24 U	<0.28 U	<0.22 U	<0.23 U	<0.23 U	<0.24 U	<0.23 U	<0.24 U	<0.49 U	<0.22 U	<0.25 U	<0.24 U	NR
2,6-Dinitrotoluene	<0.91 U	<0.24 U	<0.28 U	<0.22 U	<0.23 U	<0.23 U	<0.24 U	<0.23 U	<0.24 U	<0.49 U	<0.22 U	<0.25 U	<0.24 U	NR
2-Chloronaphthalene	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
2-Chlorophenol	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
2-Methyl-4,6-dinitrophenol	<0.68 U	<0.18 U	<0.21 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.36 U	<0.17 U	<0.18 U	<0.18 U	NR
2-Methylnaphthalene	0.53	0.0099	<0.0095 U	0.52	0.027	0.0725	0.12	<0.0076 U	0.056	0.31	0.35	0.12	0.12	NR
2-Methylphenol	<0.91 U	<0.24 U	<0.28 U	<0.22 U	<0.23 U	<0.23 U	<0.24 U	<0.23 U	<0.24 U	<0.49 U	<0.22 U	<0.25 U	<0.24 U	NR
2-Nitrobenzenamine	<0.91 U	<0.24 U	<0.28 U	<0.22 U	<0.23 U	<0.23 U	<0.24 U	<0.23 U	<0.24 U	<0.49 U	<0.22 U	<0.25 U	<0.24 U	NR
2-Nitrophenol	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
3,3'-Dichlorobenzidine	<0.46 U	<0.12 U	<0.14 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.24 U	<0.11 U	<0.12 R	<0.12 U	NR
3-Nitrobenzenamine	<0.91 U	<0.24 U	<0.28 U	<0.22 U	<0.23 U	<0.23 U	<0.24 U	<0.23 U	<0.24 U	<0.49 U	<0.22 U	<0.25 R	<0.24 U	NR
4-Bromophenyl phenyl ether	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
4-Chloro-3-methylphenol	<0.68 U	<0.18 U	<0.21 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.36 U	<0.17 U	<0.18 U	<0.18 U	NR
4-Chlorobenzenamine	<0.68 U	<0.18 U	<0.21 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.17 U	<0.18 U	<0.36 U	<0.17 U	<0.18 U	<0.18 U	NR
4-Chlorophenyl phenyl ether	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
4-Nitrobenzenamine	<0.91 U	<0.24 U	<0.28 U	<0.22 U	<0.23 U	<0.23 U	<0.24 U	<0.23 U	<0.24 U	<0.49 U	<0.22 U	<0.25 U	<0.24 U	NR
4-Nitrophenol	<1.5 U	<0.4 U	<0.47 U	<0.37 U	<0.39 U	<0.37 U	<0.39 U	<0.38 U	<0.39 U	<0.8 U	<0.37 U	<0.41 U	<0.39 U	NR
Acenaphthene	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	0.043	<0.0074 U	<0.0082 U	<0.0078 U	<0.017 U
Acenaphthylene	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	0.08	0.034	0.013	<0.0078 U	<0.017 U
Acetophenone	<0.46 U	0.013 J	<0.14 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.24 U	<0.11 U	<0.12 U	<0.12 U	NR
Anthracene	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U	0.0068 J	<0.0079 U	<0.0076 U	<0.0079 U	0.14	0.035	0.012	<0.0078 U	<0.017 U
Atrazine	<0.91 U	<0.24 U	<0.28 U	<0.22 U	<0.23 U	<0.23 U	<0.24 U	<0.23 U	<0.24 U	<0.49 U	<0.22 U	<0.25 U	<0.24 U	NR
Benz(*a*)anthracene	0.049	0.013	0.0081 J	0.017	0.032	0.0475	0.021	0.0055 J	<0.0079 U	0.46	0.14	0.071	<0.0078 U	<0.017 U
Benzaldehyde	<0.46 U	0.027 J	0.66	0.29	0.15	0.0795 J	<0.12 U	0.015 J	<0.12 U	<0.24 U	<0.11 U	0.13	0.071 J	NR
Benzo(*a*)pyrene	0.074	0.014	0.01	0.019	0.047	0.0635	0.034	<0.0076 U	<0.0079 U	0.57	0.15	0.08	0.01	<0.017 U
Benzo(*b*)fluoranthene	0.074	0.017	0.015	0.024	0.064	0.072	0.04	0.014	0.014	1	0.24	0.094	0.021	0.017
Benzo(*g,h,i*)perylene	0.047	0.011	<0.0095 U	0.017	0.023	0.0245	<0.0079 U	<0.0076 U	<0.0079 U	0.2	0.087	0.047	<0.0078 U	<0.017 U
Benzo(*k*)fluoranthene	0.026 J	0.0096	<0.0095 U	0.011	0.021	0.0215	0.018	0.0051 J	<0.0079 U	0.35	0.09	0.031	<0.0078 U	<0.017 U
Bis(2-chloroethoxy)methane	<0.46 U	<0.12 U	<0.14 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.24 U	<0.11 U	<0.12 U	<0.12 U	NR

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-129	ECCL-SL-130	ECCL-SL-131	ECCL-SL-132	ECCL-SL-133	ECCL-SL-134	ECCL-SL-135	ECCL-SL-136	ECCL-SL-137	ECCL-SL-138	ECCL-SL-139	ECCL-SL-140	ECCL-SL-141	ECCL-SL-225
Sample Id	**ECCLSL0129**	**ECCLSL0130**	**ECCLSL0131**	**ECCLSL0132**	**ECCLSL0133**	**ECCLSL0134/ECCLSL9013**	**ECCLSL0135**	**ECCLSL0136**	**ECCLSL0137**	**ECCLSL0138**	**ECCLSL0139**	**ECCLSL0140**	**ECCLSL0141/ECCLSL9015**	**ECCLSL0255/ECCLSL9026**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–3.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.0**	**0.0–2.5**	**0.0–3.0**	**0.0–1.0**
Date	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/15/16**	**06/15/16**	**06/15/16**	**06/14/16**	**08/08/19**
Bis(2-chloroethyl) ether	<0.46 U	<0.12 U	<0.14 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.24 U	<0.11 U	<0.12 U	<0.12 U	NR
Bis(2-chloroisopropyl) ether	<0.46 U	<0.12 U	<0.14 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.24 U	<0.11 U	<0.12 U	<0.12 U	NR
Bis(2-ethylhexyl)phthalate	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U	<0.079 U	<0.083 U	<0.082 U	<0.083 U	<0.17 U	<0.1 U	<0.086 U	<0.082 U	NR
Butyl benzyl phthalate	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U	<0.079 U	<0.083 U	<0.08 U	<0.083 U	<0.17 U	<0.078 U	<0.086 U	<0.082 U	NR
Caprolactam	<1.5 U	<0.4 U	<0.47 U	<0.37 U	<0.39 U	<0.37 U	<0.39 U	<0.38 U	<0.39 U	<0.8 U	<0.37 U	<0.41 U	<0.39 U	NR
Carbazole	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	0.084 J	<0.056 U	<0.061 U	<0.059 U	NR
Chrysene	0.15	0.018	0.012	0.032	0.058	0.104	0.046	0.012	0.016	0.6	0.2	0.1	<0.0078 U	0.019
Di-*n*-butyl phthalate	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U	<0.079 U	<0.083 U	<0.08 U	<0.083 U	0.037 J	0.04 J	<0.086 U	0.0325 J	NR
Di-*n*-octylphthalate	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U	<0.079 U	<0.083 U	<0.08 U	<0.083 U	<0.17 U	<0.078 U	<0.086 U	<0.082 U	NR
Dibenz(*a,h*)anthracene	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	<0.016 U	0.023	<0.0082 U	<0.0078 U	<0.017 U
Dibenzofuran	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	0.0061 J	0.047 J	<0.056 U	0.013 J	<0.059 U	NR
Diethyl phthalate	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U	<0.079 U	<0.083 U	<0.08 U	<0.083 U	<0.17 U	<0.078 U	<0.086 U	<0.082 U	NR
Dimethyl phthalate	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U	<0.079 U	<0.083 U	<0.08 U	<0.083 U	<0.17 U	<0.078 U	<0.086 U	<0.082 U	NR
Fluoranthene	0.065	0.023	0.015	0.029	0.05	0.038	0.019	0.0091	0.0093	1.3	0.31	0.086	0.0125	0.025
Fluorene	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	0.073	<0.0074 U	<0.0082 U	<0.0078 U	<0.017 U
Hexachlorobenzene	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	<0.016 U	<0.0074 U	<0.0082 U	<0.0078 U	NR
Hexachlorobutadiene	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
Hexachlorocyclopentadiene	<1.5 U	<0.4 U	<0.47 U	<0.37 U	<0.39 U	<0.37 U	<0.39 U	<0.38 U	<0.39 U	<0.8 U	<0.37 U	<0.41 R	<0.39 U	NR
Hexachloroethane	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
Indeno(1,2,3-*cd*)pyrene	0.022 J	0.0095	<0.0095 U	0.0078	0.013	0.015	<0.0079 U	<0.0076 U	<0.0079 U	0.21	0.07	0.033	0.002 J	<0.017 U
Isophorone	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
N-Nitroso-di-*n*-propylamine	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
N-Nitrosodiphenylamine	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	0.042 J	0.13	<0.057 U	<0.059 U	<0.12 U	<0.056 U	0.066	<0.059 U	NR
Naphthalene	0.16	0.0049 J	<0.0095 U	0.18	0.009	0.0215	0.045	<0.0076 U	0.017	0.1	0.12	0.034	0.03	<0.017 U
Nitrobenzene	<0.46 U	<0.12 U	<0.14 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.11 U	<0.12 U	<0.24 U	<0.11 U	<0.12 U	<0.12 U	NR
Pentachlorophenol	<0.68 U	<0.18 UJ	<0.21 UJ	<0.17 UJ	<0.18 UJ	<0.17 UJ	<0.18 UJ	<0.17 UJ	<0.18 UJ	<0.36 UJ	<0.17 U	<0.18 U	<0.18 U	NR
Phenanthrene	0.21	0.015	0.0078 J	0.14	0.031	0.049	0.033	0.0091	0.035	0.88	0.26	0.085	0.0815	0.026
Phenol	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U	<0.057 U	<0.059 U	<0.057 U	<0.059 U	<0.12 U	<0.056 U	<0.061 U	<0.059 U	NR
Pyrene	0.093	0.019	0.014	0.038	0.05	0.055	0.036	0.012	0.013	1.1	0.32	0.093	0.0465	0.023
m+p Methylphenol	<1.8 U	<0.48 U	<0.57 U	<0.45 U	<0.47 U	<0.45 U	<0.47 U	<0.46 U	<0.47 U	<0.97 U	<0.45 U	<0.49 U	<0.47 U	NR

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-226	ECCL-SL-229	ECCL-SL-230	ECCL-SL-231	ECCL-SL-232	ECCL-SL-232	ECCL-SL-233	ECCL-SL-233	ECCL-SL-234	ECCL-SL-234	ECCL-SL-236	ECCL-SL-236	ECCL-SL-237	ECCL-SL-237
Sample Id	**ECCLSL0256**	**ECCLSL0258/ECCLSL9028**	**ECCLSL0259**	**ECCLSL0275**	**ECCLSL0260**	**ECCLSL0261/ECCLSL9027**	**ECCLSL0262**	**ECCLSL0263**	**ECCLSL0264**	**ECCLSL0265**	**ECCLSL0266**	**ECCLSL0267**	**ECCLSL0268**	**ECCLSL0269**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**1.0–1.5**	**1.5–2.0**	**1.0–1.5**	**1.5–2.0**	**0.5–1.0**	**1.0–1.5**	**3.0–3.5**	**3.5–4.0**	**3.0–3.5**	**3.5–4.0**
Date	**08/06/19**	**08/07/19**	**08/07/19**	**08/07/19**	**08/08/19**	**08/08/19**	**08/07/19**	**08/07/19**	**08/08/19**	**08/08/19**	**08/06/19**	**08/06/19**	**08/06/19**	**08/06/19**
Analyte (mg/kg)														
Organics-Semivolatile													NR	NR
1,1'-Biphenyl	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,6-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dimethylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,6-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chloronaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylnaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3,3'-Dichlorobenzidine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Bromophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Acenaphthene	<0.017 U	<0.018 U	0.018	<0.019 U	<0.017 U	<0.019 U	<0.017 U	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.017 U
Acenaphthylene	<0.017 U	<0.018 U	<0.018 U	<0.019 U	<0.017 U	<0.019 U	<0.017 U	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Acetophenone	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Anthracene	<0.017 U	<0.018 U	0.019	<0.019 U	<0.017 U	<0.019 U	<0.017 U	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Atrazine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Benz(*a*)anthracene	<0.017 U	<0.018 U	0.43	0.11	0.053	<0.019 U	0.066	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Benzaldehyde	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Benzo(*a*)pyrene	<0.017 U	0.03	0.6	0.12	0.066	<0.019 U	0.083	<0.019 U	0.02	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.017 U
Benzo(*b*)fluoranthene	<0.017 U	0.026	0.6	0.15	0.072	<0.019 U	0.098	<0.019 U	0.029	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.017 U
Benzo(*g,h,i*)perylene	<0.017 U	0.019	0.3	0.06	0.036	<0.019 U	0.052	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.017 U
Benzo(*k*)fluoranthene	<0.017 U	<0.018 U	0.21	0.034	0.017	<0.019 U	0.04	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Bis(2-chloroethoxy)methane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-226	ECCL-SL-229	ECCL-SL-230	ECCL-SL-231	ECCL-SL-232	ECCL-SL-232	ECCL-SL-233	ECCL-SL-233	ECCL-SL-234	ECCL-SL-234	ECCL-SL-236	ECCL-SL-236	ECCL-SL-237	ECCL-SL-237
Sample Id	**ECCLSL0256**	**ECCLSL0258/ECCLSL9028**	**ECCLSL0259**	**ECCLSL0275**	**ECCLSL0260**	**ECCLSL0261/ECCLSL9027**	**ECCLSL0262**	**ECCLSL0263**	**ECCLSL0264**	**ECCLSL0265**	**ECCLSL0266**	**ECCLSL0267**	**ECCLSL0268**	**ECCLSL0269**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**1.0–1.5**	**1.5–2.0**	**1.0–1.5**	**1.5–2.0**	**0.5–1.0**	**1.0–1.5**	**3.0–3.5**	**3.5–4.0**	**3.0–3.5**	**3.5–4.0**
Date	**08/06/19**	**08/07/19**	**08/07/19**	**08/07/19**	**08/08/19**	**08/08/19**	**08/07/19**	**08/07/19**	**08/08/19**	**08/08/19**	**08/06/19**	**08/06/19**	**08/06/19**	**08/06/19**
Bis(2-chloroethyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl benzyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Caprolactam	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Carbazole	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Chrysene	0.026	0.0345	0.81	0.19	0.1	<0.019 U	0.12	<0.019 U	0.029	<0.018 U	<0.017 U	<0.017 U	NR	NR
Di-*n*-butyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Di-*n*-octylphthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Dibenz(*a,h*)anthracene	<0.017 U	<0.018 U	0.097	<0.019 U	0.017	<0.019 U	<0.017 U	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Dibenzofuran	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Diethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dimethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Fluoranthene	<0.017 U	0.02	0.32	0.095	0.043	<0.019 U	0.099	<0.019 U	0.02	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.017 U
Fluorene	<0.017 U	<0.018 U	<0.018 U	<0.019 U	<0.017 U	<0.019 U	<0.017 U	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Hexachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorocyclopentadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachloroethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Indeno(1,2,3-*cd*)pyrene	<0.017 U	<0.018 U	0.2	0.046	0.026	<0.019 U	0.045	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Isophorone	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitrosodiphenylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Naphthalene	0.096	<0.018 U	0.042	0.029	<0.017 U	<0.019 U	<0.017 U	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Nitrobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pentachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Phenanthrene	0.074	0.0195	0.17	0.068	0.028	<0.019 U	0.063	<0.019 U	<0.019 U	<0.018 U	<0.017 U	<0.017 U	NR	NR
Phenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.017 U	<0.017 U
Pyrene	0.026	0.02	0.38	0.092	0.044	<0.019 U	0.089	<0.019 U	0.019	<0.018 U	<0.017 U	<0.017 U	NR	NR
m+p Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR		

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-238	ECCL-SL-239	ECCL-SL-241	ECCL-SL-243	ECCL-SL-265	ECCL-SL-266
Sample Id	ECCLSL0270	ECCLSL0271	ECCLSL0273	ECCLSL0274	ECCLSL0305	ECCLSL0306
Sample Type	GR	GR	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0
Date	08/07/19	08/07/19	08/06/19	08/06/19	08/08/19	08/08/19
Analyte (mg/kg)						
Organics-Semivolatile						
1,1'-Biphenyl	NR	NR	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	NR	NR	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	NR	NR	NR	NR	NR	NR
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR	NR
2,4,6-Trichlorophenol	NR	NR	NR	NR	NR	NR
2,4-Dichlorophenol	NR	NR	NR	NR	NR	NR
2,4-Dimethylphenol	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	NR	NR	NR	NR	NR	NR
2,4-Dinitrotoluene	NR	NR	NR	NR	NR	NR
2,6-Dinitrotoluene	NR	NR	NR	NR	NR	NR
2-Chloronaphthalene	NR	NR	NR	NR	NR	NR
2-Chlorophenol	NR	NR	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	NR	NR	NR	NR	NR	NR
2-Methylnaphthalene	NR	NR	NR	NR	NR	NR
2-Methylphenol	NR	NR	NR	NR	NR	NR
2-Nitrobenzenamine	NR	NR	NR	NR	NR	NR
2-Nitrophenol	NR	NR	NR	NR	NR	NR
3,3'-Dichlorobenzidine	NR	NR	NR	NR	NR	NR
3-Nitrobenzenamine	NR	NR	NR	NR	NR	NR
4-Bromophenyl phenyl ether	NR	NR	NR	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	NR	NR	NR	NR
4-Chlorobenzenamine	NR	NR	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	NR	NR	NR	NR	NR	NR
4-Nitrobenzenamine	NR	NR	NR	NR	NR	NR
4-Nitrophenol	NR	NR	NR	NR	NR	NR
Acenaphthene	<0.018 U	<0.018 U	<0.019 U	<0.018 U	<0.019 U	<0.018 U
Acenaphthylene	<0.018 U	<0.018 U	<0.019 U	<0.018 U	<0.019 U	<0.018 U
Acetophenone	NR	NR	NR	NR	NR	NR
Anthracene	<0.018 U	<0.018 U	<0.019 U	<0.018 U	<0.019 U	<0.018 U
Atrazine	NR	NR	NR	NR	NR	NR
Benz(*a*)anthracene	0.068	0.13	<0.019 U	<0.018 U	0.036	0.084
Benzaldehyde	NR	NR	NR	NR	NR	NR
Benzo(*a*)pyrene	0.065	0.15	<0.019 U	<0.018 U	0.051	0.12
Benzo(*b*)fluoranthene	0.071	0.16	<0.019 U	<0.018 U	0.053	0.16
Benzo(*g,h,i*)perylene	0.029	0.1	<0.019 U	<0.018 U	0.039	0.089
Benzo(*k*)fluoranthene	<0.018 U	0.047	<0.019 U	<0.018 U	<0.019 U	0.059
Bis(2-chloroethoxy)methane	NR	NR	NR	NR	NR	NR

Table C-9. Results for SVOCs in Soil Samples at ECCL Pistol Range (West) – Continued

Station	ECCL-SL-238	ECCL-SL-239	ECCL-SL-241	ECCL-SL-243	ECCL-SL-265	ECCL-SL-266
Sample Id	ECCLSL0270	ECCLSL0271	ECCLSL0273	ECCLSL0274	ECCLSL0305	ECCLSL0306
Sample Type	GR	GR	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0
Date	08/07/19	08/07/19	08/06/19	08/06/19	08/08/19	08/08/19
Bis(2-chloroethyl) ether	NR	NR	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	NR	NR	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	NR	NR	NR	NR	NR	NR
Butyl benzyl phthalate	NR	NR	NR	NR	NR	NR
Caprolactam	NR	NR	NR	NR	NR	NR
Carbazole	NR	NR	NR	NR	NR	NR
Chrysene	0.13	0.26	<0.019 U	<0.018 U	0.068	0.16
Di-*n*-butyl phthalate	NR	NR	NR	NR	NR	NR
Di-*n*-octylphthalate	NR	NR	NR	NR	NR	NR
Dibenz(*a*,*h*)anthracene	<0.018 U	0.036	<0.019 U	<0.018 U	<0.019 U	0.027
Dibenzofuran	NR	NR	NR	NR	NR	NR
Diethyl phthalate	NR	NR	NR	NR	NR	NR
Dimethyl phthalate	NR	NR	NR	NR	NR	NR
Fluoranthene	0.071	0.12	<0.019 U	<0.018 U	0.033	0.068
Fluorene	<0.018 U	<0.018 U	<0.019 U	<0.018 U	<0.019 U	<0.018 U
Hexachlorobenzene	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	NR	NR	NR	NR	NR	NR
Hexachlorocyclopentadiene	NR	NR	NR	NR	NR	NR
Hexachloroethane	NR	NR	NR	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	<0.018 U	0.068	<0.019 U	<0.018 U	0.021	0.064
Isophorone	NR	NR	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	NR	NR	NR	NR	NR	NR
N-Nitrosodiphenylamine	NR	NR	NR	NR	NR	NR
Naphthalene	0.12	<0.018 U	<0.019 U	<0.018 U	<0.019 U	<0.018 U
Nitrobenzene	NR	NR	NR	NR	NR	NR
Pentachlorophenol	NR	NR	NR	NR	NR	NR
Phenanthrene	0.12	0.071	<0.019 U	<0.018 U	<0.019 U	0.026
Phenol	NR	NR	NR	NR	NR	NR
Pyrene	0.069	0.14	<0.019 U	<0.018 U	0.049	0.086
m+p Methylphenol	NR	NR	NR	NR	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.
SVOC = semivolatile organic compound.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-10. Results for Metals in Soil Samples at ECCL Rifle Range

Station	ECCL-SL-082	ECCL-SL-083	ECCL-SL-084	ECCL-SL-085	ECCL-SL-086	ECCL-SL-087	ECCL-SL-088	ECCL-SL-089	ECCL-SL-090	ECCL-SL-091	ECCL-SL-092	ECCL-SL-093	ECCL-SL-094	ECCL-SL-095
Sample ID	**ECCLSL0082**	**ECCLSL0083**	**ECCLSL0084**	**ECCLSL0085**	**ECCLSL0086**	**ECCLSL0087/ECCLSL9012**	**ECCLSL0088**	**ECCLSL0089/ECCLSL9010**	**ECCLSL0090**	**ECCLSL0091**	**ECCLSL0092**	**ECCLSL0093**	**ECCLSL0094**	**ECCLSL0095**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**
Date	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**
Analyte (mg/kg)														
Metals														
Antimony	<2.2 U	0.54 J	0.71 J	<2 U	0.53 J	0.71 J	3.6	86.5	51	2.2	24	69	2.6	39
Arsenic	28	31	34	29	22	26.5	17	19.5	21	17	18	25	20	18
Copper	60	54	66	55	72	69	160	305	320	140	460	580	140	570
Iron	30000	33000	34000	32000	22000	28500	25000	23000	24000	24000	25000	28000	28000	22000
Lead	30	30	33	32	34	35	680	9450	6600	430	4600	28000	360	9600
Tin	<11 U	<10 U	<11 U	<10 U	<11 U	<10.5 U	<11 U	<10.5 U	<11 U	<11 U	<9.4 U	<25 U	<10 U	<9.6 U
Zinc	16	14	14	19	18	24	96	43.5	34	15	66	170	18	71

Table C-10. Results for Metals in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-099	ECCL-SL-100	ECCL-SL-101	ECCL-SL-102	ECCL-SL-103	ECCL-SL-104	ECCL-SL-105	ECCL-SL-106	ECCL-SL-107	ECCL-SL-108	ECCL-SL-109	ECCL-SL-110	ECCL-SL-111	ECCL-SL-112	ECCL-SL-113
Sample ID	**ECCLSL0099**	**ECCLSL0100**	**ECCLSL0101**	**ECCLSL0102/ECCLSL9009**	**ECCLSL0103**	**ECCLSL0104**	**ECCLSL0105**	**ECCLSL0106**	**ECCLSL0107**	**ECCLSL0108**	**ECCLSL0109**	**ECCLSL0110**	**ECCLSL0111**	**ECCLSL0112**	**ECCLSL0113**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–3.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–2.5**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.5**	**0.0–2.5**	**0.0–3.0**	**0.0–2.5**
Date	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/14/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/14/16**
Analyte (mg/kg)															
Metals															
Antimony	53	3 J	24	28.05	1.2 J	1.8 J	1.1 J	3.1	0.88 J	28	0.62 J	0.72 J	0.78 J	1.4 J	0.76 J
Arsenic	13	19	12	11.5	15	14	30	17	18	28	6.1	27	23	11	13
Copper	460	170	350	135	130	91	66	160	48	62	15	56	47	56	27
Iron	15000	28000	15000	19000	26000	22000	30000	24000	22000	28000	14000	29000	26000	17000	19000 J
Lead	6800	490	3500	3180	170	240	84	590	100	12000	62	46	90	520	58 J
Tin	<13 U	<11 U	<9 U	<9.65 U	<11 U	<9.4 U	<10 U	<11 U	<10 U	<14 U	<10 U	<11 U	<11 U	<11 U	<11 U
Zinc	88	18	56	80.5	22	18	19	19	38	42	22	36	34	25	54

Table C-10. Results for Metals in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-114	ECCL-SL-213	ECCL-SL-214	ECCL-SL-214	ECCL-SL-215	ECCL-SL-215	ECCL-SL-216	ECCL-SL-216	ECCL-SL-217	ECCL-SL-218	ECCL-SL-219	ECCL-SL-219	ECCL-SL-220	ECCL-SL-220
Sample ID	**ECCLSL0114/ECCLSL9011**	**ECCLSL0230**	**ECCLSL0231**	**ECCLSL0232**	**ECCLSL0233**	**ECCLSL0234**	**ECCLSL0235**	**ECCLSL0236**	**ECCLSL0237**	**ECCLSL0238**	**ECCLSL0239**	**ECCLSL0240**	**ECCLSL0241**	**ECCLSL0242**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–3.0**	**0.0–1.0**	**1.0–1.5**	**1.5–2.0**	**1.0–1.5**	**1.5–2.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**0.0–1.0**	**4.0–4.5**	**4.5–5.0**	**5.5–6.0**	**6.0–6.5**
Date	**06/14/16**	**08/05/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/06/19**	**08/06/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**
Analyte (mg/kg)														
Metals														
Antimony	0.665 J	<2.4 UJ	NR	NR	<2.4 U	<2.3 U	<2.1 U	<2.1 U	<2.2 U	<2 U	5.3	<2.2 U	10	<1.8 U
Arsenic	19	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Copper	32.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Iron	24000	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lead	23	53 J	380	40	150	34	430	440	110	160	530	29	1900	150
Tin	<10.35 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	74	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-10. Results for Metals in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-221	ECCL-SL-223	ECCL-SL-224	ECCL-SL-227	ECCL-SL-235	ECCL-SL-235	ECCL-SL-253	ECCL-SL-260	ECCL-SL-263	ECCL-SL-263
Sample ID	**ECCLSL0243**	**ECCLSL0253**	**ECCLSL0254**	**ECCLSL0249**	**ECCLSL0250**	**ECCLSL0251**	**ECCLSL0244**	**ECCLSL0294**	**ECCLSL0307/ECCLSL9032**	**ECCLSL0308**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**2.0–2.5**	**2.5–3.0**	**0.0–1.0**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**
Date	**08/06/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/02/19**	**08/02/19**	**08/05/19**	**08/06/19**	**08/08/19**	**08/08/19**
Analyte (mg/kg)										
Metals										
Antimony	NR	<2.2 U	<2 U	NR	NR	NR	<1.8 U	3.3	NR	NR
Arsenic	NR	15	9.7	NR	NR	NR	20	NR	NR	NR
Copper	NR	40	23	NR	NR	NR	47	NR	NR	NR
Iron	NR	24000	16000	NR	NR	NR	19000	NR	NR	NR
Lead	60	42	35	62	200	49	29	280	360	240
Tin	NR	<11 U	<10 U	NR	NR	NR	<8.9 U	NR	NR	NR
Zinc	NR	43	33	NR	NR	NR	17	NR	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range

Station	ECCL-SL-082	ECCL-SL-083	ECCL-SL-084	ECCL-SL-085	ECCL-SL-086	ECCL-SL-087	ECCL-SL-088	ECCL-SL-089	ECCL-SL-090	ECCL-SL-091	ECCL-SL-092	ECCL-SL-093	ECCL-SL-094	ECCL-SL-095	ECCL-SL-096
Sample ID	**ECCLSL0082**	**ECCLSL0083**	**ECCLSL0084**	**ECCLSL0085**	**ECCLSL0086**	**ECCLSL0087/ECCLSL9012**	**ECCLSL0088**	**ECCLSL0089/ECCLSL9010**	**ECCLSL0090**	**ECCLSL0091**	**ECCLSL0092**	**ECCLSL0093**	**ECCLSL0094**	**ECCLSL0095**	**ECCLSL0096**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–3.0**
Date	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**
Analyte (mg/kg)															
Organics-Semivolatile															
1,1'-Biphenyl	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	0.022 J	0.0135 J	0.017 J	0.02 J	0.019 J	0.01 J	0.013 J	0.012 J	0.017 J
1,2,4,5-Tetrachlorobenzene	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	<0.13 U	<0.12 U	<0.29 U	<0.28 U	<0.28 U	<0.23 U	<0.27 U	<0.27 U
2,3,4,6-Tetrachlorophenol	<7.6 U	<19 U	<7.5 U	<18 U	<1.9 U	<9.65 U	<4.5 U	<2.05 U	<1.9 U	<4.6 U	<4.4 U	<4.5 U	<3.6 U	<4.4 U	<4.4 U
2,4,5-Trichlorophenol	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 U	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
2,4,6-Trichlorophenol	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 U	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
2,4-Dichlorophenol	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 U	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
2,4-Dimethylphenol	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 U	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
2,4-Dinitrophenol	<1.6 U	<3.9 U	<1.5 U	<3.7 U	<0.4 U	<2 U	<0.92 U	<0.42 U	<0.39 U	<0.96 U	<0.91 U	<0.92 U	<0.74 U	<0.9 U	<0.9 U
2,4-Dinitrotoluene	<0.95 U	<2.3 U	<0.94 U	<2.2 U	<0.24 U	<1.21 U	<0.56 U	<0.255 U	<0.24 U	<0.58 U	<0.55 U	<0.56 U	<0.45 U	<0.54 U	<0.55 U
2,6-Dinitrotoluene	<0.95 U	<2.3 U	<0.94 U	<2.2 U	<0.24 U	<1.21 U	<0.56 U	<0.255 U	<0.24 U	<0.58 U	<0.55 U	<0.56 U	<0.45 U	<0.54 U	<0.55 U
2-Chloronaphthalene	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
2-Chlorophenol	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
2-Methyl-4,6-dinitrophenol	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 U	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
2-Methylnaphthalene	0.8	1.2	0.59	1.3	0.67	1.15	0.77	0.505	0.6	0.46	0.53	0.096	0.32	0.31	0.5
2-Methylphenol	<0.95 U	<2.3 U	<0.94 U	<2.2 U	<0.24 U	<1.21 U	<0.56 U	<0.255 U	<0.24 U	<0.58 U	<0.55 U	<0.56 U	<0.45 U	<0.54 U	<0.55 U
2-Nitrobenzenamine	<0.95 U	<2.3 U	<0.94 U	<2.2 U	<0.24 U	<1.21 U	<0.56 U	<0.255 U	<0.24 U	<0.58 U	<0.55 U	<0.56 U	<0.45 U	<0.54 U	<0.55 U
2-Nitrophenol	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
3,3'-Dichlorobenzidine	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	<0.13 U	<0.12 U	<0.29 U	<0.28 U	<0.28 U	<0.23 U	<0.27 U	<0.27 U
3-Nitrobenzenamine	<0.95 U	<2.3 U	<0.94 U	<2.2 U	<0.24 U	<1.21 U	<0.56 U	<0.255 U	<0.24 U	<0.58 U	<0.55 U	<0.56 U	<0.45 U	<0.54 U	<0.55 U
4-Bromophenyl phenyl ether	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
4-Chloro-3-methylphenol	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 U	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
4-Chlorobenzenamine	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 U	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
4-Chlorophenyl phenyl ether	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
4-Nitrobenzenamine	<0.95 U	<2.3 U	<0.94 U	<2.2 U	<0.24 U	<1.21 U	<0.56 U	<0.255 U	<0.24 U	<0.58 U	<0.55 U	<0.56 U	<0.45 U	<0.54 U	<0.55 U
4-Nitrophenol	<1.6 U	<3.9 U	<1.5 U	<3.7 U	<0.4 U	<2 U	<0.92 U	<0.42 U	<0.39 U	<0.96 U	<0.91 U	<0.92 U	<0.74 U	<0.9 U	<0.9 U
Acenaphthene	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	<0.019 U	<0.0085 U	<0.008 U	<0.019 U	0.015 J	0.045	<0.015 U	<0.018 U	<0.018 U
Acenaphthylene	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	0.015 J	0.009 J	0.011	0.013 J	0.015 J	0.035	0.014 J	<0.018 U	<0.018 U
Acetophenone	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	<0.13 U	<0.12 U	<0.29 U	<0.28 U	<0.28 U	<0.23 U	<0.27 U	<0.27 U
Anthracene	0.043	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	<0.019 U	0.00605 J	<0.008 U	<0.019 U	0.024	0.17	<0.015 U	<0.018 U	0.011 J
Atrazine	<0.95 U	<2.3 U	<0.94 U	<2.2 U	<0.24 U	<1.21 U	<0.56 U	<0.255 U	<0.24 U	<0.58 U	<0.55 U	<0.56 U	<0.45 U	<0.54 U	<0.55 U
Benz(*a*)anthracene	0.11	<0.078 U	0.031	<0.074 U	<0.0081 U	<0.041 U	0.023	0.024	0.02	0.048	0.084	0.47	<0.015 U	0.075	0.068
Benzaldehyde	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	0.15	<0.12 U	0.087 J	<0.28 U	0.063 J	0.29	0.11 J	<0.27 U
Benzo(*a*)pyrene	0.11	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	0.033	0.026	0.021	0.053	0.084	0.47	<0.015 U	0.082	0.066
Benzo(*b*)fluoranthene	0.16	<0.078 U	<0.031 U	<0.074 U	0.018	<0.041 U	0.042	0.0465	0.04	0.064	0.17	0.93	0.03	0.11	0.095
Benzo(*g,h,i*)perylene	0.056	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	0.016 J	0.0155	0.013	<0.019 U	0.041	0.16	<0.015 U	0.047	0.028
Benzo(*k*)fluoranthene	0.071	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	0.021	0.0155	0.0091	0.024	0.071	0.25	<0.015 U	0.041	0.033
Bis(2-chloroethoxy)methane	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	<0.13 U	<0.12 U	<0.29 U	<0.28 U	<0.28 U	<0.23 U	<0.27 U	<0.27 U

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-082	ECCL-SL-083	ECCL-SL-084	ECCL-SL-085	ECCL-SL-086	ECCL-SL-087	ECCL-SL-088	ECCL-SL-089	ECCL-SL-090	ECCL-SL-091	ECCL-SL-092	ECCL-SL-093	ECCL-SL-094	ECCL-SL-095	ECCL-SL-096
Sample ID	**ECCLSL0082**	**ECCLSL0083**	**ECCLSL0084**	**ECCLSL0085**	**ECCLSL0086**	**ECCLSL0087/ECCLSL9012**	**ECCLSL0088**	**ECCLSL0089/ECCLSL9010**	**ECCLSL0090**	**ECCLSL0091**	**ECCLSL0092**	**ECCLSL0093**	**ECCLSL0094**	**ECCLSL0095**	**ECCLSL0096**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–3.0**
Date	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/14/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**
Bis(2-chloroethyl) ether	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	<0.13 U	<0.12 U	<0.29 U	<0.28 U	<0.28 U	<0.23 U	<0.27 U	<0.27 U
Bis(2-chloroisopropyl) ether	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	<0.13 U	<0.12 U	<0.29 U	<0.28 U	<0.28 U	<0.23 U	<0.27 U	<0.27 U
Bis(2-ethylhexyl)phthalate	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.43 U	<0.2 U	<0.089 U	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U
Butyl benzyl phthalate	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.43 U	<0.2 U	<0.089 U	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U
Caprolactam	<1.6 U	<3.9 U	<1.5 U	<3.7 U	<0.4 U	<2 U	<0.92 U	<0.42 U	<0.39 U	<0.96 U	<0.91 U	<0.92 U	<0.74 U	<0.9 U	<0.9 U
Carbazole	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
Chrysene	0.17	<0.078 U	0.046	<0.074 U	0.043	<0.041 U	0.085	0.07	0.067	0.11	0.19	0.73	0.064	0.21	0.18
Di-*n*-butyl phthalate	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.43 U	<0.2 U	<0.089 U	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U
Di-*n*-octylphthalate	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.43 U	<0.2 U	<0.089 U	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U
Dibenz(*a,h*)anthracene	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	<0.019 U	<0.0085 U	<0.008 U	<0.019 U	<0.018 U	0.058	<0.015 U	<0.018 U	<0.018 U
Dibenzofuran	0.054 J	<0.58 U	0.041 J	<0.56 U	<0.061 U	<0.31 U	0.039 J	0.057 J	<0.06 U	0.031 J	0.046 J	0.051 J	0.023 J	0.019 J	0.034 J
Diethyl phthalate	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.43 U	<0.2 U	<0.089 U	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U
Dimethyl phthalate	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.43 U	<0.2 U	<0.089 U	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U
Fluoranthene	0.32	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	0.051	0.052	0.046	0.078	0.22	0.47	0.025	0.042	0.079
Fluorene	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	<0.019 U	<0.0085 U	<0.008 U	<0.019 U	0.011 J	0.043	<0.015 U	<0.018 U	<0.018 U
Hexachlorobenzene	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	<0.019 U	<0.0085 U	<0.008 U	<0.019 U	<0.018 U	<0.019 U	<0.015 U	<0.018 U	<0.018 U
Hexachlorobutadiene	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
Hexachlorocyclopentadiene	<1.6 U	<3.9 U	<1.5 U	<3.7 U	<0.4 U	<2 U	<0.92 U	<0.42 U	<0.39 U	<0.96 U	<0.91 U	<0.92 U	<0.74 U	<0.9 U	<0.9 U
Hexachloroethane	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
Indeno(1,2,3-*cd*)pyrene	0.047	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.041 U	<0.019 U	0.0125	<0.008 U	<0.019 U	0.037	0.16	<0.015 U	0.024	<0.018 U
Isophorone	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
N-Nitroso-di-*n*-propylamine	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
N-Nitrosodiphenylamine	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
Naphthalene	0.22	0.32	0.15	0.38	0.17	0.33	0.22	0.185	0.18	0.12	0.16	0.021	0.08	0.073	0.12
Nitrobenzene	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.615 U	<0.28 U	<0.13 U	<0.12 U	<0.29 U	<0.28 U	<0.28 U	<0.23 U	<0.27 U	<0.27 U
Pentachlorophenol	<0.71 U	<1.8 U	<0.7 U	<1.7 U	<0.18 UJ	<0.945 U	<0.42 U	<0.19 U	<0.18 U	<0.44 U	<0.41 U	<0.42 U	<0.34 U	<0.41 U	<0.41 U
Phenanthrene	0.44	0.46	0.25	0.45	0.2	0.34	0.3	0.15	0.2	0.28	0.32	0.27	0.21	0.21	0.27
Phenol	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.31 U	<0.14 U	<0.0635 U	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U
Pyrene	0.28	0.094	0.064	<0.074 U	0.045	0.058	0.062	0.0605	0.051	0.093	0.15	0.45	0.046	0.076	0.094
m+p Methylphenol	<1.9 U	<4.7 U	<1.9 U	<4.5 U	<0.49 U	<2.45 U	<1.1 U	<0.505 U	<0.48 U	<1.2 U	<1.1 U	<1.1 U	<0.9 U	<1.1 U	<1.1 U

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-097	ECCL-SL-098	ECCL-SL-099	ECCL-SL-100	ECCL-SL-101	ECCL-SL-102	ECCL-SL-103	ECCL-SL-104	ECCL-SL-105	ECCL-SL-106	ECCL-SL-107	ECCL-SL-108	ECCL-SL-109	ECCL-SL-110	ECCL-SL-111	ECCL-SL-112
Sample ID	**ECCLSL0097**	**ECCLSL0098**	**ECCLSL0099**	**ECCLSL0100**	**ECCLSL0101**	**ECCLSL0102/ECCLSL9009**	**ECCLSL0103**	**ECCLSL0104**	**ECCLSL0105**	**ECCLSL0106**	**ECCLSL0107**	**ECCLSL0108**	**ECCLSL0109**	**ECCLSL0110**	**ECCLSL0111**	**ECCLSL0112**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–2.5**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.5**	**0.0–2.5**	**0.0–3.0**
Date	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/14/16**	**06/13/16**	**06/13/16**	**06/13/16**
Analyte (mg/kg)																
Organics-Semivolatile																
1,1'-Biphenyl	<0.23 U	<0.14 U	0.0038 J	0.02 J	<0.53 U	<0.0575 U	0.009 J	0.011 J	0.034 J	0.023 J	0.0055 J	0.012 J	<0.055 U	0.016 J	0.016 J	<0.055 U
1,2,4,5-Tetrachlorobenzene	<0.46 U	<0.27 U	<0.1 U	<0.28 U	<1.1 U	<0.115 U	<0.13 U	<0.11 U	<0.23 U	<0.11 U	<0.12 U	<0.23 U	<0.11 U	<0.29 U	<0.24 U	<0.11 U
2,3,4,6-Tetrachlorophenol	<7.4 U	<4.3 U	<1.7 U	<4.5 U	<17 U	<1.8 U	<2.1 U	<1.8 U	<3.7 U	<1.8 U	<1.9 U	<3.7 U	<1.8 U	<4.6 U	<3.8 U	<1.8 U
2,4,5-Trichlorophenol	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	<0.17 U	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 U	<0.43 U	<0.36 U	<0.16 U
2,4,6-Trichlorophenol	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	<0.17 U	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 U	<0.43 U	<0.36 U	<0.16 U
2,4-Dichlorophenol	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	<0.17 U	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 U	<0.43 U	<0.36 U	<0.16 U
2,4-Dimethylphenol	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	<0.17 U	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 U	<0.43 U	<0.36 U	<0.16 U
2,4-Dinitrophenol	<1.5 U	<0.89 U	<0.35 U	<0.93 U	<3.5 U	<0.38 U	<0.43 U	<0.37 U	<0.76 U	<0.37 U	<0.38 U	<0.77 U	<0.36 U	<0.94 U	<0.78 U	<0.36 U
2,4-Dinitrotoluene	<0.93 U	<0.54 U	<0.21 U	<0.57 U	<2.1 U	<0.23 U	<0.26 U	<0.23 U	<0.46 U	<0.22 U	<0.23 U	<0.46 U	<0.22 U	<0.57 U	<0.48 U	<0.22 U
2,6-Dinitrotoluene	<0.93 U	<0.54 U	<0.21 U	<0.57 U	<2.1 U	<0.23 U	<0.26 U	<0.23 U	<0.46 U	<0.22 U	<0.23 U	<0.46 U	<0.22 U	<0.57 U	<0.48 U	<0.22 U
2-Chloronaphthalene	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
2-Chlorophenol	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
2-Methyl-4,6-dinitrophenol	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	<0.17 U	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 U	<0.43 U	<0.36 U	<0.16 U
2-Methylnaphthalene	0.37	0.16	0.076	0.73 J	0.49	0.089	0.19	0.32	1.1	0.72	0.2	0.37	0.027	0.43	0.49	0.061
2-Methylphenol	<0.93 U	<0.54 U	<0.21 U	<0.57 U	<2.1 U	<0.23 U	<0.26 U	<0.23 U	<0.46 U	<0.22 U	<0.23 U	<0.46 U	<0.22 U	<0.57 U	<0.48 U	<0.22 U
2-Nitrobenzenamine	<0.93 U	<0.54 U	<0.21 U	<0.57 U	<2.1 U	<0.23 U	<0.26 U	<0.23 U	<0.46 U	<0.22 U	<0.23 U	<0.46 U	<0.22 U	<0.57 U	<0.48 U	<0.22 U
2-Nitrophenol	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
3,3'-Dichlorobenzidine	<0.46 U	<0.27 U	<0.1 U	<0.28 R	<1.1 U	< R	<0.13 U	<0.11 U	<0.23 U	<0.11 U	<0.12 U	<0.23 U	<0.11 U	<0.29 U	<0.24 U	<0.11 U
3-Nitrobenzenamine	<0.93 U	<0.54 U	<0.21 U	<0.57 U	<2.1 U	<0.23 U	<0.26 U	<0.23 U	<0.46 U	<0.22 U	<0.23 U	<0.46 U	<0.22 U	<0.57 U	<0.48 U	<0.22 U
4-Bromophenyl phenyl ether	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
4-Chloro-3-methylphenol	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	<0.17 U	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 U	<0.43 U	<0.36 U	<0.16 U
4-Chlorobenzenamine	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	<0.17 UJ	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 U	<0.43 U	<0.36 U	<0.16 U
4-Chlorophenyl phenyl ether	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
4-Nitrobenzenamine	<0.93 U	<0.54 U	<0.21 U	<0.57 UJ	<2.1 U	<0.23 U	<0.26 U	<0.23 U	<0.46 U	<0.22 U	<0.23 U	<0.46 U	<0.22 U	<0.57 U	<0.48 U	<0.22 U
4-Nitrophenol	<1.5 U	<0.89 U	<0.35 U	<0.93 U	<3.5 U	<0.38 U	<0.43 U	<0.37 U	<0.76 U	<0.37 U	<0.38 U	<0.77 U	<0.36 U	<0.94 U	<0.78 U	<0.36 U
Acenaphthene	<0.031 U	0.0093 J	<0.007 U	<0.019 U	<0.07 U	<0.00765 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	0.019	<0.0073 U	0.012 J	0.018	<0.0073 U
Acenaphthylene	<0.031 U	<0.018 U	<0.007 U	0.011 J	<0.07 U	0.01	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	0.043	<0.0073 U	0.023	0.036	<0.0073 U
Acetophenone	<0.46 U	<0.27 U	<0.1 U	<0.28 U	<1.1 U	<0.115 U	<0.13 U	<0.11 U	<0.23 U	<0.11 U	<0.12 U	<0.23 U	<0.11 U	<0.29 U	<0.24 U	<0.11 U
Anthracene	<0.031 U	0.013 J	0.0064 J	<0.019 U	0.038 J	0.00945	0.0059 J	<0.0076 U	0.015	<0.0075 U	<0.0078 U	0.067	<0.0073 U	0.027	0.054	0.0052 J
Atrazine	<0.93 U	<0.54 U	<0.21 U	<0.57 U	<2.1 U	<0.23 U	<0.26 U	<0.23 U	<0.46 U	<0.22 U	<0.23 U	<0.46 U	<0.22 U	<0.57 U	<0.48 U	<0.22 U
Benz(*a*)anthracene	<0.031 U	0.13	0.1	<0.019 U	4.5	0.043	0.013	0.011	0.0084 J	0.013	0.0095	0.31	<0.0073 U	0.11	0.2	0.028
Benzaldehyde	<0.46 U	0.19 J	0.046 J	0.2 J	<1.1 U	0.0875 J	0.056 J	0.031 J	<0.23 U	0.18	0.064 J	<0.23 U	0.015 J	0.99	<0.24 U	0.088 J
Benzo(*a*)pyrene	<0.031 U	0.19	0.14	<0.019 U	4.9	0.044	0.017	0.012	0.011 J	0.015	0.011	0.32	<0.0073 U	0.14	0.2	0.029
Benzo(*b*)fluoranthene	<0.031 U	0.26	0.18	<0.019 U	2.8	0.0745	0.022	0.014	0.023	0.015	0.014	0.57	<0.0073 U	0.25	0.43	0.041
Benzo(*g,h,i*)perylene	<0.031 U	0.08	0.075	<0.019 U	1.7	0.0275	0.011	0.012	<0.015 U	<0.0075 U	0.0088	0.12	<0.0073 U	0.052	0.076	0.019
Benzo(*k*)fluoranthene	<0.031 U	0.068	0.04	<0.019 U	0.3	0.019	0.0087	<0.0076 U	<0.015 U	<0.0075 U	0.0057 J	0.18	<0.0073 U	0.081	0.13	0.013
Bis(2-chloroethoxy)methane	<0.46 U	<0.27 U	<0.1 U	<0.28 U	<1.1 U	<0.115 U	<0.13 U	<0.11 U	<0.23 U	<0.11 U	<0.12 U	<0.23 U	<0.11 U	<0.29 U	<0.24 U	<0.11 U

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-097	ECCL-SL-098	ECCL-SL-099	ECCL-SL-100	ECCL-SL-101	ECCL-SL-102	ECCL-SL-103	ECCL-SL-104	ECCL-SL-105	ECCL-SL-106	ECCL-SL-107	ECCL-SL-108	ECCL-SL-109	ECCL-SL-110	ECCL-SL-111	ECCL-SL-112
Sample ID	**ECCLSL0097**	**ECCLSL0098**	**ECCLSL0099**	**ECCLSL0100**	**ECCLSL0101**	**ECCLSL0102/ECCLSL9009**	**ECCLSL0103**	**ECCLSL0104**	**ECCLSL0105**	**ECCLSL0106**	**ECCLSL0107**	**ECCLSL0108**	**ECCLSL0109**	**ECCLSL0110**	**ECCLSL0111**	**ECCLSL0112**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–2.5**	**0.0–3.0**	**0.0–3.0**	**0.0–3.0**	**0.0–2.5**	**0.0–2.5**	**0.0–3.0**
Date	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/14/16**	**06/13/16**	**06/13/16**	**06/13/16**
Bis(2-chloroethyl) ether	<0.46 U	<0.27 U	<0.1 U	<0.28 U	<1.1 U	<0.115 U	<0.13 U	<0.11 U	<0.23 U	<0.11 U	<0.12 U	<0.23 U	<0.11 U	<0.29 U	<0.24 U	<0.11 U
Bis(2-chloroisopropyl) ether	<0.46 U	<0.27 U	<0.1 U	<0.28 U	<1.1 U	<0.115 U	<0.13 U	<0.11 U	<0.23 U	<0.11 U	<0.12 U	<0.23 U	<0.11 U	<0.29 U	<0.24 U	<0.11 U
Bis(2-ethylhexyl)phthalate	<0.32 U	<0.19 U	<0.073 U	<0.2 U	<0.74 U	0.037 J	<0.091 U	0.026 J	<0.16 U	0.032 J	<0.082 U	<0.16 U	<0.077 U	<0.2 U	<0.17 U	<0.077 U
Butyl benzyl phthalate	<0.32 U	<0.19 U	<0.073 U	<0.2 U	<0.74 U	<0.0805 U	<0.091 U	<0.079 U	<0.16 U	<0.078 U	<0.082 U	<0.16 U	<0.077 U	<0.2 U	<0.17 U	<0.077 U
Caprolactam	<1.5 U	<0.89 U	<0.35 U	<0.93 U	<3.5 U	<0.38 U	<0.43 U	<0.37 U	<0.76 U	<0.37 U	<0.38 U	<0.77 U	<0.36 U	<0.94 U	<0.78 U	<0.36 U
Carbazole	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
Chrysene	0.074	0.22	0.25	0.06	11	0.0735	0.036	0.029	0.063	0.052	0.02	0.46	<0.0073 U	0.2	0.29	0.04
Di-*n*-butyl phthalate	<0.32 U	<0.19 U	<0.073 U	<0.2 U	0.22 J	<0.0805 U	<0.091 U	<0.079 U	<0.16 U	<0.078 U	<0.082 U	<0.16 U	<0.077 U	<0.2 U	<0.17 U	<0.077 U
Di-*n*-octylphthalate	<0.32 U	<0.19 U	<0.073 U	<0.2 U	<0.74 U	<0.0805 U	<0.091 U	<0.079 U	<0.16 U	<0.078 U	<0.082 U	<0.16 U	<0.077 U	<0.2 U	<0.17 U	<0.077 U
Dibenz(*a,h*)anthracene	<0.031 U	<0.018 U	<0.007 U	<0.019 U	0.71	<0.00765 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	0.046	<0.0073 U	<0.019 U	0.034	<0.0073 U
Dibenzofuran	<0.23 U	<0.14 U	<0.052 U	0.03 J	<0.53 U	0.014 J	0.039 J	<0.057 U	0.062 J	0.065	0.017 J	0.033 J	<0.055 U	0.029 J	0.035 J	0.013 J
Diethyl phthalate	<0.32 U	<0.19 U	<0.073 U	<0.2 U	<0.74 U	<0.0805 U	<0.091 U	<0.079 U	<0.16 U	<0.078 U	<0.082 U	<0.16 U	<0.077 U	<0.2 U	<0.17 U	<0.077 U
Dimethyl phthalate	<0.32 U	<0.19 U	<0.073 U	<0.2 U	<0.74 U	<0.0805 U	<0.091 U	<0.079 U	<0.16 U	<0.078 U	<0.082 U	<0.16 U	<0.077 U	<0.2 U	<0.17 U	<0.077 U
Fluoranthene	0.026 J	0.19	0.083	0.011 J	0.21	0.063	0.027	0.023	0.014 J	0.019	0.018	0.68	<0.0073 U	0.31	0.6	0.048
Fluorene	<0.031 U	<0.018 U	<0.007 U	<0.019 U	0.036 J	<0.00765 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	0.028	<0.0073 U	0.014 J	0.036	<0.0073 U
Hexachlorobenzene	<0.031 U	<0.018 U	<0.007 U	<0.019 U	<0.07 U	<0.00765 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	<0.015 U	<0.0073 U	<0.019 U	<0.016 U	<0.0073 U
Hexachlorobutadiene	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
Hexachlorocyclopentadiene	<1.5 UJ	<0.89 U	<0.35 U	<0.93 R	<3.5 U	< R	<0.43 U	<0.37 U	<0.76 U	<0.37 U	<0.38 U	<0.77 U	<0.36 U	<0.94 U	<0.78 U	<0.36 U
Hexachloroethane	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
Indeno(1,2,3-*cd*)pyrene	<0.031 U	0.074	0.047	<0.019 U	0.58	0.019	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	0.0074 J	0.11	<0.0073 U	0.053	0.078	0.015
Isophorone	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
N-Nitroso-di-*n*-propylamine	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
N-Nitrosodiphenylamine	<0.23 U	0.062 J	0.067	<0.14 U	<0.53 U	0.1025 J	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
Naphthalene	0.078	0.039	0.017	0.23	0.11	0.027	0.044	0.09	0.33	0.25	0.067	0.11	0.0082	0.15	0.15	0.019
Nitrobenzene	<0.46 U	<0.27 U	<0.1 U	<0.28 U	<1.1 U	<0.115 U	<0.13 U	<0.11 U	<0.23 U	<0.11 U	<0.12 U	<0.23 U	<0.11 U	<0.29 U	<0.24 U	<0.11 U
Pentachlorophenol	<0.7 U	<0.41 U	<0.16 U	<0.42 U	<1.6 U	< R	<0.2 U	<0.17 U	<0.34 U	<0.17 U	<0.17 U	<0.35 U	<0.16 UJ	<0.43 U	<0.36 U	<0.16 U
Phenanthrene	0.24	0.15	0.094	0.26	0.51	0.0595	0.11	0.16	0.37	0.3	0.059	0.54	0.015	0.38	0.52	0.044
Phenol	<0.23 U	<0.14 U	<0.052 U	<0.14 U	<0.53 U	<0.0575 U	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U	<0.055 U	<0.14 U	<0.12 U	<0.055 U
Pyrene	0.045	0.19	0.1	0.03	1.8	0.0655	0.033	0.031	0.079	0.052	0.018	0.55	0.0077	0.28	0.45	0.046
m+p Methylphenol	<1.9 U	<1.1 U	<0.42 U	<1.1 U	<4.2 U	<0.46 U	<0.52 U	<0.45 U	<0.92 U	<0.45 U	<0.47 U	<0.93 U	<0.44 U	<1.1 U	<0.95 U	<0.44 U

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-113	ECCL-SL-114	ECCL-SL-213	ECCL-SL-214	ECCL-SL-214	ECCL-SL-215	ECCL-SL-215	ECCL-SL-216	ECCL-SL-216	ECCL-SL-217	ECCL-SL-218	ECCL-SL-219	ECCL-SL-219	ECCL-SL-220	ECCL-SL-220
Sample ID	ECCLSL0113	ECCLSL0114/ECCLSL9011	ECCLSL0230	ECCLSL0231	ECCLSL0232	ECCLSL0233	ECCLSL0234	ECCLSL0235	ECCLSL0236	ECCLSL0237	ECCLSL0238	ECCLSL0239	ECCLSL0240	ECCLSL0241	ECCLSL0242
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
Depth (ft)	0.0–2.5	0.0–3.0	0.0–1.0	1.0–1.5	1.5–2.0	1.0–1.5	1.5–2.0	0.5–1.0	1.0–1.5	0.0–1.0	0.0–1.0	4.0–4.5	4.5–5.0	5.5–6.0	6.0–6.5
Date	06/14/16	06/14/16	08/05/19	08/08/19	08/08/19	08/08/19	08/08/19	08/08/19	08/08/19	08/06/19	08/06/19	08/01/19	08/01/19	08/01/19	08/01/19
Analyte (mg/kg)															
Organics-Semivolatile															
1,1'-Biphenyl	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	<0.12 U	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	<1.9 U	<1.9 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,5-Trichlorophenol	<0.18 U	<0.18 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,6-Trichlorophenol	<0.18 U	<0.18 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dichlorophenol	<0.18 U	<0.18 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dimethylphenol	<0.18 U	<0.18 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	<0.39 U	<0.39 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrotoluene	<0.24 U	<0.24 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,6-Dinitrotoluene	<0.24 U	<0.24 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chloronaphthalene	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chlorophenol	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	<0.18 U	<0.18 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylnaphthalene	<0.0079 U	0.0585	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylphenol	<0.24 U	<0.24 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrobenzenamine	<0.24 U	<0.24 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrophenol	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3,3'-Dichlorobenzidine	<0.12 R	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3-Nitrobenzenamine	<0.24 U	<0.24 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Bromophenyl phenyl ether	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chloro-3-methylphenol	<0.18 U	<0.18 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorobenzenamine	<0.18 U	<0.18 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrobenzenamine	<0.24 UJ	<0.24 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrophenol	<0.39 U	<0.39 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acenaphthene	<0.0079 U	<0.0079 U	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Acenaphthylene	<0.0079 U	<0.0079 U	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Acetophenone	<0.12 U	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Anthracene	<0.0079 U	<0.0079 U	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Atrazine	<0.24 U	<0.24 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benz(*a*)anthracene	0.0061 J	0.006 J	<0.019 U	0.023	<0.02 U	<0.019 U	<0.018 U	0.02	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	0.019
Benzaldehyde	0.022 J	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benzo(*a*)pyrene	0.0078 J	0.0076 J	<0.019 U	0.038	<0.02 U	<0.019 U	<0.018 U	0.024	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Benzo(*b*)fluoranthene	0.012	0.012	<0.019 U	0.042	<0.02 U	0.026	<0.018 U	0.033	0.031	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Benzo(*g,h,i*)perylene	0.0073 J	<0.0079 U	<0.019 U	0.034	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Benzo(*k*)fluoranthene	0.004 J	0.0067 J	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Bis(2-chloroethoxy)methane	<0.12 U	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-113	ECCL-SL-114	ECCL-SL-213	ECCL-SL-214	ECCL-SL-214	ECCL-SL-215	ECCL-SL-215	ECCL-SL-216	ECCL-SL-216	ECCL-SL-217	ECCL-SL-218	ECCL-SL-219	ECCL-SL-219	ECCL-SL-220	ECCL-SL-220
Sample ID	**ECCLSL0113**	**ECCLSL0114/ECCLSL9011**	**ECCLSL0230**	**ECCLSL0231**	**ECCLSL0232**	**ECCLSL0233**	**ECCLSL0234**	**ECCLSL0235**	**ECCLSL0236**	**ECCLSL0237**	**ECCLSL0238**	**ECCLSL0239**	**ECCLSL0240**	**ECCLSL0241**	**ECCLSL0242**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–2.5**	**0.0–3.0**	**0.0–1.0**	**1.0–1.5**	**1.5–2.0**	**1.0–1.5**	**1.5–2.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**0.0–1.0**	**4.0–4.5**	**4.5–5.0**	**5.5–6.0**	**6.0–6.5**
Date	**06/14/16**	**06/14/16**	**08/05/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/08/19**	**08/06/19**	**08/06/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**
Bis(2-chloroethyl) ether	<0.12 U	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	<0.12 U	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	<0.083 U	<0.0825 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl benzyl phthalate	<0.083 U	<0.0825 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Caprolactam	<0.39 U	<0.39 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Carbazole	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chrysene	0.011	0.016	<0.019 U	0.035	<0.02 U	0.023	<0.018 U	0.036	0.027	0.018	<0.017 U	0.024	0.03	<0.067 U	<0.018 U
Di-*n*-butyl phthalate	<0.083 U	<0.0825 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Di-*n*-octylphthalate	<0.083 U	<0.0825 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dibenz(*a,h*)anthracene	<0.0079 U	<0.0079 U	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Dibenzofuran	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Diethyl phthalate	<0.083 U	<0.0825 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dimethyl phthalate	<0.083 U	<0.0825 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fluoranthene	0.01	0.012	<0.019 U	0.034	<0.02 U	0.028	<0.018 U	0.042	0.027	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Fluorene	<0.0079 U	<0.0079 U	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Hexachlorobenzene	<0.0079 U	<0.0079 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorocyclopentadiene	<0.39 R	<0.39 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachloroethane	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	0.0048 J	<0.0079 U	<0.019 U	0.026	<0.02 U	<0.019 U	<0.018 U	<0.02 U	<0.019 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U	<0.067 U	<0.018 U
Isophorone	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitrosodiphenylamine	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Naphthalene	<0.0079 U	0.0234 J	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	0.023	0.022	0.039	<0.017 U	<0.018 U	<0.019 U	0.16	0.033
Nitrobenzene	<0.12 U	<0.12 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pentachlorophenol	<0.18 U	<0.18 UJ	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phenanthrene	0.0071 J	0.0275	<0.019 U	<0.02 U	<0.02 U	<0.019 U	<0.018 U	0.05	0.037	0.05	<0.017 U	0.055	0.093	0.24	0.061
Phenol	<0.059 U	<0.059 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pyrene	0.0092	0.0135	<0.019 U	0.03	<0.02 U	0.022	<0.018 U	0.035	0.027	<0.018 U	<0.017 U	0.021	<0.019 U	<0.067 U	<0.018 U
m+p Methylphenol	<0.47 U	<0.47 U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-223	ECCL-SL-224	ECCL-SL-227	ECCL-SL-235	ECCL-SL-235	ECCL-SL-253	ECCL-SL-260	ECCL-SL-263	ECCL-SL-263
Sample ID	ECCLSL0253	ECCLSL0254	ECCLSL0249	ECCLSL0250	ECCLSL0251	ECCLSL0244	ECCLSL0294	ECCLSL0307/ECCLSL9032	ECCLSL0308
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	2.0–2.5	2.5–3.0	0.0–1.0	0.0–1.0	0.5–1.0	1.0–1.5
Date	08/08/19	08/08/19	08/08/19	08/02/19	08/02/19	08/05/19	08/06/19	08/08/19	08/08/19
Analyte (mg/kg)									
Organics-Semivolatile									
1,1'-Biphenyl	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,6-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dimethylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,6-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chloronaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylnaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
3,3'-Dichlorobenzidine	NR	NR	NR	NR	NR	NR	NR	NR	NR
3-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Bromophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acenaphthene	<0.019 U	<0.017 U	<0.02 U	<0.018 U	<0.017 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Acenaphthylene	<0.019 U	<0.017 U	<0.02 U	<0.018 U	<0.017 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Acetophenone	NR	NR	NR	NR	NR	NR	NR	NR	NR
Anthracene	<0.019 U	<0.017 U	<0.02 U	0.019	<0.017 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Atrazine	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benz(*a*)anthracene	<0.019 U	<0.017 U	<0.02 U	0.082	0.077	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Benzaldehyde	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benzo(*a*)pyrene	0.021	<0.017 U	<0.02 U	0.094	0.085	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Benzo(*b*)fluoranthene	0.032	<0.017 U	<0.02 U	0.14	0.11	<0.018 U	<0.017 U	0.021	<0.019 U
Benzo(*g,h,i*)perylene	<0.019 U	<0.017 U	<0.02 U	0.064	0.063	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Benzo(*k*)fluoranthene	<0.019 U	<0.017 U	<0.02 U	0.057	0.06	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Bis(2-chloroethoxy)methane	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-11. Results for SVOCs in Soil Samples at ECCL Rifle Range (Continued)

Station	ECCL-SL-223	ECCL-SL-224	ECCL-SL-227	ECCL-SL-235	ECCL-SL-235	ECCL-SL-253	ECCL-SL-260	ECCL-SL-263	ECCL-SL-263
Sample ID	**ECCLSL0253**	**ECCLSL0254**	**ECCLSL0249**	**ECCLSL0250**	**ECCLSL0251**	**ECCLSL0244**	**ECCLSL0294**	**ECCLSL0307/ECCLSL9032**	**ECCLSL0308**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**2.0–2.5**	**2.5–3.0**	**0.0–1.0**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**
Date	**08/08/19**	**08/08/19**	**08/08/19**	**08/02/19**	**08/02/19**	**08/05/19**	**08/06/19**	**08/08/19**	**08/08/19**
Bis(2-chloroethyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl benzyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR
Caprolactam	NR	NR	NR	NR	NR	NR	NR	NR	NR
Carbazole	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chrysene	0.036	<0.017 U	<0.02 U	0.14	0.12	<0.018 U	<0.017 U	0.027	0.02
Di-*n*-butyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR
Di-*n*-octylphthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dibenz(*a,h*)anthracene	<0.019 U	<0.017 U	<0.02 U	0.022	<0.017 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Dibenzofuran	NR	NR	NR	NR	NR	NR	NR	NR	NR
Diethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dimethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fluoranthene	0.036	<0.017 U	<0.02 U	0.22	0.21	<0.018 U	<0.017 U	0.019	<0.019 U
Fluorene	<0.019 U	<0.017 U	<0.02 U	<0.018 U	<0.017 U	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Hexachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorocyclopentadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachloroethane	NR	NR	NR	NR	NR	NR	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	<0.019 U	<0.017 U	<0.02 U	0.061	0.059	<0.018 U	<0.017 U	<0.018 U	<0.019 U
Isophorone	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitrosodiphenylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR
Naphthalene	<0.019 U	<0.017 U	0.062	0.078	0.017	<0.018 U	<0.017 U	0.0275	0.031
Nitrobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pentachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phenanthrene	0.028	<0.017 U	0.046	0.21	0.16	0.022	<0.017 U	0.035	0.042
Phenol	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pyrene	0.031	<0.017 U	<0.02 U	0.18	0.15	0.023	<0.017 U	0.022	<0.019 U
m+p Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.
SVOC = semivolatile organic compound.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges

Station	ECCL-SD-005	ECCL-SD-006	ECCL-SD-019	ECCL-SD-020	ECCL-SDSW-002	ECCL-SDSW-003	ECCL-SL-001	ECCL-SL-002	ECCL-SL-003	ECCL-SL-004	ECCL-SL-005	ECCL-SL-006	ECCL-SL-007
Sample ID	**ECCLSD005**	**ECCLSD006**	**ECCLSD0019**	**ECCLSD0021/ECCLSD9003**	**ECCLSD002/ECCLSD9002**	**ECCLSD003**	**ECCLSL0001**	**ECCLSL0002/ECCLSL9001**	**ECCLSL0003**	**ECCLSL0004**	**ECCLSL0005**	**ECCLSL0006**	**ECCLSL0007**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.5**	**0.0–2.0**	**0.0–0.7**	**0.0–1.0**	**0.0–1.5**	**0.0–1.5**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**	**0.0–1.0**	**0.0–0.5**	**0.0–0.5**
Date	**06/09/16**	**06/09/16**	**07/31/19**	**07/31/19**	**06/09/16**	**06/09/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**
Analyte (mg/kg)													
Metals													
Antimony	6.6	1.8 J	NR	NR	11.5	5.5 J	1.1 J	0.745 J	1.4 J	0.91 J	1 J	3.2	3.6
Arsenic	20	21	NR	NR	29.5	26	16	17	24 J	13	8.9	14	14
Copper	100	73	NR	NR	68	44	41	32.5	25 J	21	14	28	31
Iron	16000 J	24000 J	NR	NR	23000 J	70000 J	18000	16500	43000 J	14000	13000	13000	11000
Lead	1200 J	260 J	590	1950	1295 J	550 J	140	50	62 J	55	140	820	1500
Tin	<16 U	<14 U	NR	NR	<15.5 U	<14 U	<12 U	<9.75 U	<12 U	<12 U	<11 U	<11 U	<12 U
Zinc	290	300	NR	NR	210	690	22	55.5	53	21	26	23	28

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-008	ECCL-SL-009	ECCL-SL-010	ECCL-SL-011	ECCL-SL-012	ECCL-SL-013	ECCL-SL-014	ECCL-SL-015	ECCL-SL-016	ECCL-SL-017	ECCL-SL-018	ECCL-SL-019	ECCL-SL-020	ECCL-SL-021	ECCL-SL-022
Sample ID	**ECCLSL0008**	**ECCLSL0009**	**ECCLSL0010**	**ECCLSL0011**	**ECCLSL0012**	**ECCLSL0013**	**ECCLSL0014/ECCLSL9002**	**ECCLSL0015**	**ECCLSL0016**	**ECCLSL0017**	**ECCLSL0018**	**ECCLSL0019**	**ECCLSL0020**	**ECCLSL0021**	**ECCLSL0022**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/09/16**	**06/10/16**	**06/10/16**	**06/13/16**	**06/13/16**	**06/10/16**	**06/10/16**	**06/10/16**
Analyte (mg/kg)															
Metals															
Antimony	4.7	4900	19	<2.1 U	2.2	1 J	<2.2 U	0.99 J	<2.1 U	<3.2 U	22	0.85 J	9.4	6.2	4.3
Arsenic	12	1600	15	3.7	8.5	5.6	7.45	7.9	3.8	8.6	30	6.8	19	13	9.4
Copper	23	20	16	4.4	11	17	13	18	5.6	11	30	5.9	16	10	5.6
Iron	18000	11000	15000	10000	20000	22000	25500	16000 J	8400	15000	38000	20000	16000	9100	12000
Lead	380	85000	1300	50	94	34	145	160 J	130	340	2900	130	2100	1500	1300
Tin	<10 U	<10 U	<9.9 U	<11 U	<11 U	<10 U	<11 U	<10 U	<10 U	<10 U	<12 U	<9.5 U	<9.3 U	<9.4 U	<9.8 U
Zinc	49	19	46	26	71	56	42.5	140	37	86	360	43	88	50	33

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-023	ECCL-SL-024	ECCL-SL-025	ECCL-SL-026	ECCL-SL-027	ECCL-SL-028	ECCL-SL-029	ECCL-SL-030	ECCL-SL-031	ECCL-SL-032	ECCL-SL-033	ECCL-SL-034	ECCL-SL-035	ECCL-SL-036
Sample Id	**ECCLSL0023**	**ECCLSL0024**	**ECCLSL0025/ECCLSL9003**	**ECCLSL0026**	**ECCLSL0027**	**ECCLSL0028**	**ECCLSL0029**	**ECCLSL0030**	**ECCLSL0031**	**ECCLSL0032**	**ECCLSL0033/ECCLSL9004**	**ECCLSL0034**	**ECCLSL0035**	**ECCLSL0036**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**
Analyte (mg/kg)														
Metals														
Antimony	1.8 J	<2.1 U	0.995 J	0.88 J	0.54 J	3.1	5	4.1	12	2.4	1.6 J	1.7 J	1 J	1.4 J
Arsenic	5.5	8.1	7.05	12	5.9	16	23	41	17	25	11.5	10	13	12
Copper	7.3	15	19.5	18	8	83	29	42	31	37	25.5	30	34	26
Iron	9600	15000	9150	14000	11000	16000	25000	54000	10000	28000	11750	8100	11000	15000
Lead	120	57	79	110	30	240	190	240	860	190	500	520	220	440
Tin	<9.3 U	<11 U	<10.15 U	<10 U	<11 U	<12 U	<10 U	<12 U	<12 U	<11 U	<10.5 U	<12 U	<11 U	<11 U
Zinc	33	51	27.5	25	23	58	42	42	32	200	24.5	23	23	23

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-037	ECCL-SL-038	ECCL-SL-039	ECCL-SL-040	ECCL-SL-041	ECCL-SL-042	ECCL-SL-043	ECCL-SL-044	ECCL-SL-045	ECCL-SL-046	ECCL-SL-047	ECCL-SL-048	ECCL-SL-049	ECCL-SL-050	ECCL-SL-051
Sample Id	**ECCLSL0037**	**ECCLSL0038**	**ECCLSL0039**	**ECCLSL0040**	**ECCLSL0041**	**ECCLSL0042/ECCLSL9005**	**ECCLSL0043**	**ECCLSL0044**	**ECCLSL0045**	**ECCLSL0046**	**ECCLSL0047**	**ECCLSL0048**	**ECCLSL0049**	**ECCLSL0050**	**ECCLSL0051**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/07/16**	**06/07/16**	**06/07/16**
Analyte (mg/kg)															
Metals															
Antimony	2.1	3.5	1.4 J	6.2	1.9 J	2.9	2.9	13	12	10000	35	15	1300	2.2 J	1600
Arsenic	18	15	6.9	8.4	11	10	13	14	14	2200	22	20	640	16	710
Copper	35	15	8.7	7.4	26	15	29	4.2	4.2	11 J	6.7 J	10 J	14	27	15
Iron	19000	14000	6300	7000	9800	9250	13000	5900	6600	5900	15000	17000	15000	22000	14000
Lead	620	580	230	450	540	755	680	1700	2600	92000	2600	2200	47000	500	51000
Tin	<10 U	<9.6 U	<11 U	<11 U	<11 U	<11 U	<12 U	<9 U	<10 U	190	<11 U	<9.2 U	<9.8 U	<11 U	<9.7 U
Zinc	29	26	32	29	31	30	61	22	24	18	26	21	20	50	18

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-052	ECCL-SL-053	ECCL-SL-054	ECCL-SL-055	ECCL-SL-056	ECCL-SL-057	ECCL-SL-058	ECCL-SL-059	ECCL-SL-060	ECCL-SL-061	ECCL-SL-062	ECCL-SL-063	ECCL-SL-064	ECCL-SL-065	ECCL-SL-066
Sample ID	**ECCLSL0052**	**ECCLSL0053**	**ECCLSL0054**	**ECCLSL0055**	**ECCLSL0056**	**ECCLSL0057**	**ECCLSL0058**	**ECCLSL0059**	**ECCLSL0060**	**ECCLSL0061**	**ECCLSL0062**	**ECCLSL0063**	**ECCLSL0064/ECCLSL9008**	**ECCLSL0065**	**ECCLSL0066**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/13/16**	**06/13/16**
Analyte (mg/kg)															
Metals															
Antimony	1.2 J	2	1 J	<5 U	6.8	2.8	2.4	1.9	39	4.1	7.4	8.8	3.6	4.1	3.2
Arsenic	5	16	5.3	8.7	9.4	5.9	5.6	8.9	37	11	12	22	10	10	6.6
Copper	18 J	25	19	18 J	7.1	4.7	4.4	5.2	9.6	4.9	4.4	19	5.65	7.5	5.3
Iron	7000 J	13000	7300	8800	10000	11000	8400	8200	10000	8900	8000	23000 J	9500 J	52000	14000
Lead	120 J	160	83	350	880	280	230	270	3000	530	930	1900 J	390 J	240	440
Tin	<10 U	<9.7 U	<11 U	<10 U	<12 U	<10 U	<11 U	<9.2 U	<11 U	<11 U	<10 U	<10 U	<9.4 U	<11 U	<9.6 U
Zinc	19	16	19	14	20	17	25	30	28	32	29	180	38.5	120	51

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-067	ECCL-SL-068	ECCL-SL-069	ECCL-SL-070	ECCL-SL-071	ECCL-SL-072	ECCL-SL-073	ECCL-SL-074	ECCL-SL-075	ECCL-SL-076	ECCL-SL-077	ECCL-SL-078	ECCL-SL-079	ECCL-SL-080
Sample ID	**ECCLSL0067**	**ECCLSL0068**	**ECCLSL0069/ECCLSL9006**	**ECCLSL0070**	**ECCLSL0071**	**ECCLSL0072**	**ECCLSL0073**	**ECCLSL0074**	**ECCLSL0075**	**ECCLSL0076**	**ECCLSL0077**	**ECCLSL0078**	**ECCLSL0079/ECCLSL9007**	**ECCLSL0080**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/13/16**	**06/08/16**	**06/08/16**	**06/09/16**	**06/07/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**
Analyte (mg/kg)														
Metals														
Antimony	2.4 J	6.7 J	2455	5000	11	11	28	2300	79	510	28	<4.2 U	<6.6 U	29
Arsenic	7.8	20	660	1400	16	21	31	680	61	260	30	13	13	36
Copper	11	27 J	12.5 J	13 J	9.8	29	16 J	17 J	5.1 J	10 J	7.4	27 J	12.5 J	7.2
Iron	59000	14000 J	6650	5200	11000	14000 J	14000	6900	6300	9100	12000	13000	11500	8900
Lead	150	1700 J	73000	85000	1900	2400 J	3100	100000	8400	45000	3400	370	895	3600
Tin	<9.9 U	<12 U	<10.15 U	<8.6 U	<12 U	<9.6 U	<11 U	<10 U	<9.7 U	<12 U	<12 U	<11 U	<11 U	<9.9 U
Zinc	91	82 J	30.5	22	30	100	100	34	21	30	28	17	19.5	40

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-081	ECCL-SL-178	ECCL-SL-179	ECCL-SL-180	ECCL-SL-180	ECCL-SL-181	ECCL-SL-181	ECCL-SL-182	ECCL-SL-183	ECCL-SL-183	ECCL-SL-184	ECCL-SL-185	ECCL-SL-186	ECCL-SL-186
Sample ID	**ECCLSL0081**	**ECCLSL0181**	**ECCLSL0182**	**ECCLSL0183**	**ECCLSL0184**	**ECCLSL0185**	**ECCLSL0186**	**ECCLSL0187/ECCLSL9020**	**ECCLSL0188**	**ECCLSL0189**	**ECCLSL0190**	**ECCLSL0191/ECCLSL9021**	**ECCLSL0192**	**ECCLSL0193**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**	**0.5–1.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**
Date	**06/09/16**	**08/02/19**	**08/02/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**
Analyte (mg/kg)														
Metals														
Antimony	3900	NR	NR	NR	NR	9.3	<2.1 UJ	NR	NR	NR	NR	NR	NR	NR
Arsenic	210	NR	NR	NR	NR	17	8 J	NR	NR	NR	NR	NR	NR	NR
Copper	7.7 J	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Iron	6500	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lead	81000	160	290	120	20	1700	97 J	26935	520	7.8	140	455	740	390
Tin	300	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	27	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-187	ECCL-SL-188	ECCL-SL-189	ECCL-SL-190	ECCL-SL-191	ECCL-SL-191	ECCL-SL-192	ECCL-SL-193	ECCL-SL-194	ECCL-SL-195	ECCL-SL-195	ECCL-SL-196	ECCL-SL-196	ECCL-SL-197	ECCL-SL-198
Sample ID	**ECCLSL0194**	**ECCLSL0195**	**ECCLSL0196**	**ECCLSL0197**	**ECCLSL0198**	**ECCLSL0199**	**ECCLSL0200**	**ECCLSL0201**	**ECCLSL0202**	**ECCLSL0203**	**ECCLSL0204**	**ECCLSL0213**	**ECCLSL0214**	**ECCLSL0215**	**ECCLSL0216**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–0.8**	**0.0–0.9**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**1.0–1.5**	**1.5–2.0**	**1.0–1.5**	**1.5–2.0**	**0.0–1.0**	**0.0–1.0**
Date	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**08/01/19**	**07/31/19**	**07/31/19**	**07/31/19**	**07/31/19**	**07/30/19**	**07/30/19**
Analyte (mg/kg)															
Metals															
Antimony	NR	NR	NR	NR	NR	NR	NR	NR	NR	20	6.6	NR	NR	NR	NR
Arsenic	NR	NR	NR	NR	NR	NR	NR	NR	NR	13	5.3	NR	NR	NR	NR
Copper	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Iron	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lead	400	250 J	420	2400	710	51	170	1100	700	590	70	640	6.5	46	270
Tin	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-199	ECCL-SL-199	ECCL-SL-200	ECCL-SL-200	ECCL-SL-201	ECCL-SL-201	ECCL-SL-203	ECCL-SL-203	ECCL-SL-204	ECCL-SL-207	ECCL-SL-208	ECCL-SL-208	ECCL-SL-268
Sample ID	**ECCLSL0217/ECCLSL9025**	**ECCLSL0218**	**ECCLSL0205**	**ECCLSL0206/ECCLSL9022**	**ECCLSL0207/ECCLSL9023**	**ECCLSL0208**	**ECCLSL0211**	**ECCLSL0212**	**ECCLSL0219**	**ECCLSL0223**	**ECCLSL0224**	**ECCLSL0225**	**ECCLSL0297**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.5–1.0**	**1.0–1.5**	**0.5–1.0**	**1.0–1.5**	**0.0–0.5**	**0.5–1.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**	**0.5–1.0**	**0.0–0.5**
Date	**07/30/19**	**07/30/19**	**07/31/19**	**07/31/19**	**07/31/19**	**07/31/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**08/08/19**
Analyte (mg/kg)													
Metals													
Antimony	NR	NR	19	246.45	NR	NR	NR	NR	NR	NR	NR	NR	NR
Arsenic	NR	NR	22	122.45	NR	NR	NR	NR	NR	NR	NR	NR	NR
Copper	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Iron	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lead	187.5	350	3400	28105	775	310	2000	36	160	350	360	28	730
Tin	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-12. Results for Metals in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-268	ECCL-SL-269	ECCL-SL-270
Sample ID	ECCLSL0298	ECCLSL0299/ECCLSL9031	ECCLSL0296
Sample Type	GR	GR	GR
Depth (ft)	0.5–1.0	0.0–1.0	0.0–0.5
Date	08/08/19	08/08/19	08/08/19
Analyte (mg/kg)			
Metals			
Antimony	NR	NR	NR
Arsenic	NR	NR	NR
Copper	NR	NR	NR
Iron	NR	NR	NR
Lead	220	460	250
Tin	NR	NR	NR
Zinc	NR	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges

Station	ECCL-SD-005	ECCL-SD-006	ECCL-SD-020	ECCL-SDSW-002	ECCL-SDSW-003	ECCL-SL-001	ECCL-SL-002	ECCL-SL-003	ECCL-SL-004	ECCL-SL-005	ECCL-SL-006	ECCL-SL-007	ECCL-SL-008
Sample ID	**ECCLSD005**	**ECCLSD006**	**ECCLSD0021/ECCLSD9003**	**ECCLSD002/ECCLSD9002**	**ECCLSD003**	**ECCLSL0001**	**ECCLSL0002/ECCLSL9001**	**ECCLSL0003**	**ECCLSL0004**	**ECCLSL0005**	**ECCLSL0006**	**ECCLSL0007**	**ECCLSL0008**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.5**	**0.0–2.0**	**0.0–1.0**	**0.0–1.5**	**0.0–1.5**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**	**0.0–1.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/09/16**	**06/09/16**	**07/31/19**	**06/09/16**	**06/09/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**
Analyte (mg/kg)													
Organics-Semivolatile													<0.057 U
1,1'-Biphenyl	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	
1,2,4,5-Tetrachlorobenzene	<0.19 U	<8.5 U	NR	<0.2 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U
2,3,4,6-Tetrachlorophenol	<3 U	<140 U	NR	<3.25 U	<2.5 U	<100 U	<2 U	<99 U	<99 U	<19 U	<2 U	<2 U	<1.8 U
2,4,5-Trichlorophenol	<0.28 U	<13 U	NR	<0.305 U	<0.23 U	<9.5 U	<0.185 U	<9.3 U	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U
2,4,6-Trichlorophenol	<0.28 U	<13 U	NR	<0.305 U	<0.23 U	<9.5 U	<0.185 U	<9.3 UJ	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U
2,4-Dichlorophenol	<0.28 U	<13 U	NR	<0.305 U	<0.23 U	<9.5 U	<0.185 U	<9.3 U	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U
2,4-Dimethylphenol	<0.28 UJ	<13 UJ	NR	<0.305 UJ	<0.23 UJ	<9.5 U	<0.185 U	<9.3 U	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U
2,4-Dinitrophenol	<0.63 U	<28 U	NR	<0.67 U	<0.51 U	<21 UJ	<0.405 U	<20 UJ	<20 U	<4 UJ	<0.4 U	<0.41 U	<0.38 U
2,4-Dinitrotoluene	<0.38 U	<17 U	NR	<0.405 U	<0.31 U	<13 U	<0.25 U	<12 U	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U
2,6-Dinitrotoluene	<0.38 U	<17 U	NR	<0.405 U	<0.31 U	<13 U	<0.25 U	<12 U	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U
2-Chloronaphthalene	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
2-Chlorophenol	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
2-Methyl-4,6-dinitrophenol	<0.28 U	<13 U	NR	<0.305 U	<0.23 U	<9.5 UJ	<0.185 U	<9.3 UJ	<9.3 U	<1.8 UJ	<0.18 U	<0.18 U	<0.17 U
2-Methylnaphthalene	0.043	<0.57 U	NR	0.0089 J	<0.01 U	<0.42 U	0.00515 J	<0.41 U	1.5	<0.081 U	<0.0081 U	<0.0082 U	<0.0076 U
2-Methylphenol	<0.38 U	<17 U	NR	<0.405 U	<0.31 U	<13 U	<0.25 U	<12 UJ	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U
2-Nitrobenzenamine	<0.38 U	<17 U	NR	<0.405 U	<0.31 U	<13 U	<0.25 U	<12 UJ	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U
2-Nitrophenol	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 UJ	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
3,3'-Dichlorobenzidine	<0.19 U	<8.5 U	NR	<0.17 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U
3-Nitrobenzenamine	<0.38 U	<17 U	NR	<0.405 U	<0.31 U	<13 U	<0.25 U	<12 U	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U
4-Bromophenyl phenyl ether	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 UJ	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
4-Chloro-3-methylphenol	<0.28 UJ	<13 UJ	NR	<0.305 UJ	<0.23 UJ	<9.5 U	<0.185 U	<9.3 U	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U
4-Chlorobenzenamine	<0.28 U	<13 U	NR	<0.305 U	<0.23 U	<9.5 U	<0.185 U	<9.3 U	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U
4-Chlorophenyl phenyl ether	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 UJ	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
4-Nitrobenzenamine	<0.38 U	<17 U	NR	<0.405 U	<0.31 U	<13 U	<0.25 U	<12 U	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U
4-Nitrophenol	<0.63 U	<28 U	NR	<0.67 U	<0.51 U	<21 U	<0.405 U	<20 UJ	<20 U	<4 U	<0.4 U	<0.41 U	<0.38 U
Acenaphthene	<0.013 U	<0.57 U	<0.635 U	0.015 J	<0.01 U	<0.42 U	0.0165	2.8 J	1.7	0.05 J	0.024	<0.0082 U	<0.0076 U
Acenaphthylene	0.0074 J	<0.57 U	<0.635 U	0.0205	<0.01 U	<0.42 U	<0.00825 U	<0.41 U	<0.41 U	<0.081 U	0.1	<0.0082 U	<0.0076 U
Acetophenone	<0.19 U	<8.5 U	NR	<0.2 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U
Anthracene	<0.013 U	0.56 J	<0.635 U	0.0345	<0.01 U	0.32 J	0.0165	1.7 J	1.2	0.081	0.17	<0.0082 U	<0.0076 U
Atrazine	<0.38 U	<17 U	NR	<0.405 U	<0.31 U	<13 U	<0.25 U	<12 U	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U
Benz(*a*)anthracene	0.064	20	17	0.195	<0.01 U	21	0.435	21	43	3.8	0.48	0.0077 J	0.0085
Benzaldehyde	<0.19 U	<8.5 U	NR	<0.2 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	2.8 J	<1.2 U	0.022 J	<0.12 U	<0.11 U
Benzo(*a*)pyrene	0.089	19	17.45	0.26	0.0077 J	24	0.695	32	54	4.1	0.46	0.01	0.012
Benzo(*b*)fluoranthene	0.13	11	7.9 J	0.37	0.011	12	0.66	37	50	2.9	0.73	0.016	0.014
Benzo(*g,h,i*)perylene	0.07	7.1	9.65 J	0.13	<0.01 U	9.8	0.255	18	29	1.8	0.13	0.0064 J	0.0078
Benzo(*k*)fluoranthene	0.06	<0.57 U	1.525	0.2	<0.01 U	1.5	0.185	12	19	0.6	0.22	0.0047 J	0.0047 J
Bis(2-chloroethoxy)methane	<0.19 U	<8.5 U	NR	<0.2 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SD-005	ECCL-SD-006	ECCL-SD-020	ECCL-SDSW-002	ECCL-SDSW-003	ECCL-SL-001	ECCL-SL-002	ECCL-SL-003	ECCL-SL-004	ECCL-SL-005	ECCL-SL-006	ECCL-SL-007	ECCL-SL-008
Sample ID	**ECCLSD005**	**ECCLSD006**	**ECCLSD0021/ECCLSD9003**	**ECCLSD002/ECCLSD9002**	**ECCLSD003**	**ECCLSL0001**	**ECCLSL0002/ECCLSL9001**	**ECCLSL0003**	**ECCLSL0004**	**ECCLSL0005**	**ECCLSL0006**	**ECCLSL0007**	**ECCLSL0008**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.5**	**0.0–2.0**	**0.0–1.0**	**0.0–1.5**	**0.0–1.5**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**	**0.0–1.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/09/16**	**06/09/16**	**07/31/19**	**06/09/16**	**06/09/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**
Bis(2-chloroethyl) ether	<0.19 U	<8.5 U	NR	<0.2 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U
Bis(2-chloroisopropyl) ether	<0.19 U	<8.5 U	NR	<0.2 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U
Bis(2-ethylhexyl)phthalate	0.084 J	<6 U	NR	0.0445 J	0.036 J	<4.4 U	<0.0865 U	<4.3 U	<4.3 U	<0.85 U	<0.085 U	<0.086 U	<0.08 U
Butyl benzyl phthalate	<0.13 U	<6 U	NR	<0.14 U	<0.11 U	<4.4 U	<0.0865 U	<4.3 UJ	<4.3 U	<0.85 U	<0.085 U	<0.086 U	<0.08 U
Caprolactam	<0.63 U	<28 U	NR	<0.67 U	<0.51 U	<21 U	<0.405 U	<20 U	<20 U	<4 U	<0.4 U	<0.41 U	<0.38 U
Carbazole	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	2 J	<3.1 U	<0.61 U	0.075	<0.061 U	<0.057 U
Chrysene	0.1	41	36.5	0.285	<0.01 U	43	0.73	28	71	7.7	0.49	0.012	0.018
Di-*n*-butyl phthalate	<0.13 U	<6 U	NR	<0.14 U	<0.11 U	<4.4 U	0.1175 J	<4.3 U	<4.3 U	<0.85 U	0.022 J	0.019 J	0.035 J
Di-*n*-octylphthalate	<0.13 U	<6 U	NR	<0.14 U	<0.11 U	<4.4 U	<0.0865 U	<4.3 UJ	<4.3 U	<0.85 U	<0.085 U	<0.086 U	<0.08 U
Dibenz(*a,h*)anthracene	<0.013 U	3.5	3.6	<0.014 U	<0.01 U	3.2	0.075	4.5	7.4	0.67	0.053	<0.0082 U	<0.0076 U
Dibenzofuran	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 U	<3.1 U	<0.61 U	0.035 J	<0.061 U	<0.057 U
Diethyl phthalate	<0.13 U	<6 U	NR	<0.14 U	<0.11 U	<4.4 U	<0.0865 U	<4.3 U	<4.3 U	<0.85 U	<0.085 U	<0.086 U	<0.08 U
Dimethyl phthalate	<0.13 U	<6 U	NR	<0.14 U	<0.11 U	<4.4 U	<0.0865 U	<4.3 U	<4.3 U	<0.85 U	<0.085 U	<0.086 U	<0.08 U
Fluoranthene	0.15	2.5	1.75	0.49	0.013	1.1	0.29	31	23	1	1.3	0.014	0.012
Fluorene	<0.013 U	<0.57 U	<0.635 U	0.019	<0.01 U	<0.42 U	0.0058 J	0.54 J	0.54	<0.081 U	0.057	<0.0082 U	<0.0076 U
Hexachlorobenzene	<0.013 U	<0.57 U	NR	<0.014 U	<0.01 U	<0.42 U	<0.00825 U	<0.41 U	<0.41 U	<0.081 U	<0.0081 U	<0.0082 U	<0.0076 U
Hexachlorobutadiene	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
Hexachlorocyclopentadiene	<0.63 U	<28 U	NR	<0.57 U	<0.51 U	<21 U	<0.405 U	<20 UJ	<20 U	<4 U	<0.4 U	<0.41 U	<0.38 U
Hexachloroethane	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 UJ	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
Indeno(1,2,3-*cd*)pyrene	0.051	2.5	2.4	0.1285	<0.01 U	2.3	0.16	14	18	0.78	0.15	0.0053 J	0.0043 J
Isophorone	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 UJ	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
N-Nitroso-di-*n*-propylamine	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
N-Nitrosodiphenylamine	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	0.1345	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
Naphthalene	0.013	<0.57 U	<0.635 U	<0.014 U	<0.01 U	0.28 J	<0.00825 U	0.24 J	0.63	0.086	0.0052 J	<0.0082 U	<0.0076 U
Nitrobenzene	<0.19 U	<8.5 U	NR	<0.2 U	<0.15 U	<6.3 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U
Pentachlorophenol	<0.28 U	<13 U	NR	<0.305 U	<0.23 U	<9.5 U	<0.185 U	<9.3 U	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U
Phenanthrene	0.078	2.8	2	0.265	0.0063 J	1.8	0.0965	9.9	6.7	0.48	0.87	0.0065 J	0.0069 J
Phenol	<0.095 U	<4.3 U	NR	<0.1035 U	<0.077 U	<3.2 U	<0.0615 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U
Pyrene	0.095	11	8.5 J	0.33	0.01	13	0.395	31	34	2.6	0.93	0.012	0.01
m+p Methylphenol	<0.76 U	<34 U	NR	<0.81 U	<0.62 U	<25 U	<0.495 U	<25 U	<25 U	<4.9 U	<0.49 U	<0.49 U	<0.46 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-009	ECCL-SL-010	ECCL-SL-011	ECCL-SL-012	ECCL-SL-013	ECCL-SL-014	ECCL-SL-015	ECCL-SL-016	ECCL-SL-017	ECCL-SL-018	ECCL-SL-019	ECCL-SL-020	ECCL-SL-021	ECCL-SL-022	ECCL-SL-023
Sample ID	**ECCLSL0009**	**ECCLSL0010**	**ECCLSL0011**	**ECCLSL0012**	**ECCLSL0013**	**ECCLSL0014/ECCLSL9002**	**ECCLSL0015**	**ECCLSL0016**	**ECCLSL0017**	**ECCLSL0018**	**ECCLSL0019**	**ECCLSL0020**	**ECCLSL0021**	**ECCLSL0022**	**ECCLSL0023**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–1.0**
Date	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/09/16**	**06/10/16**	**06/10/16**	**06/13/16**	**06/13/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/07/16**
Analyte (mg/kg)															
Organics-Semivolatile	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
1,1'-Biphenyl															
1,2,4,5-Tetrachlorobenzene	<0.12 U	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.125 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U
2,3,4,6-Tetrachlorophenol	<1.9 U	<1.8 U	<2.1 U	<1.8 U	<2.2 U	<1.95 U	<2 U	<1.8 U	<1.9 U	<2.1 U	<1.9 U	<1.8 U	<1.8 U	<1.9 U	<3.5 U
2,4,5-Trichlorophenol	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.185 U	<0.19 U	<0.17 U	<0.17 U	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
2,4,6-Trichlorophenol	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.185 U	<0.19 U	<0.17 U	<0.17 U	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
2,4-Dichlorophenol	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.185 U	<0.19 U	<0.17 U	<0.17 U	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
2,4-Dimethylphenol	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.185 U	<0.19 UJ	<0.17 U	<0.17 U	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
2,4-Dinitrophenol	<0.38 UJ	<0.37 U	<0.43 U	<0.37 UJ	<0.45 U	<0.405 UJ	<0.41 U	<0.38 U	<0.38 U	<0.43 U	<0.4 U	<0.38 U	<0.37 U	<0.39 U	<0.73 U
2,4-Dinitrotoluene	<0.23 U	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.245 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U
2,6-Dinitrotoluene	<0.23 U	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.245 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U
2-Chloronaphthalene	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
2-Chlorophenol	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
2-Methyl-4,6-dinitrophenol	<0.17 UJ	<0.17 U	<0.19 U	<0.17 UJ	<0.2 U	<0.185 UJ	<0.19 U	<0.17 U	<0.17 U	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
2-Methylnaphthalene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	0.0057 J	<0.0083 U	<0.0077 U	<0.0077 U	0.0056 J	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	<0.015 U
2-Methylphenol	<0.23 U	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.245 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U
2-Nitrobenzenamine	<0.23 U	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.245 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U
2-Nitrophenol	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
3,3'-Dichlorobenzidine	<0.12 U	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.125 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U
3-Nitrobenzenamine	<0.23 U	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.245 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U
4-Bromophenyl phenyl ether	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
4-Chloro-3-methylphenol	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.185 U	<0.19 UJ	<0.17 U	<0.17 U	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
4-Chlorobenzenamine	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.185 U	<0.19 U	<0.17 U	<0.17 U	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
4-Chlorophenyl phenyl ether	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
4-Nitrobenzenamine	<0.23 U	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.245 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U
4-Nitrophenol	<0.38 U	<0.37 U	<0.43 U	<0.37 U	<0.45 U	<0.405 U	<0.41 U	<0.38 U	<0.38 U	<0.43 U	<0.4 U	<0.38 U	<0.37 U	<0.39 U	<0.73 U
Acenaphthene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.00825 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	0.0098 J
Acenaphthylene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	0.0065 J	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	<0.015 U
Acetophenone	0.014 J	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.125 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U
Anthracene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.00825 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	0.035
Atrazine	<0.23 U	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.245 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U
Benz(*a*)anthracene	0.0063 J	0.0075	0.0049 J	0.0056 J	0.011	0.0136	0.0087	0.0066 J	0.0056 J	0.013	0.0087	0.0085	0.0043 J	0.0064 J	1.1
Benzaldehyde	0.02 J	<0.11 U	0.043 J	0.018 J	0.021 J	0.028 J	0.019 J	<0.12 U	0.017 J	0.038 J	0.017 J	<0.11 U	<0.11 U	0.021 J	<0.22 U
Benzo(*a*)pyrene	0.0076 J	0.0095	0.0052 J	0.0068 J	0.012	0.018	0.011	0.0071 J	0.0075 J	0.016	0.013	0.012	0.0061 J	0.0087	1.5
Benzo(*b*)fluoranthene	0.014	0.02	0.0075 J	0.014	0.024	0.0295	0.022	0.014	0.014	0.028	0.017	0.023	0.013	0.016	0.85
Benzo(*g,h,i*)perylene	0.0052 J	<0.0075 U	<0.0087 U	0.0049 J	0.012	0.0117	<0.0083 U	0.0056 J	0.005 J	0.014	<0.008 U	0.0071 J	0.0041 J	0.0055 J	0.64
Benzo(*k*)fluoranthene	0.0051 J	0.0041 J	<0.0087 U	<0.0075 U	0.012	0.01115	0.0081 J	0.0042 J	0.0061 J	0.012	0.0055 J	0.0056 J	<0.0075 U	0.0064 J	0.19
Bis(2-chloroethoxy)methane	<0.12 U	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.125 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-009	ECCL-SL-010	ECCL-SL-011	ECCL-SL-012	ECCL-SL-013	ECCL-SL-014	ECCL-SL-015	ECCL-SL-016	ECCL-SL-017	ECCL-SL-018	ECCL-SL-019	ECCL-SL-020	ECCL-SL-021	ECCL-SL-022	ECCL-SL-023
Sample ID	**ECCLSL0009**	**ECCLSL0010**	**ECCLSL0011**	**ECCLSL0012**	**ECCLSL0013**	**ECCLSL0014/ECCLSL9002**	**ECCLSL0015**	**ECCLSL0016**	**ECCLSL0017**	**ECCLSL0018**	**ECCLSL0019**	**ECCLSL0020**	**ECCLSL0021**	**ECCLSL0022**	**ECCLSL0023**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–1.0**
Date	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/09/16**	**06/10/16**	**06/10/16**	**06/13/16**	**06/13/16**	**06/10/16**	**06/10/16**	**06/10/16**	**06/07/16**
Bis(2-chloroethyl) ether	<0.12 U	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.125 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U
Bis(2-chloroisopropyl) ether	<0.12 U	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.125 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U
Bis(2-ethylhexyl)phthalate	<0.082 U	<0.078 U	<0.091 U	<0.079 U	<0.094 U	<0.0885 U	0.05 J	<0.081 U	<0.081 U	<0.091 U	<0.084 U	<0.08 U	<0.079 U	<0.082 U	<0.15 U
Butyl benzyl phthalate	<0.082 U	<0.078 U	<0.091 U	<0.079 U	<0.094 U	<0.0865 U	<0.088 U	<0.081 U	<0.081 U	<0.091 U	<0.084 U	<0.08 U	<0.079 U	<0.082 U	<0.15 U
Caprolactam	<0.38 U	<0.37 U	<0.43 U	<0.37 U	<0.45 U	<0.405 U	<0.41 U	<0.38 U	<0.38 U	<0.43 U	<0.4 U	<0.38 U	<0.37 U	<0.39 U	<0.73 U
Carbazole	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
Chrysene	0.009	0.0087	0.0068 J	0.0078	0.018	0.0215	0.016	0.0082	0.011	0.019	0.01	0.015	0.0082	0.01	2.1
Di-*n*-butyl phthalate	0.036 J	0.027 J	0.039 J	<0.079 U	0.056 J	0.045 J	<0.088 U	<0.081 U	0.017 J	<0.091 U	<0.084 U	0.028 J	<0.079 U	0.018 J	<0.17 U
Di-*n*-octylphthalate	<0.082 U	<0.078 U	<0.091 U	<0.079 U	<0.094 U	<0.0865 U	<0.088 U	<0.081 U	<0.081 U	<0.091 U	<0.084 U	<0.08 U	<0.079 U	<0.082 U	<0.15 U
Dibenz(*a,h*)anthracene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.00825 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	0.21
Dibenzofuran	<0.058 U	<0.056 U	0.023 J	0.0098 J	<0.067 U	0.01145 J	<0.063 U	<0.058 U	0.015 J	<0.065 U	<0.06 U	0.012 J	<0.056 U	0.013 J	<0.11 U
Diethyl phthalate	<0.082 U	<0.078 U	<0.091 U	<0.079 U	<0.094 U	<0.0865 U	<0.088 U	<0.081 U	<0.081 U	<0.091 U	<0.084 U	<0.08 U	<0.079 U	<0.082 U	<0.15 U
Dimethyl phthalate	<0.082 U	<0.078 U	<0.091 U	<0.079 U	<0.094 U	<0.0865 U	<0.088 U	<0.081 U	<0.081 U	<0.091 U	<0.084 U	<0.08 U	<0.079 U	<0.082 U	<0.15 U
Fluoranthene	0.016	0.015	0.01	0.014	0.03	0.0355	0.02	0.019	0.015	0.034	0.016	0.022	0.013	0.019	0.29
Fluorene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.00825 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	0.0079 J
Hexachlorobenzene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.00825 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	<0.015 U
Hexachlorobutadiene	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
Hexachlorocyclopentadiene	<0.38 U	<0.37 U	<0.43 U	<0.37 U	<0.45 U	<0.405 U	<0.41 U	<0.38 U	<0.38 U	<0.43 U	<0.4 U	<0.38 U	<0.37 U	<0.39 U	<0.73 U
Hexachloroethane	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
Indeno(1,2,3-*cd*)pyrene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	0.0084 J	0.01205	<0.0083 U	0.0049 J	0.0048 J	0.014	<0.008 U	0.0061 J	<0.0075 U	0.005 J	0.25
Isophorone	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
N-Nitroso-di-*n*-propylamine	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
N-Nitrosodiphenylamine	<0.058 U	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.062 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	0.45
Naphthalene	<0.0078 U	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	0.0047 J	<0.0083 U	<0.0077 U	<0.0077 U	0.0044 J	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	<0.015 U
Nitrobenzene	<0.12 U	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.125 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U
Pentachlorophenol	<0.17 U	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.185 U	<0.19 U	0.062 J	0.048 J	<0.2 U	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U
Phenanthrene	0.0081	0.0064 J	<0.0087 U	0.0063 J	0.012	0.017	0.0091	0.0081	0.0073 J	0.015	0.0081	0.009	0.0058 J	0.0083	0.21
Phenol	<0.058 U	<0.056 U	<0.065 U	<0.057 U	0.016 J	0.015 J	<0.063 U	<0.058 U	<0.058 U	<0.065 U	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U
Pyrene	0.014	0.012	0.0083 J	0.011	0.023	0.029	0.017	0.023	0.014	0.026	0.013	0.021	0.015	0.018	0.87
m+p Methylphenol	<0.47 U	<0.45 U	<0.52 U	<0.45 U	<0.54 U	<0.495 U	<0.5 U	<0.46 U	<0.46 U	<0.52 U	<0.48 U	<0.46 U	<0.45 U	<0.47 U	<0.88 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-024	ECCL-SL-025	ECCL-SL-026	ECCL-SL-027	ECCL-SL-028	ECCL-SL-029	ECCL-SL-030	ECCL-SL-031	ECCL-SL-032	ECCL-SL-033	ECCL-SL-034	ECCL-SL-035	ECCL-SL-036	ECCL-SL-037	ECCL-SL-038
Sample ID	ECCLSL0024	ECCLSL0025/ECCLSL9003	ECCLSL0026	ECCLSL0027	ECCLSL0028	ECCLSL0029	ECCLSL0030	ECCLSL0031	ECCLSL0032	ECCLSL0033/ECCLSL9004	ECCLSL0034	ECCLSL0035	ECCLSL0036	ECCLSL0037	ECCLSL0038
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
Depth (ft)	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5
Date	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16
Analyte (mg/kg)															
Organics-Semivolatile															
1,1'-Biphenyl	0.016 J	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
1,2,4,5-Tetrachlorobenzene	<0.29 U	<0.92 U	<0.29 U	<0.12 U	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	<0.32 U	<5.8 U
2,3,4,6-Tetrachlorophenol	<4.7 U	<14.5 U	<4.7 U	<1.9 R	<250 U	<470 U	<110 U	<410 U	<470 U	<220 U	<100 U	<14 U	<37 U	<5.1 U	<93 U
2,4,5-Trichlorophenol	<0.44 U	<1.38 U	<0.44 U	<0.18 U	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
2,4,6-Trichlorophenol	<0.44 U	<1.38 U	<0.44 U	<0.18 U	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
2,4-Dichlorophenol	<0.44 U	<1.38 U	<0.44 U	<0.18 U	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
2,4-Dimethylphenol	<0.44 U	<1.38 U	<0.44 U	<0.18 U	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
2,4-Dinitrophenol	<0.97 U	<3 U	<0.96 U	<0.39 U	<52 U	<98 U	<23 U	<84 U	<97 U	<45.5 U	<21 U	<2.9 U	<7.6 U	<1.1 U	<19 U
2,4-Dinitrotoluene	<0.59 U	<1.84 U	<0.58 U	<0.24 U	<31 U	<59 U	<14 U	<51 U	<59 U	<28 U	<13 U	<1.7 U	<4.6 U	<0.64 U	<12 U
2,6-Dinitrotoluene	<0.59 U	<1.84 U	<0.58 U	<0.24 U	<31 U	<59 U	<14 U	<51 U	<59 U	<28 U	<13 U	<1.7 U	<4.6 U	<0.64 U	<12 U
2-Chloronaphthalene	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
2-Chlorophenol	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
2-Methyl-4,6-dinitrophenol	<0.44 U	<1.38 U	<0.44 U	<0.18 U	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
2-Methylnaphthalene	0.056	0.1105	0.058	<0.0079 U	8.7	5.3	1.4	2	2.8	2.4	0.29 J	0.06	<0.15 U	0.011 J	0.38 J
2-Methylphenol	<0.59 U	<1.84 U	<0.58 U	<0.24 U	<31 U	<59 U	<14 U	<51 U	<59 U	<28 U	<13 U	<1.7 U	<4.6 U	<0.64 U	<12 U
2-Nitrobenzenamine	<0.59 U	<1.84 U	<0.58 U	<0.24 U	<31 U	<59 U	<14 U	<51 U	<59 U	<28 U	<13 U	<1.7 U	<4.6 U	<0.64 U	<12 U
2-Nitrophenol	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
3,3'-Dichlorobenzidine	<0.29 U	<0.92 U	<0.29 U	<0.12 R	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	<0.32 U	<5.8 U
3-Nitrobenzenamine	<0.59 U	<1.84 U	<0.58 U	<0.24 U	<31 U	<59 U	<14 U	<51 U	<59 U	<28 U	<13 U	<1.7 U	<4.6 U	<0.64 U	<12 U
4-Bromophenyl phenyl ether	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
4-Chloro-3-methylphenol	<0.44 U	<1.38 U	<0.44 U	<0.18 U	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
4-Chlorobenzenamine	<0.44 U	<1.38 U	<0.44 U	<0.18 U	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
4-Chlorophenyl phenyl ether	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
4-Nitrobenzenamine	<0.59 U	<1.84 U	<0.58 U	<0.24 U	<31 U	<59 U	<14 U	<51 U	<59 U	<28 U	<13 U	<1.7 U	<4.6 U	<0.64 U	<12 U
4-Nitrophenol	<0.97 U	<3 U	<0.96 U	<0.39 U	<52 U	<98 U	<23 U	<84 U	<97 U	<45.5 U	<21 U	<2.9 U	<7.6 U	<1.1 U	<19 U
Acenaphthene	0.12	0.34	0.011 J	<0.0079 U	7.1	6.6	0.78	1.1 J	7.4	6.2	1.7	0.28	<0.15 U	<0.021 U	3.1
Acenaphthylene	0.032	<0.0605 U	<0.019 U	<0.0079 U	<1 U	<2 U	<0.46 U	<1.7 U	<2 U	<0.915 U	<0.43 U	<0.058 U	<0.15 U	<0.021 U	<0.39 U
Acetophenone	<0.29 U	<0.92 U	<0.29 U	<0.12 U	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	<0.32 U	<5.8 U
Anthracene	0.19	0.491	0.1	0.0019 J	8.6	6.8	1.8	3	5.4	5.6	1.3	0.42	0.23	0.024	2.4
Atrazine	<0.59 U	<1.84 U	<0.58 U	<0.24 U	<31 U	<59 U	<14 U	<51 U	<59 U	<28 U	<13 U	<1.7 U	<4.6 U	<0.64 U	<12 U
Benz(*a*)anthracene	1.7	5.8	1.6	0.035	170	180	32	110	130	91.5	29	6.6	13	1	56
Benzaldehyde	<0.29 U	<0.92 U	<0.29 U	<0.12 U	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	0.093 J	<5.8 U
Benzo(*a*)pyrene	1.9	6.55	2.8	0.054	220	220	41	130	160	140.5	35	8.7	15	0.92	64
Benzo(*b*)fluoranthene	2.2	6.55	0.97	0.043	150	200	45	64	170	155	29	8.2	6.4	0.47	58
Benzo(*g,h,i*)perylene	0.73	2.235	0.89	0.028	110	140	14	79	59	51.5	18	3	7.3	0.46	32
Benzo(*k*)fluoranthene	0.7	1.66	0.17	0.013	49	65	11	19	38	55.5	9.5	2.6	1.4	0.086	17
Bis(2-chloroethoxy)methane	<0.29 U	<0.92 U	<0.29 U	<0.12 U	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	<0.32 U	<5.8 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-024	ECCL-SL-025	ECCL-SL-026	ECCL-SL-027	ECCL-SL-028	ECCL-SL-029	ECCL-SL-030	ECCL-SL-031	ECCL-SL-032	ECCL-SL-033	ECCL-SL-034	ECCL-SL-035	ECCL-SL-036	ECCL-SL-037	ECCL-SL-038
Sample ID	**ECCLSL0024**	**ECCLSL0025/ECCLSL9003**	**ECCLSL0026**	**ECCLSL0027**	**ECCLSL0028**	**ECCLSL0029**	**ECCLSL0030**	**ECCLSL0031**	**ECCLSL0032**	**ECCLSL0033/ECCLSL9004**	**ECCLSL0034**	**ECCLSL0035**	**ECCLSL0036**	**ECCLSL0037**	**ECCLSL0038**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**
Bis(2-chloroethyl) ether	<0.29 U	<0.92 U	<0.29 U	<0.12 U	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	<0.32 U	<5.8 U
Bis(2-chloroisopropyl) ether	<0.29 U	<0.92 U	<0.29 U	<0.12 U	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	<0.32 U	<5.8 U
Bis(2-ethylhexyl)phthalate	<0.2 U	<0.64 U	<0.2 U	<0.083 U	<11 U	<21 U	<4.9 U	<18 U	<21 U	<9.85 U	<4.5 U	<0.61 U	<1.6 U	<0.26 U	<4.1 U
Butyl benzyl phthalate	<0.21 U	<0.64 U	<0.2 U	<0.083 U	<11 U	<21 U	<4.9 U	<18 U	<21 U	<9.85 U	<4.5 U	<0.61 U	<1.6 U	<0.22 U	<4.1 U
Caprolactam	<0.97 U	<3 U	<0.96 U	<0.39 U	<52 U	<98 U	<23 U	<84 U	<97 U	<45.5 U	<21 U	<2.9 U	<7.6 U	<1.1 U	<19 U
Carbazole	0.22	0.95	<0.15 U	<0.059 U	8.7	<15 U	<3.5 U	<13 U	<15 U	7.3 J	<3.2 U	0.41 J	<1.2 U	<0.16 U	2.7 J
Chrysene	3	9.05	2.3	0.06	220	280	54	240	230	138	51	9.9	27	1.7	87
Di-*n*-butyl phthalate	<0.21 U	<0.64 U	<0.2 U	<0.083 U	<11 U	<21 U	<4.9 U	<18 U	<21 U	<9.85 U	<4.5 U	<0.61 U	<1.6 U	<0.22 U	<4.1 U
Di-*n*-octylphthalate	<0.21 U	<0.64 U	<0.2 U	<0.083 U	<11 U	<21 U	<4.9 U	<18 U	<21 U	<9.85 U	<4.5 U	<0.61 U	<1.6 U	<0.22 U	<4.1 U
Dibenz(*a,h*)anthracene	0.3	0.845	0.24	0.015	32	41	4.8	24	19	16.95	7.5	1.1	3.4	0.2	13
Dibenzofuran	0.14 J	0.18 J	<0.15 U	<0.059 U	1.3 J	<15 U	<3.5 U	<13 U	<15 U	1.6 J	<3.2 U	<0.43 U	<1.2 U	0.031 J	<2.9 U
Diethyl phthalate	<0.21 U	<0.64 U	<0.2 U	<0.083 U	<11 U	<21 U	<4.9 U	<18 U	<21 U	<9.85 U	<4.5 U	<0.61 U	<1.6 U	<0.22 U	<4.1 U
Dimethyl phthalate	<0.21 U	<0.64 U	<0.2 U	<0.083 U	<11 U	<21 U	<4.9 U	<18 U	<21 U	<9.85 U	<4.5 U	<0.61 U	<1.6 U	<0.22 U	<4.1 U
Fluoranthene	2.4	5.03	0.27	0.028	110	110	24	18	88	76	21	5.1	0.61	0.13	39
Fluorene	0.23	0.1535 J	0.022	<0.0079 U	3.2	2	0.45 J	<1.7 U	1.9 J	2.035	0.42 J	0.11	<0.15 U	<0.021 U	0.7
Hexachlorobenzene	<0.02 U	<0.0605 U	<0.019 U	<0.0079 U	<1 U	<2 U	<0.46 U	<1.7 U	<2 U	<0.915 U	<0.43 U	<0.058 U	<0.15 U	<0.021 U	<0.39 U
Hexachlorobutadiene	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
Hexachlorocyclopentadiene	<0.97 U	<3 U	<0.96 U	<0.39 R	<52 U	<98 U	<23 U	<84 U	<97 U	<45.5 U	<21 U	<2.9 U	<7.6 U	<1.1 U	<19 U
Hexachloroethane	<0.15 U	<0.455 U	<0.15 U	<0.059 UJ	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
Indeno(1,2,3-*cd*)pyrene	0.56	1.53	0.25	0.016	55	88	11	25	44	46	12	2.1	1.9	0.16	21
Isophorone	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
N-Nitroso-di-*n*-propylamine	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
N-Nitrosodiphenylamine	<0.15 U	0.27	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
Naphthalene	0.07	0.021 J	<0.019 U	<0.0079 U	2	1.4 J	0.28 J	<1.7 U	1 J	1.15	<0.43 U	<0.058 U	<0.15 U	<0.021 U	0.3 J
Nitrobenzene	<0.29 U	<0.92 U	<0.29 U	<0.12 U	<16 U	<30 U	<7 U	<26 U	<29 U	<13.5 U	<6.4 U	<0.87 U	<2.3 U	<0.32 U	<5.8 U
Pentachlorophenol	<0.44 U	<1.38 U	<0.44 U	<0.18 R	<23 U	<45 U	<10 U	<38 U	<44 U	<21 U	<9.6 U	<1.3 U	<3.5 U	<0.48 U	<8.7 U
Phenanthrene	2.1	3.04	0.53	0.014	54	36	7.9	15	30	24	8.1	2.2	1.3	0.13	14
Phenol	<0.15 U	<0.455 U	<0.15 U	<0.059 U	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<6.9 U	<3.2 U	<0.43 U	<1.2 U	<0.16 U	<2.9 U
Pyrene	2	5.95	1.8	0.043	200	160	27	75	100	85	30	6.3	6.6	0.56	51
m+p Methylphenol	<1.2 U	<3.65 U	<1.2 U	<0.47 U	<63 U	<120 U	<28 U	<100 U	<120 U	<55.5 U	<26 U	<3.5 U	<9.2 U	<1.3 U	<23 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-039	ECCL-SL-040	ECCL-SL-041	ECCL-SL-042	ECCL-SL-043	ECCL-SL-044	ECCL-SL-045	ECCL-SL-046	ECCL-SL-047	ECCL-SL-048	ECCL-SL-049	ECCL-SL-050	ECCL-SL-051	ECCL-SL-052	ECCL-SL-053	ECCL-SL-054
Sample ID	**ECCLSL0039**	**ECCLSL0040**	**ECCLSL0041**	**ECCLSL0042/ECCLSL9005**	**ECCLSL0043**	**ECCLSL0044**	**ECCLSL0045**	**ECCLSL0046**	**ECCLSL0047**	**ECCLSL0048**	**ECCLSL0049**	**ECCLSL0050**	**ECCLSL0051**	**ECCLSL0052**	**ECCLSL0053**	**ECCLSL0054**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/09/16**	**06/09/16**	**06/09/16**
Analyte (mg/kg)																
Organics-Semivolatile																
1,1'-Biphenyl	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
1,2,4,5-Tetrachlorobenzene	<29 U	<13 U	<0.13 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U
2,3,4,6-Tetrachlorophenol	<470 U	<200 U	<2 U	<1.95 U	<2.1 U	<2 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2 U	<2 U	<3.6 U	<2 U	<1.9 U	<1.9 U
2,4,5-Trichlorophenol	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
2,4,6-Trichlorophenol	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
2,4-Dichlorophenol	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
2,4-Dimethylphenol	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
2,4-Dinitrophenol	<96 U	<41 U	<0.42 U	<0.4 U	<0.43 U	<0.4 U	<0.4 U	<0.39 U	<0.39 UJ	<0.37 UJ	<0.41 U	<0.42 U	<0.75 U	<0.41 U	<0.4 U	<0.39 U
2,4-Dinitrotoluene	<58 U	<25 U	<0.25 U	<0.24 U	<0.26 U	<0.24 U	<0.24 U	<0.23 U	<0.24 U	<0.22 U	<0.25 U	<0.25 U	<0.45 U	<0.25 U	<0.24 U	<0.24 U
2,6-Dinitrotoluene	<58 U	<25 U	<0.25 U	<0.24 U	<0.26 U	<0.24 U	<0.24 U	<0.23 U	<0.24 U	<0.22 U	<0.25 U	<0.25 U	<0.45 U	<0.25 U	<0.24 U	<0.24 U
2-Chloronaphthalene	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
2-Chlorophenol	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
2-Methyl-4,6-dinitrophenol	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 UJ	<0.17 UJ	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
2-Methylnaphthalene	7.9	1.3	0.0076 J	0.0073 J	<0.0087 U	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	0.0039 J	<0.0082 U	0.0099	0.016	<0.0082 U	<0.0081 U	<0.0079 U
2-Methylphenol	<58 U	<25 U	<0.25 U	<0.24 U	<0.26 U	<0.24 U	<0.24 U	<0.23 U	<0.24 U	<0.22 U	<0.25 U	<0.25 U	<0.45 U	<0.25 U	<0.24 U	<0.24 U
2-Nitrobenzenamine	<58 U	<25 U	<0.25 U	<0.24 U	<0.26 U	<0.24 U	<0.24 U	<0.23 U	<0.24 U	<0.22 U	<0.25 U	<0.25 U	<0.45 U	<0.25 U	<0.24 U	<0.24 U
2-Nitrophenol	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
3,3'-Dichlorobenzidine	<29 U	<13 U	<0.13 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 R	<0.12 U	<0.11 U	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U
3-Nitrobenzenamine	<58 U	<25 U	<0.25 U	<0.24 U	<0.26 U	<0.24 U	<0.24 U	<0.23 U	<0.24 U	<0.22 U	<0.25 U	<0.25 U	<0.45 U	<0.25 U	<0.24 U	<0.24 U
4-Bromophenyl phenyl ether	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
4-Chloro-3-methylphenol	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
4-Chlorobenzenamine	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
4-Chlorophenyl phenyl ether	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
4-Nitrobenzenamine	<58 U	<25 U	<0.25 U	<0.24 U	<0.26 U	<0.24 U	<0.24 U	<0.23 U	<0.24 U	<0.22 U	<0.25 U	<0.25 U	<0.45 U	<0.25 U	<0.24 U	<0.24 U
4-Nitrophenol	<96 U	<41 U	<0.42 U	<0.4 U	<0.43 U	<0.4 U	<0.4 U	<0.39 U	<0.39 U	<0.37 U	<0.41 U	<0.42 U	<0.75 U	<0.41 U	<0.4 U	<0.39 U
Acenaphthene	7.7	3.9	0.028	<0.0081 U	<0.0087 U	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	<0.0074 U	<0.0082 U	<0.0085 U	<0.015 U	<0.0082 U	<0.0081 U	<0.0079 U
Acenaphthylene	<1.9 U	<0.83 U	<0.0084 U	0.0056 J	<0.0087 U	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	<0.0074 U	<0.0082 U	0.0093	<0.015 U	<0.0082 U	<0.0081 U	<0.0079 U
Acetophenone	<29 U	<13 U	<0.13 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U
Anthracene	9.6	3.9	0.033	0.0063 J	0.0048 J	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	<0.0074 U	<0.0082 U	0.0062 J	0.017	<0.0082 U	<0.0081 U	<0.0079 U
Atrazine	<58 U	<25 U	<0.25 U	<0.24 U	<0.26 U	<0.24 U	<0.24 U	<0.23 U	<0.24 U	<0.22 U	<0.25 U	<0.25 U	<0.45 U	<0.25 U	<0.24 U	<0.24 U
Benz(*a*)anthracene	200	70	0.58	0.115	0.035	0.014	0.015	0.025 J	0.013	0.017	0.018	0.033	1.1	0.012	0.013	0.018
Benzaldehyde	<29 U	<13 U	0.017 J	0.016 J	0.072 J	<0.12 U	<0.12 U	<0.12 U	<0.12 U	0.018 J	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U
Benzo(*a*)pyrene	210	91	0.73	0.1245	0.049	0.019	0.019	0.034 J	0.018	0.021	0.024	0.045	1.3	0.019	0.017	0.023
Benzo(*b*)fluoranthene	200	71	0.69	0.1145	0.063	0.022	0.022	0.043 J	0.029	0.033	0.033	0.072	0.73	0.034	0.028	0.038
Benzo(*g,h,i*)perylene	110	49	0.51	0.0885	0.035	0.016	0.016	0.018	<0.008 U	0.011	0.022	0.033	0.63	<0.0082 U	0.015	0.013
Benzo(*k*)fluoranthene	57	23	0.28	0.0355	0.024	0.009	0.012	0.015	0.01	0.014	0.012	0.027	0.12	0.014	0.014	0.019
Bis(2-chloroethoxy)methane	<29 U	<13 U	<0.13 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-039	ECCL-SL-040	ECCL-SL-041	ECCL-SL-042	ECCL-SL-043	ECCL-SL-044	ECCL-SL-045	ECCL-SL-046	ECCL-SL-047	ECCL-SL-048	ECCL-SL-049	ECCL-SL-050	ECCL-SL-051	ECCL-SL-052	ECCL-SL-053	ECCL-SL-054
Sample ID	**ECCLSL0039**	**ECCLSL0040**	**ECCLSL0041**	**ECCLSL0042/ECCLSL9005**	**ECCLSL0043**	**ECCLSL0044**	**ECCLSL0045**	**ECCLSL0046**	**ECCLSL0047**	**ECCLSL0048**	**ECCLSL0049**	**ECCLSL0050**	**ECCLSL0051**	**ECCLSL0052**	**ECCLSL0053**	**ECCLSL0054**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/07/16**	**06/07/16**	**06/07/16**	**06/09/16**	**06/09/16**	**06/09/16**
Bis(2-chloroethyl) ether	<29 U	<13 U	<0.13 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U
Bis(2-chloroisopropyl) ether	<29 U	<13 U	<0.13 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U
Bis(2-ethylhexyl)phthalate	<20 U	<8.8 U	<0.089 U	<0.085 U	<0.091 U	<0.086 U	<0.084 U	<0.082 U	<0.084 U	0.025 J	<0.086 U	<0.089 U	<0.16 U	0.028 J	0.033 J	<0.083 U
Butyl benzyl phthalate	<20 U	<8.8 U	<0.089 U	<0.085 U	<0.091 U	<0.086 U	<0.084 U	<0.082 U	<0.084 U	<0.078 U	<0.086 U	<0.089 U	<0.16 U	<0.086 U	<0.085 U	<0.083 U
Caprolactam	<96 U	<41 U	<0.42 U	<0.4 U	<0.43 U	<0.4 U	<0.4 U	<0.39 U	<0.39 U	<0.37 U	<0.41 U	<0.42 U	<0.75 U	<0.41 U	<0.4 U	<0.39 U
Carbazole	10 J	<6.3 U	0.035 J	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
Chrysene	370	120	0.95	0.236	0.057	0.02	0.025	0.041	0.018	0.024	0.027	0.054	2.3	0.021	0.021	0.023
Di-*n*-butyl phthalate	<20 U	<8.8 U	<0.089 U	<0.085 U	<0.091 U	<0.086 U	<0.084 U	<0.082 U	<0.084 U	0.021 J	0.019 J	<0.089 U	<0.16 U	<0.086 U	<0.085 U	<0.083 U
Di-*n*-octylphthalate	<20 U	<8.8 U	<0.089 U	<0.085 U	<0.091 U	<0.086 U	<0.084 U	<0.082 U	<0.084 U	<0.078 U	<0.086 U	<0.089 U	<0.16 U	<0.086 U	<0.085 U	<0.083 U
Dibenz(*a,h*)anthracene	42	21	0.18	0.032	0.0094	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	<0.0074 U	<0.0082 U	<0.0085 U	0.32	<0.0082 U	<0.0081 U	<0.0079 U
Dibenzofuran	<15 U	0.84 J	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	0.016 J	0.032 J	<0.11 U	<0.062 U	<0.061 U	0.0036 J
Diethyl phthalate	<20 U	<8.8 U	<0.089 U	<0.085 U	<0.091 U	<0.086 U	<0.084 U	<0.082 U	<0.084 U	<0.078 U	<0.086 U	<0.089 U	<0.16 U	<0.086 U	<0.085 U	<0.083 U
Dimethyl phthalate	<20 U	<8.8 U	<0.089 U	<0.085 U	<0.091 U	<0.086 U	<0.084 U	<0.082 U	<0.084 U	<0.078 U	<0.086 U	<0.089 U	<0.16 U	<0.086 U	<0.085 U	<0.083 U
Fluoranthene	130	30	0.56	0.069	0.065	0.019	0.024	0.031	0.025	0.028	0.033	0.08	0.14	0.033	<0.0081 U	0.036
Fluorene	3.2	1.7	0.0084	<0.0081 U	<0.0087 U	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	<0.0074 U	<0.0082 U	0.0052 J	<0.015 U	<0.0082 U	<0.0081 U	<0.0079 U
Hexachlorobenzene	<1.9 U	<0.83 U	<0.0084 U	<0.0081 U	<0.0087 U	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	<0.0074 U	<0.0082 U	<0.0085 U	<0.015 U	<0.0082 U	<0.0081 U	<0.0079 U
Hexachlorobutadiene	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
Hexachlorocyclopentadiene	<96 U	<41 U	<0.42 U	<0.4 U	<0.43 U	<0.4 U	<0.4 U	<0.39 R	<0.39 UJ	<0.37 UJ	<0.41 U	<0.42 U	<0.75 U	<0.41 R	<0.4 U	<0.39 U
Hexachloroethane	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 UJ	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
Indeno(1,2,3-*cd*)pyrene	71	31	0.36	0.049	0.029	0.0083	0.012	0.014	<0.008 U	<0.0074 U	0.015	0.031	0.2	0.0099	0.013	0.013
Isophorone	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
N-Nitroso-di-*n*-propylamine	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
N-Nitrosodiphenylamine	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
Naphthalene	1.9	0.49 J	0.0056 J	<0.0081 U	<0.0087 U	<0.0082 U	<0.008 U	<0.0078 U	<0.008 U	<0.0074 U	<0.0082 U	<0.0085 U	<0.015 U	<0.0082 U	<0.0081 U	<0.0079 U
Nitrobenzene	<29 U	<13 U	<0.13 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.13 U	<0.23 U	<0.12 U	<0.12 U	<0.12 U
Pentachlorophenol	<44 U	<19 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.19 U	<0.19 U	<0.34 U	<0.19 U	<0.18 U	<0.18 U
Phenanthrene	54	15	0.2	0.0275	0.029	0.0075 J	0.0083	0.014	0.0088	0.012	<0.0082 U	0.036	0.1	0.012	0.011	0.012
Phenol	<15 U	<6.3 U	<0.063 U	<0.061 U	<0.065 U	<0.061 U	<0.06 U	<0.058 U	<0.06 U	<0.055 U	<0.062 U	<0.063 U	<0.11 U	<0.062 U	<0.061 U	<0.059 U
Pyrene	180	50	0.67	0.087	0.058	0.02	0.023	0.033 J	0.022	0.024	0.033	0.069	0.62	0.027	0.025	0.03
m+p Methylphenol	<120 U	<50 U	<0.51 U	<0.49 U	<0.52 U	<0.49 U	<0.48 U	<0.47 U	<0.48 U	<0.44 U	<0.49 U	<0.51 U	<0.9 U	<0.49 U	<0.49 U	<0.47 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-055	ECCL-SL-056	ECCL-SL-057	ECCL-SL-058	ECCL-SL-059	ECCL-SL-060	ECCL-SL-061	ECCL-SL-062	ECCL-SL-063	ECCL-SL-064	ECCL-SL-065	ECCL-SL-066	ECCL-SL-067	ECCL-SL-068	ECCL-SL-069
Sample ID	ECCLSL0055	ECCLSL0056	ECCLSL0057	ECCLSL0058	ECCLSL0059	ECCLSL0060	ECCLSL0061	ECCLSL0062	ECCLSL0063	ECCLSL0064/ECCLSL9008	ECCLSL0065	ECCLSL0066	ECCLSL0067	ECCLSL0068	ECCLSL0069/ECCLSL9006
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
Depth (ft)	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5
Date	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/13/16	06/13/16	06/13/16	06/08/16	06/08/16
Analyte (mg/kg)															
Organics-Semivolatile															
1,1'-Biphenyl	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	0.044 J
1,2,4,5-Tetrachlorobenzene	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.13 U	<0.12 U
2,3,4,6-Tetrachlorophenol	<2 U	<2.1 U	<2.1 U	<1.9 U	<1.9 U	<1.9 U	<1.9 U	<1.8 U	<2 U	<2 U	<1.8 U	<1.8 U	<1.9 U	<2 U	<1.9 U
2,4,5-Trichlorophenol	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U	<0.185 U	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U
2,4,6-Trichlorophenol	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U	<0.185 U	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U
2,4-Dichlorophenol	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U	<0.185 U	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U
2,4-Dimethylphenol	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U	<0.185 UJ	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U
2,4-Dinitrophenol	<0.41 U	<0.43 U	<0.43 U	<0.4 U	<0.39 U	<0.39 U	<0.4 U	<0.38 UJ	<0.41 UJ	<0.41 U	<0.37 U	<0.37 U	<0.39 U	<0.42 UJ	<0.395 UJ
2,4-Dinitrotoluene	<0.25 U	<0.26 U	<0.26 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.23 U	<0.25 U	<0.25 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	<0.24 U
2,6-Dinitrotoluene	<0.25 U	<0.26 U	<0.26 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.23 U	<0.25 U	<0.25 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	<0.24 U
2-Chloronaphthalene	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
2-Chlorophenol	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
2-Methyl-4,6-dinitrophenol	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 UJ	<0.18 UJ	<0.185 U	<0.17 U	<0.17 U	<0.18 U	<0.19 UJ	<0.18 UJ
2-Methylnaphthalene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	0.0048 J	<0.0074 U	0.0041 J	0.045	0.66
2-Methylphenol	<0.25 U	<0.26 U	<0.26 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.23 U	<0.25 U	<0.25 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	0.014 J
2-Nitrobenzenamine	<0.25 U	<0.26 U	<0.26 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.23 U	<0.25 U	<0.25 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	<0.24 U
2-Nitrophenol	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
3,3'-Dichlorobenzidine	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.13 R	<0.12 U
3-Nitrobenzenamine	<0.25 U	<0.26 U	<0.26 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.23 U	<0.25 U	<0.25 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	<0.24 U
4-Bromophenyl phenyl ether	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
4-Chloro-3-methylphenol	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U	<0.185 UJ	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U
4-Chlorobenzenamine	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	<0.17 U	<0.18 U	<0.185 U	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U
4-Chlorophenyl phenyl ether	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
4-Nitrobenzenamine	<0.25 U	<0.26 U	<0.26 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.23 U	<0.25 U	<0.25 U	<0.23 U	<0.22 U	<0.23 U	<0.25 R	<0.24 U
4-Nitrophenol	<0.41 U	<0.43 U	<0.43 U	<0.4 U	<0.39 U	<0.39 U	<0.4 U	<0.38 U	<0.41 U	<0.41 U	<0.37 U	<0.37 U	<0.39 U	<0.42 U	<0.395 U
Acenaphthene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U
Acenaphthylene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U
Acetophenone	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.13 U	<0.12 U
Anthracene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U
Atrazine	<0.25 U	<0.26 U	<0.26 U	<0.24 U	<0.24 U	<0.24 U	<0.24 U	<0.23 U	<0.25 U	<0.25 U	<0.23 U	<0.22 U	<0.23 U	<0.25 U	<0.24 U
Benz(*a*)anthracene	0.0085	0.0087	0.006 J	0.011	0.0064 J	0.0073 J	<0.0081 U	0.0049 J	0.026	0.0072 J	0.01	0.0058 J	0.01	0.026	0.0235
Benzaldehyde	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	0.44	0.016 J	<0.11 U	<0.11 U	0.017 J	0.027 J	<0.12 U
Benzo(*a*)pyrene	0.011	0.012	0.0091	0.013	0.0081	0.01	0.0051 J	0.0072 J	0.058	0.0105	0.016	0.0058 J	0.012	0.034	0.0225
Benzo(*b*)fluoranthene	0.018	0.016	0.016	0.015	0.013	0.017	<0.0081 U	0.012	0.085	0.018	0.024	0.011	0.022	0.06	0.0385
Benzo(*g,h,i*)perylene	<0.0084 U	0.0069 J	0.0069 J	0.013	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	0.028	<0.00825 U	0.013	0.0058 J	0.011	<0.0084 U	<0.008 U
Benzo(*k*)fluoranthene	0.0086	0.008 J	<0.0086 U	0.01	0.0048 J	0.0084	<0.0081 U	0.0059 J	0.032	<0.00825 U	0.0059 J	0.004 J	0.006 J	0.024	0.01285
Bis(2-chloroethoxy)methane	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.13 U	<0.12 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-055	ECCL-SL-056	ECCL-SL-057	ECCL-SL-058	ECCL-SL-059	ECCL-SL-060	ECCL-SL-061	ECCL-SL-062	ECCL-SL-063	ECCL-SL-064	ECCL-SL-065	ECCL-SL-066	ECCL-SL-067	ECCL-SL-068	ECCL-SL-069
Sample ID	**ECCLSL0055**	**ECCLSL0056**	**ECCLSL0057**	**ECCLSL0058**	**ECCLSL0059**	**ECCLSL0060**	**ECCLSL0061**	**ECCLSL0062**	**ECCLSL0063**	**ECCLSL0064/ECCLSL9008**	**ECCLSL0065**	**ECCLSL0066**	**ECCLSL0067**	**ECCLSL0068**	**ECCLSL0069/ECCLSL9006**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/08/16**	**06/08/16**
Bis(2-chloroethyl) ether	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.13 U	<0.12 U
Bis(2-chloroisopropyl) ether	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.13 U	<0.12 U
Bis(2-ethylhexyl)phthalate	<0.088 U	0.034 J	0.028 J	0.033 J	0.046 J	<0.083 U	0.027 J	<0.08 U	0.14	0.0455 J	<0.079 U	<0.078 U	<0.082 U	0.028 J	<0.084 U
Butyl benzyl phthalate	<0.088 U	<0.091 U	<0.091 U	<0.084 U	<0.083 U	<0.083 U	<0.085 U	<0.08 U	<0.086 U	<0.0865 U	<0.079 U	<0.078 U	<0.082 U	<0.088 U	<0.084 U
Caprolactam	<0.41 U	<0.43 U	<0.43 U	<0.4 U	<0.39 U	<0.39 U	<0.4 U	<0.38 U	<0.41 U	<0.41 U	<0.37 U	<0.37 U	<0.39 U	<0.42 U	<0.395 U
Carbazole	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
Chrysene	0.012	0.012	0.01	0.014	0.0088	0.01	<0.0081 U	0.0073 J	0.048	0.0092	0.017	0.0085	0.016	0.046	0.028
Di-*n*-butyl phthalate	<0.088 U	<0.091 U	<0.091 U	<0.084 U	<0.083 U	<0.083 U	<0.085 U	<0.08 U	<0.086 U	<0.0865 U	<0.079 U	<0.078 U	<0.082 U	0.024 J	0.018 J
Di-*n*-octylphthalate	<0.088 U	<0.091 U	<0.091 U	<0.084 U	<0.083 U	<0.083 U	<0.085 U	<0.08 U	<0.086 U	<0.0865 U	<0.079 U	<0.078 U	<0.082 U	<0.088 U	<0.084 U
Dibenz(*a,h*)anthracene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U
Dibenzofuran	<0.063 U	<0.065 U	<0.065 U	0.011 J	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	0.12
Diethyl phthalate	<0.088 U	<0.091 U	<0.091 U	<0.084 U	<0.083 U	<0.083 U	<0.085 U	<0.08 U	<0.086 U	<0.0865 U	<0.079 U	<0.078 U	<0.082 U	<0.088 U	<0.084 U
Dimethyl phthalate	<0.088 U	<0.091 U	<0.091 U	<0.084 U	<0.083 U	<0.083 U	<0.085 U	<0.08 U	<0.086 U	<0.0865 U	<0.079 U	<0.078 U	<0.082 U	<0.088 U	<0.084 U
Fluoranthene	0.02	0.019	0.014	0.022	0.011	<0.0079 U	<0.0081 U	0.011	0.035	0.014	0.021	0.018	0.022	0.049	0.036
Fluorene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	0.016
Hexachlorobenzene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U
Hexachlorobutadiene	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
Hexachlorocyclopentadiene	<0.41 U	<0.43 U	<0.43 U	<0.4 U	<0.39 U	<0.39 U	<0.4 U	<0.38 U	<0.41 U	<0.41 U	<0.37 U	<0.37 U	<0.39 U	<0.42 R	<0.395 UJ
Hexachloroethane	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
Indeno(1,2,3-*cd*)pyrene	<0.0084 U	<0.0087 U	<0.0086 U	0.011	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	0.022	<0.00825 U	0.0099	<0.0074 U	0.01	<0.0084 U	<0.008 U
Isophorone	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
N-Nitroso-di-*n*-propylamine	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
N-Nitrosodiphenylamine	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U
Naphthalene	<0.0084 U	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.00825 U	<0.0075 U	<0.0074 U	<0.0078 U	0.016	0.5
Nitrobenzene	<0.13 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.11 U	<0.12 U	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.13 U	<0.12 U
Pentachlorophenol	<0.19 U	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	0.12 J	<0.18 U	<0.185 U	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U
Phenanthrene	0.0076 J	0.0071 J	0.0064 J	<0.008 U	<0.0079 U	0.0064 J	<0.0081 U	0.0052 J	0.013	0.0066 J	0.0096	<0.0074 U	0.0099	0.029	0.17
Phenol	<0.063 U	<0.065 U	<0.065 U	<0.06 U	<0.059 U	<0.059 U	<0.06 U	<0.057 U	<0.062 U	<0.062 U	<0.056 U	<0.055 U	<0.059 U	<0.063 U	0.027 J
Pyrene	0.016	0.015	0.011	0.021	0.0091	0.013	0.007 J	0.011	0.033	0.012	0.019	0.0097	0.021	0.043	0.036
m+p Methylphenol	<0.5 U	<0.52 U	<0.52 U	<0.48 U	<0.47 U	<0.48 U	<0.48 U	<0.46 U	<0.49 U	<0.495 U	<0.45 U	<0.44 U	<0.47 U	<0.51 U	<0.48 U

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-070	ECCL-SL-071	ECCL-SL-072	ECCL-SL-073	ECCL-SL-074	ECCL-SL-075	ECCL-SL-076	ECCL-SL-077	ECCL-SL-078	ECCL-SL-079	ECCL-SL-080	ECCL-SL-081	ECCL-SL-173	ECCL-SL-174	ECCL-SL-175
Sample ID	**ECCLSL0070**	**ECCLSL0071**	**ECCLSL0072**	**ECCLSL0073**	**ECCLSL0074**	**ECCLSL0075**	**ECCLSL0076**	**ECCLSL0077**	**ECCLSL0078**	**ECCLSL0079/ECCLSL9007**	**ECCLSL0080**	**ECCLSL0081**	**ECCLSL0173**	**ECCLSL0174**	**ECCLSL0175**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–1.0**	**0.0–1.0**	**1.0–2.0**
Date	**06/09/16**	**06/07/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**08/02/19**	**08/02/19**	**08/01/19**
Analyte (mg/kg)															
Organics-Semivolatile															
1,1'-Biphenyl	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	NR	NR	NR
2,3,4,6-Tetrachlorophenol	<2 U	<2 U	<1.9 U	<1.9 U	<2 U	<1.9 U	<2 U	<2 U	<1.9 U	<2 U	<1.9 U	<2 U	NR	NR	NR
2,4,5-Trichlorophenol	<0.19 U	<0.19 U	<0.18 U	<0.17 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.185 U	<0.18 U	<0.18 U	NR	NR	NR
2,4,6-Trichlorophenol	<0.19 U	<0.19 U	<0.18 U	<0.17 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.185 U	<0.18 U	<0.18 U	NR	NR	NR
2,4-Dichlorophenol	<0.19 U	<0.19 U	<0.18 U	<0.17 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.185 U	<0.18 U	<0.18 U	NR	NR	NR
2,4-Dimethylphenol	<0.19 U	<0.19 U	<0.18 UJ	<0.17 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.185 U	<0.18 U	<0.18 U	NR	NR	NR
2,4-Dinitrophenol	<0.41 UJ	<0.42 U	<0.39 U	<0.38 U	<0.41 U	<0.39 UJ	<0.41 U	<0.41 U	<0.39 U	<0.405 U	<0.39 U	<0.4 U	NR	NR	NR
2,4-Dinitrotoluene	<0.25 U	<0.26 U	<0.24 U	<0.23 U	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.245 U	<0.24 U	<0.24 U	NR	NR	NR
2,6-Dinitrotoluene	<0.25 U	<0.26 U	<0.24 U	<0.23 U	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.245 U	<0.24 U	<0.24 U	NR	NR	NR
2-Chloronaphthalene	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
2-Chlorophenol	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
2-Methyl-4,6-dinitrophenol	<0.19 UJ	<0.19 U	<0.18 U	<0.17 U	<0.19 U	<0.18 UJ	<0.18 U	<0.19 U	<0.18 U	<0.185 U	<0.18 U	<0.18 U	NR	NR	NR
2-Methylnaphthalene	0.006 J	0.0048 J	<0.008 U	<0.0078 U	0.0056 J	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	NR	NR	NR
2-Methylphenol	<0.25 U	<0.26 U	<0.24 U	<0.23 U	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.245 U	<0.24 U	<0.24 U	NR	NR	NR
2-Nitrobenzenamine	<0.25 U	<0.26 U	<0.24 U	<0.23 U	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.245 U	<0.24 U	<0.24 U	NR	NR	NR
2-Nitrophenol	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
3,3'-Dichlorobenzidine	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	NR	NR	NR
3-Nitrobenzenamine	<0.25 U	<0.26 U	<0.24 U	<0.23 U	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.245 U	<0.24 U	<0.24 U	NR	NR	NR
4-Bromophenyl phenyl ether	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
4-Chloro-3-methylphenol	<0.19 U	<0.19 U	<0.18 UJ	<0.17 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.185 U	<0.18 U	<0.18 U	NR	NR	NR
4-Chlorobenzenamine	<0.19 U	<0.19 U	<0.18 U	<0.17 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.185 U	<0.18 U	<0.18 U	NR	NR	NR
4-Chlorophenyl phenyl ether	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
4-Nitrobenzenamine	<0.25 U	<0.26 U	<0.24 U	<0.23 U	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.245 U	<0.24 U	<0.24 U	NR	NR	NR
4-Nitrophenol	<0.41 U	<0.42 U	<0.39 U	<0.38 U	<0.41 U	<0.39 U	<0.41 U	<0.41 U	<0.39 U	<0.405 U	<0.39 U	<0.4 U	NR	NR	NR
Acenaphthene	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	0.045	<0.017 U	<0.018 U
Acenaphthylene	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	<0.017 U	<0.017 U	<0.018 U
Acetophenone	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	NR	NR	NR
Anthracene	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	0.054	<0.017 U	<0.018 U
Atrazine	<0.25 U	<0.26 U	<0.24 U	<0.23 U	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.245 U	<0.24 U	<0.24 U	NR	NR	NR
Benz(*a*)anthracene	0.02	0.014	0.0085	0.0085	0.0086	0.0065 J	0.014	0.0072 J	0.012	0.0088 J	0.012	0.0049 J	1	0.1	0.12
Benzaldehyde	<0.12 U	<0.13 U	<0.12 U	0.033 J	<0.13 U	0.014 J	0.016 J	<0.13 U	0.017 J	0.019 J	<0.12 U	<0.12 U	NR	NR	NR
Benzo(*a*)pyrene	0.025	0.017	0.012	0.01	0.01	0.0087	0.018	0.0093	0.015	0.01165	0.016	0.0065 J	1.4	0.16	0.17
Benzo(*b*)fluoranthene	0.044	0.024	0.019	0.018	0.015	0.013	0.029	0.016	0.027	0.0215	0.023	<0.0082 U	1.5	0.16	0.085
Benzo(*g,h,i*)perylene	0.011	0.018	0.01	0.0087	<0.0084 U	<0.0079 U	0.011	<0.0084 U	<0.0078 U	<0.00825 U	0.0097	<0.0082 U	0.8	0.11	0.1
Benzo(*k*)fluoranthene	0.017	0.013	0.0068 J	0.008	0.0073 J	0.0066 J	0.011	<0.0084 U	0.011	0.0096	0.011	<0.0082 U	0.49	0.058	0.023
Bis(2-chloroethoxy)methane	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	NR	NR	NR

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-070	ECCL-SL-071	ECCL-SL-072	ECCL-SL-073	ECCL-SL-074	ECCL-SL-075	ECCL-SL-076	ECCL-SL-077	ECCL-SL-078	ECCL-SL-079	ECCL-SL-080	ECCL-SL-081	ECCL-SL-173	ECCL-SL-174	ECCL-SL-175
Sample ID	**ECCLSL0070**	**ECCLSL0071**	**ECCLSL0072**	**ECCLSL0073**	**ECCLSL0074**	**ECCLSL0075**	**ECCLSL0076**	**ECCLSL0077**	**ECCLSL0078**	**ECCLSL0079/ECCLSL9007**	**ECCLSL0080**	**ECCLSL0081**	**ECCLSL0173**	**ECCLSL0174**	**ECCLSL0175**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–1.0**	**0.0–1.0**	**1.0–2.0**
Date	**06/09/16**	**06/07/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**06/09/16**	**08/02/19**	**08/02/19**	**08/01/19**
Bis(2-chloroethyl) ether	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	NR	NR	NR
Bis(2-chloroisopropyl) ether	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	NR	NR	NR
Bis(2-ethylhexyl)phthalate	<0.087 U	<0.089 U	1.5	<0.082 U	<0.088 U	<0.082 U	<0.086 U	<0.088 U	<0.082 U	0.03 J	<0.083 U	0.031 J	NR	NR	NR
Butyl benzyl phthalate	<0.087 U	<0.089 U	<0.083 U	<0.082 U	<0.088 U	<0.082 U	<0.086 U	<0.088 U	<0.082 U	<0.0865 U	<0.083 U	<0.086 U	NR	NR	NR
Caprolactam	<0.41 U	<0.42 U	<0.39 U	<0.38 U	<0.41 U	<0.39 U	<0.41 U	<0.41 U	<0.39 U	<0.405 U	<0.39 U	<0.4 U	NR	NR	NR
Carbazole	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	<0.059 U
Chrysene	0.026	0.018	0.014	0.014	0.012	0.009	0.023	0.011	0.018	0.0135	0.016	0.0074 J	1.6	0.15	0.24
Di-*n*-butyl phthalate	0.022 J	<0.089 U	<0.083 U	<0.082 U	<0.088 U	<0.082 U	<0.086 U	<0.088 U	0.022 J	<0.0865 U	0.019 J	0.019 J	NR	NR	NR
Di-*n*-octylphthalate	<0.087 U	<0.089 U	<0.083 U	<0.082 U	<0.088 U	<0.082 U	<0.086 U	<0.088 U	<0.082 U	<0.0865 U	<0.083 U	<0.086 U	NR	NR	NR
Dibenz(*a,h*)anthracene	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	0.24	0.031	0.033
Dibenzofuran	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
Diethyl phthalate	<0.087 U	<0.089 U	<0.083 U	<0.082 U	<0.088 U	<0.082 U	<0.086 U	<0.088 U	<0.082 U	<0.0865 U	<0.083 U	<0.086 U	NR	NR	NR
Dimethyl phthalate	<0.087 U	<0.089 U	<0.083 U	<0.082 U	<0.088 U	<0.082 U	<0.086 U	<0.088 U	<0.082 U	<0.0865 U	<0.083 U	<0.086 U	NR	NR	NR
Fluoranthene	0.04	0.026	0.018	<0.0078 U	<0.0084 U	0.011	0.034	0.015	0.03	0.0215	0.025	<0.0082 U	0.83	0.13	0.036
Fluorene	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	0.018	<0.017 U	<0.018 U
Hexachlorobenzene	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	NR	NR	NR
Hexachlorobutadiene	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
Hexachlorocyclopentadiene	<0.41 UJ	<0.42 U	<0.39 U	<0.38 U	<0.41 U	<0.39 UJ	<0.41 U	<0.41 U	<0.39 U	<0.405 U	<0.39 U	<0.4 U	NR	NR	NR
Hexachloroethane	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	0.01	0.013	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	0.01	<0.0084 U	<0.0078 U	<0.00825 U	0.009	<0.0082 U	0.58	0.079	0.034
Isophorone	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
N-Nitroso-di-*n*-propylamine	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
N-Nitrosodiphenylamine	<0.062 U	<0.064 U	<0.06 U	<0.058 U	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
Naphthalene	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.00825 U	<0.0079 U	<0.0082 U	<0.017 U	<0.017 U	<0.018 U
Nitrobenzene	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	NR	NR	NR
Pentachlorophenol	<0.19 U	<0.19 U	<0.18 U	<0.17 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.185 U	0.069 J	<0.18 U	NR	NR	NR
Phenanthrene	0.014	0.012	0.007 J	0.0071 J	0.008 J	<0.0079 U	0.016	0.0063 J	0.011	0.00835 J	0.0096	<0.0082 U	0.28	0.044	0.018
Phenol	0.017 J	<0.064 U	<0.06 U	<0.058 U	<0.063 U	0.015 J	<0.061 U	<0.063 U	<0.058 U	<0.0615 U	<0.059 U	<0.061 U	NR	NR	NR
Pyrene	0.036	0.026	0.013	0.015	0.013	0.0097	0.03	0.013	0.023	0.017	0.022	0.0092	1	0.13	0.088
m+p Methylphenol	<0.5 U	<0.51 U	<0.48 U	<0.47 U	<0.5 U	<0.47 U	<0.49 U	<0.5 U	<0.47 U	<0.495 U	<0.47 U	<0.49 U	NR	NR	NR

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-175	ECCL-SL-176	ECCL-SL-176	ECCL-SL-176	ECCL-SL-177	ECCL-SL-177	ECCL-SL-177	ECCL-SL-178	ECCL-SL-179	ECCL-SL-182	ECCL-SL-198	ECCL-SL-199	ECCL-SL-199	ECCL-SL-200
Sample ID	ECCLSL0176/ECCLSL9019	ECCLSL0177	ECCLSL0178	ECCLSL0293	ECCLSL0179	ECCLSL0180	ECCLSL0292	ECCLSL0181	ECCLSL0182	ECCLSL0187/ECCLSL9020	ECCLSL0216	ECCLSL0217/ECCLSL9025	ECCLSL0218	ECCLSL0205
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
Depth (ft)	2.0–3.0	1.0–2.0	2.0–3.0	3.0–4.0	1.0–2.0	2.0–3.0	3.0–4.0	0.0–1.0	0.0–1.0	0.0–1.0	0.0–1.0	0.5–1.0	1.0–1.5	0.5–1.0
Date	08/01/19	08/02/19	08/02/19	08/02/19	07/31/19	07/31/19	07/31/19	08/02/19	08/02/19	08/01/19	07/30/19	07/30/19	07/30/19	07/31/19
Analyte (mg/kg)														
Organics-Semivolatile														
1,1'-Biphenyl	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,6-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dimethylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,6-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chloronaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylnaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3,3'-Dichlorobenzidine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Bromophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acenaphthene	<0.019 U	0.082	<0.017 U	<0.018 U	<0.018 U	<0.019 U	<0.019 U	<0.17 U	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Acenaphthylene	<0.019 U	<0.044 U	<0.017 U	<0.018 U	<0.018 U	<0.019 U	<0.019 U	<0.17 U	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Acetophenone	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Anthracene	<0.019 U	0.075	<0.017 U	<0.018 U	<0.018 U	<0.019 U	0.022	<0.17 U	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Atrazine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benz(*a*)anthracene	0.0975	1.5	0.21	0.091	0.3	0.56	0.76	4	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Benzaldehyde	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benzo(*a*)pyrene	0.1295	2.2	0.26	0.13	0.36	0.63	0.91	3.3	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Benzo(*b*)fluoranthene	0.059	2.3	0.26	0.11	0.24	0.36	0.32	1.5	<0.019 U	<0.018 U	0.019	0.02	<0.018 U	0.02
Benzo(*g,h,i*)perylene	0.0805	1.3	0.18	0.08	0.21	0.36	0.47	1.2	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Benzo(*k*)fluoranthene	<0.019 U	1.1	0.11	0.034	0.064	0.062	0.055	0.23	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Bis(2-chloroethoxy)methane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-175	ECCL-SL-176	ECCL-SL-176	ECCL-SL-176	ECCL-SL-177	ECCL-SL-177	ECCL-SL-177	ECCL-SL-178	ECCL-SL-179	ECCL-SL-182	ECCL-SL-198	ECCL-SL-199	ECCL-SL-199	ECCL-SL-200
Sample ID	**ECCLSL0176/ECCLSL9019**	**ECCLSL0177**	**ECCLSL0178**	**ECCLSL0293**	**ECCLSL0179**	**ECCLSL0180**	**ECCLSL0292**	**ECCLSL0181**	**ECCLSL0182**	**ECCLSL0187/ECCLSL9020**	**ECCLSL0216**	**ECCLSL0217/ECCLSL9025**	**ECCLSL0218**	**ECCLSL0205**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**2.0–3.0**	**1.0–2.0**	**2.0–3.0**	**3.0–4.0**	**1.0–2.0**	**2.0–3.0**	**3.0–4.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.5–1.0**	**1.0–1.5**	**0.5–1.0**
Date	**08/01/19**	**08/02/19**	**08/02/19**	**08/02/19**	**07/31/19**	**07/31/19**	**07/31/19**	**08/02/19**	**08/02/19**	**08/01/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/31/19**
Bis(2-chloroethyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl benzyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Caprolactam	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Carbazole	<0.063 U	NR	NR	NR	<0.059 U	<0.062 U	<0.064 U	NR	NR	NR	NR	NR	NR	NR
Chrysene	0.205	2.5	0.36	0.15	0.57	0.97	1.3	6.8	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	0.018
Di-*n*-butyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Di-*n*-octylphthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dibenz(*a,h*)anthracene	0.0295	0.39	0.056	0.026	0.072	0.12	0.15	0.6	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Dibenzofuran	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Diethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dimethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fluoranthene	0.019	1.3	0.15	0.048	0.1	0.11	0.071	0.21	<0.019 U	<0.018 U	0.025	0.022	0.021	0.02
Fluorene	<0.019 U	<0.044 U	<0.017 U	<0.018 U	<0.018 U	<0.019 U	<0.019 U	<0.17 U	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Hexachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorocyclopentadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachloroethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	0.035	0.98	0.12	0.043	0.11	0.14	0.12	0.42	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Isophorone	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitrosodiphenylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Naphthalene	<0.019 U	<0.044 U	<0.017 U	<0.018 U	<0.018 U	<0.019 U	<0.019 U	<0.17 U	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Nitrobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pentachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phenanthrene	<0.019 U	0.35	0.049	<0.018 U	0.049	0.07	0.11	0.35	<0.019 U	<0.018 U	<0.018 U	<0.0185 U	<0.018 U	<0.016 U
Phenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pyrene	0.0725	1.4	0.18	0.065	0.19	0.34	0.61	1.7	<0.019 U	<0.018 U	0.021	0.018	0.018	0.017
m+p Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-200	ECCL-SL-201	ECCL-SL-201	ECCL-SL-202	ECCL-SL-202	ECCL-SL-202	ECCL-SL-203	ECCL-SL-203	ECCL-SL-204	ECCL-SL-205	ECCL-SL-205	ECCL-SL-206	ECCL-SL-207	ECCL-SL-208
Sample ID	**ECCLSL0206/ECCLSL9022**	**ECCLSL0207/ECCLSL9023**	**ECCLSL0208**	**ECCLSL0209**	**ECCLSL0210**	**ECCLSL0291**	**ECCLSL0211**	**ECCLSL0212**	**ECCLSL0219**	**ECCLSL0220**	**ECCLSL0221**	**ECCLSL0222/ECCLSL9024**	**ECCLSL0223**	**ECCLSL0224**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**1.0–1.5**	**0.0–0.5**	**0.5–1.0**	**1.0–2.0**	**2.0–3.0**	**3.0–4.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**1.0–2.0**	**2.0–3.0**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**
Date	**07/31/19**	**07/31/19**	**07/31/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**
Analyte (mg/kg)														
Organics-Semivolatile														
1,1'-Biphenyl	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,3,4,6-Tetrachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,5-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4,6-Trichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dichlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dimethylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,4-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2,6-Dinitrotoluene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chloronaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Chlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methyl-4,6-dinitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylnaphthalene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3,3'-Dichlorobenzidine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Bromophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Chlorophenyl phenyl ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrobenzenamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-Nitrophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Acenaphthene	<0.016 U	<0.017 U	<0.017 U	1.7	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.019 U	<0.019 U	<0.041 U	<0.017 U	<0.17 U
Acenaphthylene	<0.016 U	<0.017 U	<0.017 U	<1.7 U	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.019 U	<0.019 U	<0.041 U	<0.017 U	<0.17 U
Acetophenone	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Anthracene	<0.016 U	<0.017 U	<0.017 U	2.2	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.019 U	<0.019 U	<0.041 U	<0.017 U	<0.17 U
Atrazine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benz(*a*)anthracene	<0.016 U	0.0325	0.024	57	0.12	0.33	0.047	<0.017 U	0.43	0.022	<0.019 U	0.909	0.024	4.4
Benzaldehyde	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benzo(*a*)pyrene	<0.016 U	0.0385	0.032	59	0.15	0.31	0.045	<0.017 U	0.48	0.031	<0.019 U	1.111	0.027	4.4
Benzo(*b*)fluoranthene	<0.016 U	0.036	0.022	50	0.091	0.16	0.041	<0.017 U	0.24	0.034	<0.019 U	0.4515	0.038	2.6
Benzo(*g,h,i*)perylene	<0.016 U	0.0265	0.02	33	0.087	0.16	0.029	<0.017 U	0.26	0.025	<0.019 U	0.558	0.021	2.1
Benzo(*k*)fluoranthene	<0.016 U	<0.017 U	<0.017 U	17	0.022	0.018	<0.017 U	<0.017 U	0.043	<0.019 U	<0.019 U	0.15	0.017	0.32
Bis(2-chloroethoxy)methane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-200	ECCL-SL-201	ECCL-SL-201	ECCL-SL-202	ECCL-SL-202	ECCL-SL-202	ECCL-SL-203	ECCL-SL-203	ECCL-SL-204	ECCL-SL-205	ECCL-SL-205	ECCL-SL-206	ECCL-SL-207	ECCL-SL-208
Sample ID	**ECCLSL0206/ECCLSL9022**	**ECCLSL0207/ECCLSL9023**	**ECCLSL0208**	**ECCLSL0209**	**ECCLSL0210**	**ECCLSL0291**	**ECCLSL0211**	**ECCLSL0212**	**ECCLSL0219**	**ECCLSL0220**	**ECCLSL0221**	**ECCLSL0222/ECCLSL9024**	**ECCLSL0223**	**ECCLSL0224**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**1.0–1.5**	**0.0–0.5**	**0.5–1.0**	**1.0–2.0**	**2.0–3.0**	**3.0–4.0**	**0.5–1.0**	**1.0–1.5**	**0.0–1.0**	**1.0–2.0**	**2.0–3.0**	**0.0–1.0**	**0.0–1.0**	**0.0–0.5**
Date	**07/31/19**	**07/31/19**	**07/31/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**	**07/30/19**
Bis(2-chloroethyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-chloroisopropyl) ether	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bis(2-ethylhexyl)phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Butyl benzyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Caprolactam	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Carbazole	NR	NR	NR	<1.2 U	<0.057 U	<0.06 U	NR	NR	NR	<0.065 U	<0.063 U	NR	NR	NR
Chrysene	<0.016 U	0.0745	0.041	110	0.25	0.63	0.08	<0.017 U	0.72	0.035	<0.019 U	1.716	0.039	11
Di-*n*-butyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Di-*n*-octylphthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dibenz(*a,h*)anthracene	<0.016 U	<0.017 U	<0.017 U	12	0.037	0.066	<0.017 U	<0.017 U	0.1	<0.019 U	<0.019 U	0.54	<0.017 U	1.2
Dibenzofuran	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Diethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dimethyl phthalate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fluoranthene	<0.016 U	0.0235	0.018	28	0.033	0.029	0.03	<0.017 U	0.056	0.022	<0.019 U	0.13	0.055	0.78
Fluorene	<0.016 U	<0.017 U	<0.017 U	<1.7 U	<0.017 U	<0.018 U	<0.017 U	<0.017 U	<0.017 U	<0.019 U	<0.019 U	<0.041 U	<0.017 U	<0.17 U
Hexachlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorocyclopentadiene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachloroethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	<0.016 U	<0.017 U	<0.017 U	21	0.037	0.049	0.017	<0.017 U	0.078	0.019	<0.019 U	0.32	0.019	0.93
Isophorone	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitroso-di-*n*-propylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
N-Nitrosodiphenylamine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Naphthalene	<0.016 U	<0.017 U	<0.017 U	<1.7 U	<0.017 U	<0.018 U	<0.017 U	<0.017 U	0.022	<0.019 U	<0.019 U	<0.041 U	<0.017 U	<0.17 U
Nitrobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pentachlorophenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phenanthrene	<0.016 U	<0.017 U	<0.017 U	9.9	<0.017 U	0.033	<0.017 U	<0.017 U	0.068	<0.019 U	<0.019 U	0.21	0.028	0.68
Phenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pyrene	<0.016 U	0.0275	0.028	42	0.069	0.22	0.037	<0.017 U	0.29	0.027	<0.019 U	0.504	0.042	2.5
m+p Methylphenol	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-208	ECCL-SL-269	ECCL-SL-270
Sample ID	ECCLSL0225	ECCLSL0299/ECCLSL9031	ECCLSL0296
Sample Type	GR	GR	GR
Depth (ft)	0.5–1.0	0.0–1.0	0.0–0.5
Date	07/30/19	08/08/19	08/08/19
Analyte (mg/kg)			
Organics-Semivolatile			
1,1'-Biphenyl	NR	NR	NR
1,2,4,5-Tetrachlorobenzene	NR	NR	NR
2,3,4,6-Tetrachlorophenol	NR	NR	NR
2,4,5-Trichlorophenol	NR	NR	NR
2,4,6-Trichlorophenol	NR	NR	NR
2,4-Dichlorophenol	NR	NR	NR
2,4-Dimethylphenol	NR	NR	NR
2,4-Dinitrophenol	NR	NR	NR
2,4-Dinitrotoluene	NR	NR	NR
2,6-Dinitrotoluene	NR	NR	NR
2-Chloronaphthalene	NR	NR	NR
2-Chlorophenol	NR	NR	NR
2-Methyl-4,6-dinitrophenol	NR	NR	NR
2-Methylnaphthalene	NR	NR	NR
2-Methylphenol	NR	NR	NR
2-Nitrobenzenamine	NR	NR	NR
2-Nitrophenol	NR	NR	NR
3,3'-Dichlorobenzidine	NR	NR	NR
3-Nitrobenzenamine	NR	NR	NR
4-Bromophenyl phenyl ether	NR	NR	NR
4-Chloro-3-methylphenol	NR	NR	NR
4-Chlorobenzenamine	NR	NR	NR
4-Chlorophenyl phenyl ether	NR	NR	NR
4-Nitrobenzenamine	NR	NR	NR
4-Nitrophenol	NR	NR	NR
Acenaphthene	<0.017 U	<0.019 U	<0.02 U
Acenaphthylene	<0.017 U	<0.019 U	<0.02 U
Acetophenone	NR	NR	NR
Anthracene	<0.017 U	<0.019 U	<0.02 U
Atrazine	NR	NR	NR
Benz(*a*)anthracene	0.031	<0.019 U	<0.02 U
Benzaldehyde	NR	NR	NR
Benzo(*a*)pyrene	0.038	<0.019 U	<0.02 U
Benzo(*b*)fluoranthene	0.036	<0.019 U	0.025
Benzo(*g,h,i*)perylene	0.022	<0.019 U	<0.02 U
Benzo(*k*)fluoranthene	<0.017 U	<0.019 U	<0.02 U
Bis(2-chloroethoxy)methane	NR	NR	NR
Bis(2-chloroethyl) ether	NR	NR	NR
Bis(2-chloroisopropyl) ether	NR	NR	NR

Table C-13. Results for SVOCs in Soil Samples at ECCL Trap and Skeet Ranges (Continued)

Station	ECCL-SL-208	ECCL-SL-269	ECCL-SL-270
Sample ID	ECCLSL0225	ECCLSL0299/ECCLSL9031	ECCLSL0296
Sample Type	GR	GR	GR
Depth (ft)	0.5–1.0	0.0–1.0	0.0–0.5
Date	07/30/19	08/08/19	08/08/19
Bis(2-ethylhexyl)phthalate	NR	NR	NR
Butyl benzyl phthalate	NR	NR	NR
Caprolactam	NR	NR	NR
Carbazole	NR	NR	NR
Chrysene	0.054	<0.019 U	<0.02 U
Di-*n*-butyl phthalate	NR	NR	NR
Di-*n*-octylphthalate	NR	NR	NR
Dibenz(*a,h*)anthracene	<0.017 U	<0.019 U	<0.02 U
Dibenzofuran	NR	NR	NR
Diethyl phthalate	NR	NR	NR
Dimethyl phthalate	NR	NR	NR
Fluoranthene	0.025	<0.019 U	0.03
Fluorene	<0.017 U	<0.019 U	<0.02 U
Hexachlorobenzene	NR	NR	NR
Hexachlorobutadiene	NR	NR	NR
Hexachlorocyclopentadiene	NR	NR	NR
Hexachloroethane	NR	NR	NR
Indeno(1,2,3-*cd*)pyrene	0.017	<0.019 U	<0.02 U
Isophorone	NR	NR	NR
N-Nitroso-di-*n*-propylamine	NR	NR	NR
N-Nitrosodiphenylamine	NR	NR	NR
Naphthalene	<0.017 U	<0.019 U	<0.02 U
Nitrobenzene	NR	NR	NR
Pentachlorophenol	NR	NR	NR
Phenanthrene	<0.017 U	<0.019 U	<0.02 U
Phenol	NR	NR	NR
Pyrene	0.03	<0.019 U	0.023
m+p Methylphenol	NR	NR	NR

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.
NR = not reported.
SVOC = semivolatile organic compound.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-14. Results for Metals in Groundwater Samples at ECCL Firing Range

Station	MW-12	MW-9
Sample ID	ECCLGW0012/ECCLGW9001	ECCLGW0009
Sample Type	GR	GR
Date	08/21/19	08/21/19
Analyte (µg/L)		
Metals		
Antimony	<2 U	8.3
Arsenic	<5 U	25
Copper	45.5	110
Iron	2750	37000
Lead	6.4	290
Tin	<10 U	<10 U
Zinc	1200	200
Metals, Dissolved		
Antimony, Dissolved	NR	<2 U
Arsenic, Dissolved	NR	<5 U
Copper, Dissolved	NR	6
Iron, Dissolved	NR	10000
Lead, Dissolved	NR	14
Tin, Dissolved	NR	<10 U
Zinc, Dissolved	NR	170

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
µg/L = micrograms per liter.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

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Table C-15. Results for PAHs in Groundwater Samples at ECCL Firing Range

Station	MW-12	MW-9
Sample ID	ECCLGW0012/ECCLGW9001	ECCLGW0009
Sample Type	GR	GR
Date	08/21/19	08/21/19
Analyte (µg/L)		
Organics-PAHs		
Acenaphthene	<0.052 U	<0.053 U
Acenaphthylene	<0.052 U	<0.053 U
Anthracene	<0.052 U	<0.053 U
Benz(*a*)anthracene	<0.052 U	<0.053 U
Benzo(*a*)pyrene	<0.052 U	<0.053 U
Benzo(*b*)fluoranthene	<0.052 U	<0.053 U
Benzo(*g,h,i*)perylene	<0.052 U	<0.053 U
Benzo(*k*)fluoranthene	<0.052 U	<0.053 U
Chrysene	<0.052 U	<0.053 U
Dibenz(*a,h*)anthracene	<0.052 U	<0.053 U
Fluoranthene	<0.052 U	<0.053 U
Fluorene	<0.052 U	<0.053 U
Indeno(1,2,3-*cd*)pyrene	<0.052 U	<0.053 U
Naphthalene	<0.052 U	0.13
Phenanthrene	<0.052 U	0.093
Pyrene	<0.052 U	<0.053 U
Organics-PAHs, Filtered		
Acenaphthene, Filtered	NR	<0.049 U
Acenaphthylene, Filtered	NR	<0.049 U
Anthracene, Filtered	NR	<0.049 U
Benz(*a*)anthracene, Filtered	NR	<0.049 U
Benzo(*a*)pyrene, Filtered	NR	<0.049 U
Benzo(*b*)fluoranthene, Filtered	NR	<0.049 U
Benzo(*g,h,i*)perylene, Filtered	NR	<0.049 U
Benzo(*k*)fluoranthene, Filtered	NR	<0.049 U

Table C-15. Results for PAHs in Groundwater Samples at ECCL Firing Range (Continued)

Station	MW-12	MW-9
Sample ID	ECCLGW0012/ECCLGW9001	ECCLGW0009
Sample Type	GR	GR
Date	08/21/19	08/21/19
Chrysene, Filtered	NR	<0.049 U
Dibenz(*a,h*)anthracene, Filtered	NR	<0.049 U
Fluoranthene, Filtered	NR	<0.049 U
Fluorene, Filtered	NR	<0.049 U
Indeno(1,2,3-*cd*)pyrene, Filtered	NR	<0.049 U
Naphthalene, Filtered	NR	<0.049 U
Phenanthrene, Filtered	NR	<0.049 U
Pyrene, Filtered	NR	<0.049 U

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
PAH = polycyclic aromatic hydrocarbon.
µg/L = micrograms per liter.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-16. Results for Metals in Sediment Samples at ECCL Ponds (East and West)

Area	Pond East	Pond East	Pond East	Pond West A	Pond West A	Pond West A	Pond West A	Pond West A	Pond West A
Station	**ECCL-SDSW-010**	**ECCL-SDSW-011**	**ECCL-SDSW-012**	**ECCL-SD-022**	**ECCL-SD-024**	**ECCL-SD-026**	**ECCL-SD-028**	**ECCL-SD-029**	**ECCL-SDSW-015**
Sample ID	**ECCLSD010**	**ECCLSD011/ECCLSD9001**	**ECCLSD012**	**ECCLSD0024**	**ECCLSD0026**	**ECCLSD0028**	**ECCLSD0030/ECCLSD9004**	**ECCLSD0031**	**ECCLSD015**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.0**	**0.0–0.0**	**0.0–0.0**	**0.0–0.7**	**0.0–0.7**	**0.0–0.3**	**0.0–1.0**	**0.0–0.5**	**0.0–0.5**
Date	**06/08/16**	**06/08/16**	**06/08/16**	**07/31/19**	**07/31/19**	**07/31/19**	**07/31/19**	**07/31/19**	**06/08/16**
Analyte (mg/kg)									
Metals									
Antimony	0.93 J	1 J	1.3 J	NR	NR	NR	NR	NR	<13 U
Arsenic	31	9.6	23	7.9	3.1	7.7	9.75	12	9.8
Copper	66 J	39	88	NR	NR	NR	NR	NR	290 J
Iron	41000	15500	34000	NR	NR	NR	NR	NR	24000
Lead	20	27	29	450	62	390	680	470 J	650
Tin	<15 U	<16 U	<25 U	NR	NR	NR	NR	NR	<64 U
Zinc	22	39	58	NR	NR	NR	NR	NR	360

Table C-16. Results for Metals in Sediment Samples at ECCL Ponds (East and West) – Continued

Area	Pond West A	Pond West A	Pond West A	Pond West B	Pond West B
Station	ECCL-SDSW-016	ECCL-SDSW-017	ECCL-SDSW-018	ECCL-SDSW-013	ECCL-SDSW-014
Sample ID	ECCLSD016	ECCLSD017	ECCLSD018	ECCLSD013	ECCLSD014
Sample Type	GR	GR	GR	GR	GR
Depth (ft)	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5
Date	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16
Analyte (mg/kg)					
Metals					
Antimony	<8.5 U	<10 U	<11 U	2.2 J	1.7 J
Arsenic	13	17	24	9	13
Copper	200 J	530	540	78	100
Iron	30000	32000	53000	8800	13000
Lead	590	2100	3500	330	270
Tin	<42 U	<50 U	<44 U	<26 U	<27 U
Zinc	250	480	410	220	260

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-17. Results for SVOCs in Sediment Samples at ECCL Ponds (East and West)

Area	Pond East	Pond East	Pond East	Pond West A	Pond West A	Pond West A	Pond West A	Pond West B	Pond West B
Station	ECCL-SDSW-010	ECCL-SDSW-011	ECCL-SDSW-012	ECCL-SDSW-015	ECCL-SDSW-016	ECCL-SDSW-017	ECCL-SDSW-018	ECCL-SDSW-013	ECCL-SDSW-014
Sample ID	ECCLSD010	ECCLSD011/ECCLSD9001	ECCLSD012	ECCLSD015	ECCLSD016	ECCLSD017	ECCLSD018	ECCLSD013	ECCLSD014
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR
Depth (ft)	0.0–0.0	0.0–0.0	0.0–0.0	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5
Date	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16
Analyte (mg/kg)									
Organics-Semivolatile									
1,1'-Biphenyl	0.018 J	<0.0935 U	0.013 J	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
1,2,4,5-Tetrachlorobenzene	<0.16 U	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U
2,3,4,6-Tetrachlorophenol	<2.5 U	<3 U	<4.6 U	<24 U	<9.2 U	<9.7 U	<7.6 U	<4.7 U	<5.6 U
2,4,5-Trichlorophenol	<0.24 U	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
2,4,6-Trichlorophenol	<0.24 U	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
2,4-Dichlorophenol	<0.24 U	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
2,4-Dimethylphenol	<0.24 U	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
2,4-Dinitrophenol	<0.52 U	<0.615 U	<0.95 U	<4.9 U	<1.9 U	<2 U	<1.6 U	<0.97 U	<1.1 U
2,4-Dinitrotoluene	<0.31 U	<0.375 U	<0.57 U	<3 U	<1.1 U	<1.2 U	<0.95 U	<0.59 U	<0.69 U
2,6-Dinitrotoluene	<0.31 U	<0.375 U	<0.57 U	<3 U	<1.1 U	<1.2 U	<0.95 U	<0.59 U	<0.69 U
2-Chloronaphthalene	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
2-Chlorophenol	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
2-Methyl-4,6-dinitrophenol	<0.24 U	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
2-Methylnaphthalene	0.38 J	0.092	0.32	<0.098 U	<0.038 U	<0.04 U	0.019 J	<0.02 U	<0.023 U
2-Methylphenol	<0.31 U	<0.375 U	<0.57 U	<3 U	<1.1 U	<1.2 U	<0.95 U	<0.59 U	<0.69 U
2-Nitrobenzenamine	<0.31 U	<0.375 U	<0.57 U	<3 U	<1.1 U	<1.2 U	<0.95 U	<0.59 U	<0.69 U
2-Nitrophenol	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
3,3'-Dichlorobenzidine	<0.16 R	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U
3-Nitrobenzenamine	<0.31 R	<0.375 U	<0.57 U	<3 U	<1.1 U	<1.2 U	<0.95 U	<0.59 U	<0.69 U
4-Bromophenyl phenyl ether	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
4-Chloro-3-methylphenol	<0.24 U	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
4-Chlorobenzenamine	<0.24 R	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
4-Chlorophenyl phenyl ether	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
4-Nitrobenzenamine	<0.31 UJ	<0.375 U	<0.57 U	<3 U	<1.1 U	<1.2 U	<0.95 U	<0.59 U	<0.69 U
4-Nitrophenol	<0.52 U	<0.615 U	<0.95 U	<4.9 U	<1.9 U	<2 U	<1.6 U	<0.97 U	<1.1 U
Acenaphthene	<0.01 U	<0.0125 U	<0.019 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Acenaphthylene	<0.01 U	<0.0125 U	<0.019 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Acetophenone	<0.16 U	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U
Anthracene	<0.01 U	<0.0125 U	0.012 J	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Atrazine	<0.31 U	<0.375 U	<0.57 U	<3 U	<1.1 U	<1.2 U	<0.95 U	<0.59 U	<0.69 U
Benz(*a*)anthracene	<0.01 U	0.028	0.061	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Benzaldehyde	<0.16 U	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U
Benzo(*a*)pyrene	<0.01 U	0.043	0.084	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	0.012 J
Benzo(*b*)fluoranthene	<0.01 U	0.037	0.09	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	0.015 J
Benzo(*g,h,i*)perylene	<0.01 U	0.0325	0.055	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Benzo(*k*)fluoranthene	<0.01 U	0.0125	0.034	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Bis(2-chloroethoxy)methane	<0.16 U	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U

Table C-17. Results for SVOCs in Sediment Samples at ECCL Ponds (East and West) – Continued

Area	Pond East	Pond East	Pond East	Pond West A	Pond West A	Pond West A	Pond West A	Pond West B	Pond West B
Station	**ECCL-SDSW-010**	**ECCL-SDSW-011**	**ECCL-SDSW-012**	**ECCL-SDSW-015**	**ECCL-SDSW-016**	**ECCL-SDSW-017**	**ECCL-SDSW-018**	**ECCL-SDSW-013**	**ECCL-SDSW-014**
Sample ID	**ECCLSD010**	**ECCLSD011/ECCLSD9001**	**ECCLSD012**	**ECCLSD015**	**ECCLSD016**	**ECCLSD017**	**ECCLSD018**	**ECCLSD013**	**ECCLSD014**
Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
Depth (ft)	**0.0–0.0**	**0.0–0.0**	**0.0–0.0**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**	**0.0–0.5**
Date	**06/08/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/08/16**	**06/08/16**
Bis(2-chloroethyl) ether	<0.16 U	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U
Bis(2-chloroisopropyl) ether	<0.16 U	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U
Bis(2-ethylhexyl)phthalate	<0.11 U	<0.135 U	<0.2 U	<1 U	0.12 J	<0.42 U	<0.33 U	<0.21 U	<0.24 U
Butyl benzyl phthalate	<0.11 U	<0.135 U	<0.2 U	<1 U	<0.4 U	<0.42 U	<0.33 U	<0.21 U	<0.24 U
Caprolactam	<0.52 U	<0.615 U	<0.95 U	<4.9 U	<1.9 U	0.31 J	<1.6 U	<0.97 U	<1.1 U
Carbazole	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
Chrysene	0.031	0.056	0.098	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	0.012 J
Di-*n*-butyl phthalate	<0.11 U	<0.135 U	<0.2 U	<1 U	0.1 J	<0.42 U	<0.33 U	<0.21 U	<0.24 U
Di-*n*-octylphthalate	<0.11 U	<0.135 U	<0.2 U	<1 U	<0.4 U	<0.42 U	<0.33 U	<0.21 U	<0.24 U
Dibenz(*a,h*)anthracene	<0.01 U	<0.0125 U	<0.019 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Dibenzofuran	<0.079 U	<0.0935 U	0.019 J	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
Diethyl phthalate	<0.11 U	<0.135 U	<0.2 U	<1 U	<0.4 U	<0.42 U	<0.33 U	<0.21 U	<0.24 U
Dimethyl phthalate	<0.11 U	<0.135 U	<0.2 U	<1 U	<0.4 U	<0.42 U	<0.33 U	<0.21 U	<0.24 U
Fluoranthene	0.011	0.0245	0.12	<0.098 U	<0.038 U	0.03 J	0.027 J	0.012 J	0.024
Fluorene	<0.01 U	<0.0125 U	<0.019 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Hexachlorobenzene	<0.01 U	<0.0125 U	<0.019 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Hexachlorobutadiene	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
Hexachlorocyclopentadiene	<0.52 R	<0.615 U	<0.95 U	<4.9 U	<1.9 U	<2 U	<1.6 U	<0.97 U	<1.1 U
Hexachloroethane	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
Indeno(1,2,3-*cd*)pyrene	<0.01 U	0.0165	0.04	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Isophorone	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
N-Nitroso-di-*n*-propylamine	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
N-Nitrosodiphenylamine	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
Naphthalene	0.087	0.037	0.12	<0.098 U	<0.038 U	<0.04 U	<0.032 U	<0.02 U	<0.023 U
Nitrobenzene	<0.16 U	<0.185 U	<0.29 U	<1.5 U	<0.57 U	<0.6 U	<0.47 U	<0.29 U	<0.35 U
Pentachlorophenol	<0.24 U	<0.28 U	<0.43 U	<2.2 U	<0.86 U	<0.91 U	<0.71 U	<0.44 U	<0.52 U
Phenanthrene	0.16 J	0.039	0.15	<0.098 U	<0.038 U	<0.04 U	0.016 J	<0.02 U	<0.023 U
Phenol	<0.079 U	<0.0935 U	<0.14 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U	<0.15 U	<0.17 U
Pyrene	0.062	0.0375	0.12	<0.098 U	<0.038 U	0.024 J	0.027 J	<0.02 U	0.016 J
m+p Methylphenol	<0.63 U	<0.745 U	<1.1 U	<5.9 U	<2.3 U	<2.4 U	<1.9 U	<1.2 U	<1.4 U

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-18. Results for Metals in Surface Water Samples at ECCL Ponds (East and West)

Area	Pond East	Pond East	Pond East	Pond West A	Pond West A	Pond West A
Station	ECCL-SDSW-010	ECCL-SDSW-011	ECCL-SDSW-012	ECCL-SDSW-015	ECCL-SDSW-016	ECCL-SDSW-017
Sample ID	ECCLSW010	ECCLSW011	ECCLSW012/ECCLSW9001	ECCLSW015	ECCLSW016	ECCLSW017
Sample Type	GR	GR	GR	GR	GR	GR
Date	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16
Analyte (µg/L)						
Metals						
Antimony	<2 U	0.24 J	<2 U	0.52 J	0.35 J	0.32 J
Arsenic	0.88 J	1 J	0.89 J	0.9 J	0.66 J	0.7 J
Copper	4	4.2	4.2	<18 U	<19 U	24
Iron	320	310	310	340	270	270
Lead	2.4	2.6	2.45	19	20	27
Tin	<10 U	<10 U	<10 U	2.3 J	<10 U	<10 U
Zinc	67	65	65.5	44	53	55

Table C-18. Results for Metals in Surface Water Samples at ECCL Ponds (East and West) – Continued

Area	Pond West A	Pond West B	Pond West B
Station	ECCL-SDSW-018	ECCL-SDSW-013	ECCL-SDSW-014
Sample ID	ECCLSW018	ECCLSW013	ECCLSW014
Sample Type	GR	GR	GR
Date	06/08/16	06/08/16	06/08/16
Analyte (µg/L)			
Metals			
Antimony	0.26 J	<2 U	<2 U
Arsenic	0.62 J	0.87 J	0.81 J
Copper	22	3.9	4.4
Iron	250	840	870
Lead	25	27	28
Tin	<10 U	<10 U	<10 U
Zinc	49	63	64

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
µg/L = micrograms per liter.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

Table C-19. Results for SVOCs in Surface Water Samples at ECCL Ponds (East and West)

Area	Pond East	Pond East	Pond East	Pond West A	Pond West A	Pond West A	Pond West A	Pond West B	Pond West B
Station	ECCL-SDSW-010	ECCL-SDSW-011	ECCL-SDSW-012	ECCL-SDSW-015	ECCL-SDSW-016	ECCL-SDSW-017	ECCL-SDSW-018	ECCL-SDSW-013	ECCL-SDSW-014
Sample ID	ECCLSW010	ECCLSW011	ECCLSW012/ECCLSW9001	ECCLSW015	ECCLSW016	ECCLSW017	ECCLSW018	ECCLSW013	ECCLSW014
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR
Date	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16
Analyte (µg/L)									
Organics-Semivolatile									
1,1'-Biphenyl	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
1,2,4,5-Tetrachlorobenzene	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
2,3,4,6-Tetrachlorophenol	<10 U	<10 U	<10 U	<9.8 U	<9.9 U	<10 U	<10 U	<10 U	<11 U
2,4,5-Trichlorophenol	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
2,4,6-Trichlorophenol	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
2,4-Dichlorophenol	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
2,4-Dimethylphenol	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
2,4-Dinitrophenol	<5.1 UJ	<5 UJ	<5.1 UJ	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
2,4-Dinitrotoluene	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
2,6-Dinitrotoluene	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
2-Chloronaphthalene	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
2-Chlorophenol	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
2-Methyl-4,6-dinitrophenol	<5.1 UJ	<5 UJ	<5.1 UJ	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
2-Methylnaphthalene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
2-Methylphenol	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
2-Nitrobenzenamine	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
2-Nitrophenol	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
3,3'-Dichlorobenzidine	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
3-Nitrobenzenamine	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
4-Bromophenyl phenyl ether	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
4-Chloro-3-methylphenol	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
4-Chlorobenzenamine	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
4-Chlorophenyl phenyl ether	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
4-Nitrobenzenamine	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
4-Nitrophenol	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 UJ	<5 UJ	<5.1 UJ	<5.6 UJ
Acenaphthene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Acenaphthylene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Acetophenone	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Anthracene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Atrazine	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Benz(*a*)anthracene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Benzaldehyde	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Benzo(*a*)pyrene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Benzo(*b*)fluoranthene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Benzo(*g,h,i*)perylene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Benzo(k)fluoranthene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Bis(2-chloroethoxy)methane	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U

Table C-19. Results for SVOCs in Surface Water Samples at ECCL Ponds (East and West) – Continued

Area	Pond East	Pond East	Pond East	Pond West A	Pond West A	Pond West A	Pond West A	Pond West B	Pond West B
Station	ECCL-SDSW-010	ECCL-SDSW-011	ECCL-SDSW-012	ECCL-SDSW-015	ECCL-SDSW-016	ECCL-SDSW-017	ECCL-SDSW-018	ECCL-SDSW-013	ECCL-SDSW-014
Sample ID	ECCLSW010	ECCLSW011	ECCLSW012/ECCLSW9001	ECCLSW015	ECCLSW016	ECCLSW017	ECCLSW018	ECCLSW013	ECCLSW014
Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR
Date	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16	06/08/16
Bis(2-chloroethyl) ether	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Bis(2-chloroisopropyl) ether	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Bis(2-ethylhexyl)phthalate	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
Butyl benzyl phthalate	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
Caprolactam	<5.1 U	<5 R	<5.1 U	0.32 J	<5 U	<5 U	0.37 J	0.33 J	<5.6 U
Carbazole	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Chrysene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Di-n-butyl phthalate	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
Di-n-octylphthalate	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
Dibenz(*a,h*)anthracene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Dibenzofuran	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Diethyl phthalate	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
Dimethyl phthalate	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U
Fluoranthene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Fluorene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Hexachlorobenzene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Hexachlorobutadiene	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Hexachlorocyclopentadiene	<10 UJ	<10 UJ	<10 UJ	<9.8 U	<9.9 U	<10 U	<10 U	<10 U	<11 U
Hexachloroethane	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Indeno(1,2,3-*cd*)pyrene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Isophorone	<1 U	<1 U	<1 U	0.35 J	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
N-Nitroso-di-*n*-propylamine	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
N-Nitrosodiphenylamine	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Naphthalene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Nitrobenzene	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Pentachlorophenol	<5.1 U	<5 U	<5.1 U	<4.9 U	<5 U	<5 U	<5 U	<5.1 U	<5.6 U
Phenanthrene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
Phenol	<1 U	<1 U	<1 U	<0.98 U	<0.99 U	<1 U	<1 U	<1 U	<1.1 U
Pyrene	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.22 U
m+p Methylphenol	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2 U	<2.2 U

ECCL = Erie County Conservation League.
GR = grab.
ID = identifier.
mg/kg = milligrams per kilogram.

Data Qualifiers:
J = Estimated concentration because the result was below the reporting limit or quality control criteria were not met.
R = The sample result was rejected due to serious deficiencies in the ability to meet one or more quality control criteria. The presence or absence of the analyte could not be verified.
U = Analyte was analyzed for but not detected but was not detected below the associated detection limit concentration.
UJ = The analyte was not detected at or above the reported concentration. However, the reported concentration is approximate and may or may not represent the actual limit necessary to accurately and precisely measure the analyte in the sample.

ECCL FIRING RANGE 2016
LABORATORY DATA PACKAGES

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2016 Laboratory Data Packages

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ECCL FIRING RANGE 2019
LABORATORY DATA PACKAGES

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2019 Laboratory Data Packages

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Appendix D

Data Quality Assessment

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DATA QUALITY ASSESSMENT FOR JULY-AUGUST 2019 DATA

1.0 DATA VALIDATION

Analytical data for soil, sediment, and groundwater samples collected in July–August 2019 were validated (Table D-1) following receipt to ensure that the precision and accuracy of the data were adequate for their intended use. Data presentation tables and analytical data packages are provided in **Appendix C**. The protocols used for validation include a systematic review of the data for compliance with established quality control (QC) criteria based on the following categories:

- Holding times;
- Blanks;
- Laboratory control samples;
- Surrogate recovery (organic methods);
- Internal standards (primarily organic methods);
- Matrix spike/matrix spike duplicates (MS/MSDs);
- Calibration;
- Serial Dilutions/Post-Digestion Spikes (inorganic methods)
- Sample re-analysis;
- Secondary dilutions; and
- Laboratory case narrative.

1.1 ANALYTICAL DETECTION LIMITS AND ESTIMATED DATA

Within this report, detected concentrations below the level of quantitation (LOQ) are shown with a "J" flag. The LOQ is the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias. Measurements between the method detection limit (MDL) and the LOQ ensure the presence of the analyte with confidence, but their numeric values are estimates. Note that the analytical reports from the laboratory (TestAmerica) provided in **Appendix C** refer to the LOQ as the reporting limit. Non-detects reported by the laboratory are reported at the LOQ, followed by a "U" flag.

The MDL is the smallest concentration of a substance that can be demonstrated to be different from zero or a blank concentration at a 99 percent confidence level. Although a result at or above the MDL indicates that the analyte is present, the absence of a result at or above the MDL is inconclusive (i.e., one cannot confidently state whether the analyte is present or absent) because the false negative rate at the MDL is 50 percent.

1.2 DATA VALIDATION QUALIFIERS AND DATA USABILITY

Consistent with the data quality requirements presented in the Quality Assurance Project Plan (QAPP) (Leidos 2019), all project data and associated QC were evaluated and qualified per the outcome of the review. As a result of the data evaluation and validation, individual sample results were qualified, as necessary, to designate usability of the data toward meeting project objectives. The primary qualifiers used are defined as follows:

U = The analyte was analyzed for but was not detected above the level of the associated value.

J = Estimated concentration because the result was below the sample quantitation limit or QC criteria were not met.

UJ = The analyte was analyzed for but not detected above the associated value; however, the reported value is an estimate and indicates uncertainty regarding accuracy or precision.

R = The sample result was rejected due to serious deficiencies in the ability to meet QC criteria. The presence or absence of the analyte could not be verified.

Data qualification was based on deviations from the cited methods, the criteria specified in the QAPP (Leidos 2019), and using applicable United States Environmental Protection Agency (USEPA) guidance; data were qualified as estimated values or rejected based on the degree and impact of the non-conformance. This data quality assessment resulted in data that are considered: (1) usable as a quantitative concentration (no qualifiers); (2) usable with caution as an estimated concentration (J, UJ); or (3) unusable due to non-compliant QC results (R).

***Volatile Organic Compounds (VOCs)*:** Internal standard area counts were below 25 percent of the mid-point criteria for two soil samples and resulted in 13 VOC results qualified as unusable (R). There were 54 soil results qualified as estimated (UJ, J) due to internal standard area counts below the lower control limits. One soil result was qualified as estimated (J) due to MS/MSD recovery above upper control limits. There were 244 discrete VOC results generated, of which 13 results were qualified unusable (5.3 percent) and 55 discrete data points were qualified as estimated, resulting in 94.7 percent of the VOC data deemed usable.

***Semivolatile Organic Compounds (SVOCs)*:** One SVOC result evaluated as part of the soil MS/MSD analyses had spiked recovery less than 10 percent and was therefore qualified as unusable (R). Five soil results were qualified as estimated (J) due to MS/MSD percent recoveries below control limits. One soil result was qualified as estimated (J) due to MS/MSD relative percent difference (RPD) results above control limits. Thirteen results were qualified as estimated (UJ) due to calibration discrepancies. There were 480 discrete SVOC results generated, of which one result was qualified unusable (0.2 percent) and an additional 17 discrete data points were qualified as estimated, with 99.8 percent of the SVOC data deemed usable.

***Polynuclear Aromatic Hydrocarbons (PAHs)*:** Data for PAHs were qualified as estimated (J) based MS/MSD percent recovery and RPD results exceeding control limits. Three soil results were qualified as estimated (J) due to MS/MSD percent recoveries below control limits and RPD results above control limits. There were 1,664 discrete PAH results generated, of which three discrete data points were qualified as estimated, with 100 percent of the PAH data deemed usable.

***Inorganics*:** Data for metals results were qualified based on MS/MSD results, internal standard, post-digestion spike, or serial dilution results. One metals result had a post-digestion spiked recovery less than 10 percent and was therefore qualified as unusable (R). Three results were qualified as estimated (J) due to post-digestion spike discrepancies (>10 percent but below control limits). Five results were qualified as estimated (J) due to serial dilution discrepancies. Fifteen results were qualified as estimated (J, UJ) due to MS/MSD percent recoveries above or below control limits. Four results were qualified as estimated (J) due to MS/MSD RPD discrepancies. There were 412 discrete metals results generated, of which one result was qualified unusable (0.2 percent) and an additional 19 discrete data points were qualified as estimated, with 99.8 percent of the metals data deemed usable.

1.3 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. Sufficient data were obtained to meet project objectives. There were 2,800 discrete results generated with 99.5 percent of the data deemed usable.

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that depends upon the proper design of the sampling program and proper laboratory protocol. Representativeness for this project was determined by assessing the combined aspects of the quality assurance program, QC measures, and data evaluations. Representativeness was achieved by following the sampling approach.

Comparability expresses the confidence that one data set can be compared against another. The extent to which existing and planned analytical data shall be comparable depends upon the similarity of sampling and analytical methods. The procedures used to obtain the analytical data for this project were expected to provide comparable data.

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Table D-1. DQA for ECCL Firing Range

Station	Sample ID	Media	Analysis	Chemical	Results	Units	Data Qual	Validation Code
ECCL-SD-029	ECCLSD0031	Sediment	Inorganics	Lead	470	mg/kg	J	H01,H04,E03
ECCL-SL-169	ECCLSL0169	Soil	Inorganics	Antimony	13	mg/kg	R	E03,H02
ECCL-SL-169	ECCLSL0169	Soil	Inorganics	Calcium	12000	mg/kg	J	E03,H02
ECCL-SL-169	ECCLSL0169	Soil	Inorganics	Manganese	360	mg/kg	J	E03,H02
ECCL-SL-169	ECCLSL0169	Soil	Inorganics	Zinc	190	mg/kg	J	H02
ECCL-SL-181	ECCLSL0186	Soil	Inorganics	Antimony	2.1	mg/kg	UJ	H02
ECCL-SL-181	ECCLSL0186	Soil	Inorganics	Arsenic	8	mg/kg	J	H02
ECCL-SL-181	ECCLSL0186	Soil	Inorganics	Lead	97	mg/kg	J	H01,H04,E07
ECCL-SL-188	ECCLSL0195	Soil	Inorganics	Lead	250	mg/kg	J	E07,H01,H04,
ECCL-SL-213	ECCLSL0230	Soil	Inorganics	Antimony	2.4	mg/kg	UJ	H02
ECCL-SL-213	ECCLSL0230	Soil	Inorganics	Lead	53	mg/kg	J	H02,E07
ECCL-SL-226	ECCLSL0256	Soil	Inorganics	Antimony	2.2	mg/kg	UJ	H02
ECCL-SL-226	ECCLSL0256	Soil	Inorganics	Arsenic	19	mg/kg	J	K01
ECCL-SL-226	ECCLSL0256	Soil	Inorganics	Copper	51	mg/kg	J	K01
ECCL-SL-226	ECCLSL0256	Soil	Inorganics	Iron	24000	mg/kg	J	K01
ECCL-SL-226	ECCLSL0256	Soil	Inorganics	Lead	30	mg/kg	J	K01
ECCL-SL-226	ECCLSL0256	Soil	Inorganics	Zinc	69	mg/kg	J	H01
ECCL-SL-234	ECCLSL0265	Soil	Inorganics	Antimony	2.4	mg/kg	UJ	H02
ECCL-SL-234	ECCLSL0265	Soil	Inorganics	Lead	45	mg/kg	J	E07
ECCL-SL-229	ECCLSL9028	Soil	Inorganics	Lead	180	mg/kg	J	H01,H04,E07
ECCL-SD-020	ECCLSD0021	Sediment	Polynuclear Aromatic Hy	Benzo(b)fluoranthene	4.8	mg/kg	J	H02,H04
ECCL-SD-020	ECCLSD0021	Sediment	Polynuclear Aromatic Hy	Benzo(ghi)perylene	5.3	mg/kg	J	H02,H04
ECCL-SD-020	ECCLSD0021	Sediment	Polynuclear Aromatic Hy	Pyrene	4	mg/kg	J	H02,H04
ECCL-QAQC	ECCLEB0002	Quality Control	Semi-Volatile Organics	Pentachlorophenol	9.5	µg/L	UJ	C05
ECCL-QAQC	ECCLFB0001	Quality Control	Semi-Volatile Organics	4-Nitrophenol	11	µg/L	UJ	C05
ECCL-QAQC	ECCLFB0001	Quality Control	Semi-Volatile Organics	Hexachlorocyclopentadiene	11	µg/L	UJ	C05
ECCL-SL-169	ECCLSL0169	Soil	Semi-Volatile Organics	Benz(a)anthracene	1.4	mg/kg	J	H02
ECCL-SL-169	ECCLSL0169	Soil	Semi-Volatile Organics	Benzo(b)fluoranthene	2.2	mg/kg	J	H02
ECCL-SL-169	ECCLSL0169	Soil	Semi-Volatile Organics	Fluoranthene	3.6	mg/kg	J	H02
ECCL-SL-169	ECCLSL0169	Soil	Semi-Volatile Organics	Hexachlorocyclopentadiene	0.9	mg/kg	R	H03,C05
ECCL-SL-169	ECCLSL0169	Soil	Semi-Volatile Organics	Pentachlorophenol	0.41	mg/kg	UJ	C05
ECCL-SL-169	ECCLSL0169	Soil	Semi-Volatile Organics	Phenanthrene	1.9	mg/kg	J	H02,H04
ECCL-SL-169	ECCLSL0169	Soil	Semi-Volatile Organics	Pyrene	2.5	mg/kg	J	H02

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Table D-1. DQA for ECCL Firing Range (Continued)

Station	Sample ID	Media	Analysis	Chemical	Results	Units	Data Qual	Validation Code
ECCL-SL-170	ECCLSL0170	Soil	Semi-Volatile Organics	Hexachlorocyclopentadiene	0.34	mg/kg	UJ	C05
ECCL-SL-170	ECCLSL0170	Soil	Semi-Volatile Organics	Pentachlorophenol	0.16	mg/kg	UJ	C05
ECCL-SL-171	ECCLSL0171	Soil	Semi-Volatile Organics	Hexachlorocyclopentadiene	0.39	mg/kg	UJ	C05
ECCL-SL-171	ECCLSL0171	Soil	Semi-Volatile Organics	Pentachlorophenol	0.18	mg/kg	UJ	C05
ECCL-SL-172	ECCLSL0172	Soil	Semi-Volatile Organics	Hexachlorocyclopentadiene	0.39	mg/kg	UJ	C05
ECCL-SL-172	ECCLSL0172	Soil	Semi-Volatile Organics	Pentachlorophenol	0.18	mg/kg	UJ	C05
ECCL-SL-169	ECCLSL9018	Soil	Semi-Volatile Organics	Hexachlorocyclopentadiene	1.9	mg/kg	UJ	C05
ECCL-SL-169	ECCLSL9018	Soil	Semi-Volatile Organics	Pentachlorophenol	0.86	mg/kg	UJ	C05
ECCL-SL-169	ECCLSL0169R	Soil	Volatile Organics	Acetone	150	µg/kg	J	H01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,1,1-Trichloroethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,1,2,2-Tetrachloroethane	5.1	µg/kg	R	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,1,2-Trichloro-1,2,2-trifluorc	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,1,2-Trichloroethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,1-Dichloroethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,1-Dichloroethene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,2,4-Trichlorobenzene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,2-Dibromo-3-chloropropan	10	µg/kg	R	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,2-Dichlorobenzene	5.1	µg/kg	R	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,2-Dichloroethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,2-Dichloropropane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,3-Dichlorobenzene	5.1	µg/kg	R	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	1,4-Dichlorobenzene	5.1	µg/kg	R	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	2-Butanone	21	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	2-Hexanone	21	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	4-Methyl-2-pentanone	21	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Acetone	200	µg/kg	J	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Benzene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Bromodichloromethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Bromoform	5.1	µg/kg	R	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Bromomethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Carbon disulfide	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Carbon tetrachloride	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Chlorobenzene	5.1	µg/kg	UJ	K01

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Table D-1. DQA for ECCL Firing Range (Continued)

Station	Sample ID	Media	Analysis	Chemical	Results	Units	Data Qual	Validation Code
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Chloroethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Chloroform	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Chloromethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	cis-1,2-Dichloroethene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	cis-1,3-Dichloropropene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Cyclohexane	10	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Dibromochloromethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Dichlorodifluoromethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Ethylbenzene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Ethylene Dibromide	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Isopropylbenzene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Methyl acetate	26	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Methyl tert-butyl ether	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Methylcyclohexane	12	µg/kg	J	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Methylene chloride	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Styrene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Tetrachloroethene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Toluene	11	µg/kg	J	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	trans-1,2-Dichloroethene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	trans-1,3-Dichloropropene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Trichloroethene	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Trichlorofluoromethane	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Vinyl chloride	5.1	µg/kg	UJ	K01
ECCL-SL-170	ECCLSL0170R	Soil	Volatile Organics	Xylene, Total	10	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	1,1,2,2-Tetrachloroethane	6.2	µg/kg	R	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	1,1,2-Trichloroethane	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	1,2,4-Trichlorobenzene	6.2	µg/kg	R	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	1,2-Dibromo-3-chloropropan	12	µg/kg	R	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	1,2-Dichlorobenzene	6.2	µg/kg	R	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	1,3-Dichlorobenzene	6.2	µg/kg	R	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	1,4-Dichlorobenzene	6.2	µg/kg	R	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	2-Hexanone	25	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Bromoform	6.2	µg/kg	R	K01

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Table D-1. DQA for ECCL Firing Range (Continued)

Station	Sample ID	Media	Analysis	Chemical	Results	Units	Data Qual	Validation Code
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Chlorobenzene	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Dibromochloromethane	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Ethylbenzene	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Ethylene Dibromide	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Isopropylbenzene	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Styrene	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Tetrachloroethene	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Toluene	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	trans-1,3-Dichloropropene	6.2	µg/kg	UJ	K01
ECCL-SL-169	ECCLSL9018R	Soil	Volatile Organics	Xylene, Total	12	µg/kg	UJ	K01

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Appendix E

ACM Survey Report

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August 29, 2019

Rich Sprinzl
Leidos
8866 Commons Blvd., Suite 201
Twinsburg, Ohio 44087

RE: Potential ACM Survey Support
Environmental Assessment at the ECCL Firing Range
NASA Plum Brook Station
Sandusky, Ohio
Emerald Project No. 2246

Emerald Environmental, Inc. (EEI) was contracted to determine the presence or absence of surface asbestos containing materials (ACM) and ACM-impacted surface soils present at the ECCL Firing Range.

On July 30, 2019, Mr. William Mello CAHES #35450 met with Mr. Ryan Laurich with Leidos. Prior to commencing any work on the Site, a pre-entry briefing was conducted by Mr. Laurich. Once the pre-entry briefing was completed, Mr. Laurich directed Mr. Mello to the "Trap Field." The Trap Field was heavily vegetated. Several locations were identified which contained building material such as burnt wood, debris and roofing shingles. The roofing shingles are considered potential ACM and two samples of the roofing shingles were collected by EEI. Because the roofing shingles were damaged by fire, they are considered to be a friable material. The building debris was sampled in accordance with the Leidos Statement of Work titled, *Potential Asbestos Containing Material Survey/Sampling Support for NASA ECCL Firing Range Environmental Investigation.* The building debris was sampled using a decontaminated hand auger. Debris and soil from the surface to approximately 0.5 feet below the surface were collected from four separate locations. Each sample location was marked with a pin flag. Sample locations are identified on Figure 1. Photographs of the area are provided in Appendix C. The sampled material was then placed into a decontaminated container and thoroughly mixed. A composite sample was collected of this material for analysis. All of the samples collected for asbestos analysis were placed into zip-loc plastic bags and relinquished to Leidos. The samples were analyzed for asbestos content using EPA Method 600/R-93/116 using polarized light microscopy. Sample information is provided in the table below. Laboratory data is provided in Appendix B.

Table 1 – Asbestos Sample Data

Sample ID	Sample Time	Depth/Material	Location ID	Sample Result
ECCLSL0290	0900	0-0.5 feet	ECCL-SL-259	Non-Detect
ECCLDD0001	0850	Roofing shingle	ECCL-DD-001	Non-Detect
ECCLDD0002	0852	Roofing shingle	ECCL-DD-002	Non-Detect

The "East Pistol Range" was the next area to be surveyed. The East Pistol Range is located in a wooded area. Metal support columns and plywood were the only materials observed. No potential ACM was observed in the East Pistol Range area. No samples were collected from the East Pistol Range.

The access road to the "Pistol and Rifle Ranges" was the final area to be surveyed. The only material observed in this area were large pieces of concrete. No potential ACM was observed near the access road to the Pistol and Rifle Ranges. No samples were collected from the access road to the Pistol and Rifle Ranges.

Please contact the undersigned if you require any additional information. Thank you for consulting Emerald Environmental, Inc.

Sincerely,

EMERALD ENVIRONMENTAL, INC.

William Mello, CAHES #ES35450

Attachments

Appendix A

Figure 1 – Soil Sample Locations

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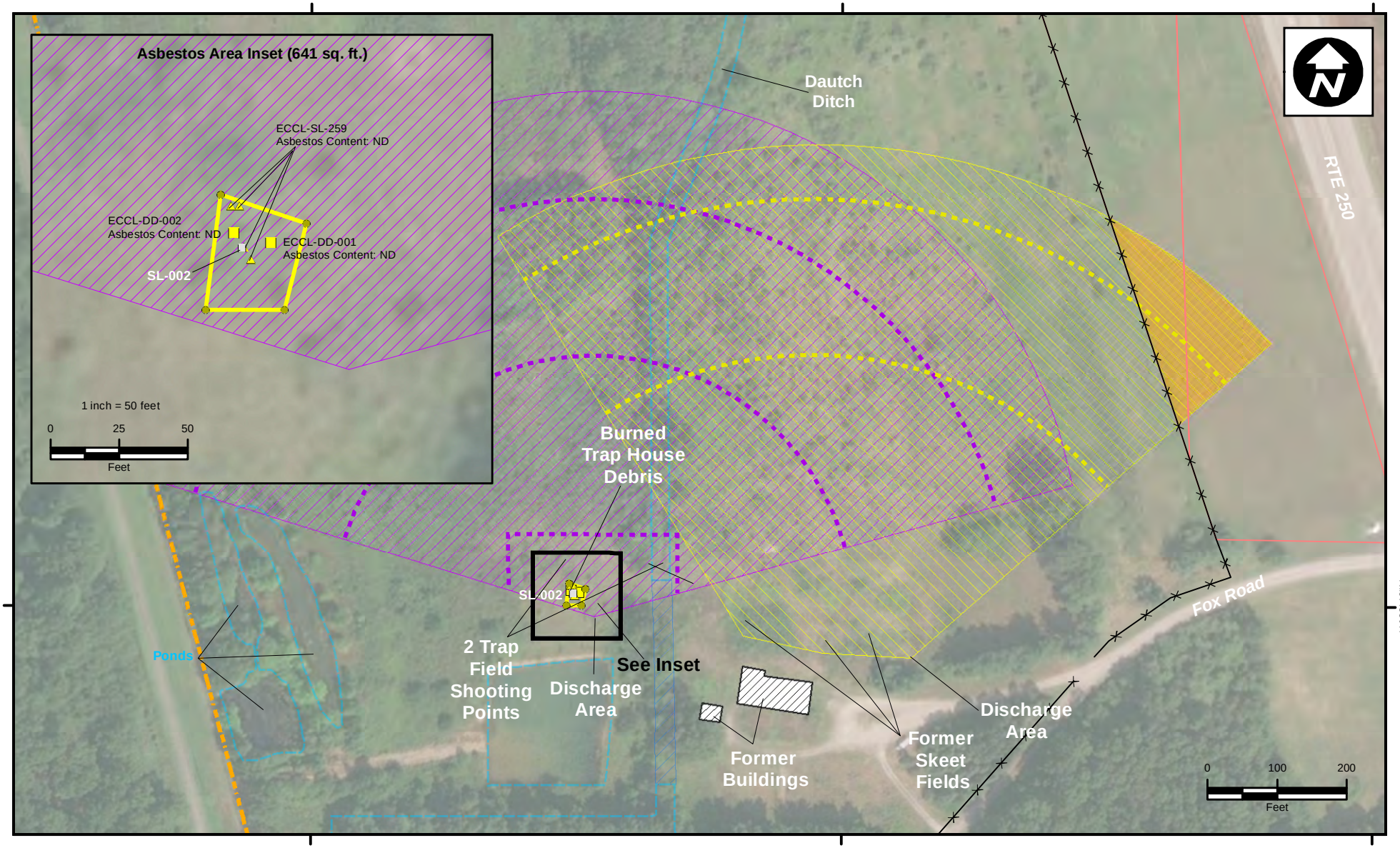
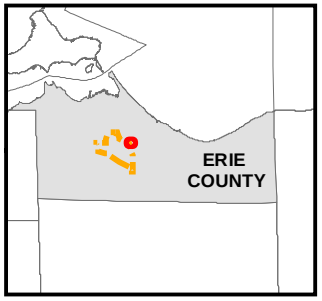
Document Path: F:\NASA\NASA_Plum_Brook\Projects\GPS\ECCL Trap & Skeet Asbestos Samples.mxd





Legend

- Bulk Asbestos
- Corner
- Asbestos Sample (Shingles)
- Soil Sample Location
- Fence
- Skeet Fallout Zone
- Trap Fallout Zone
- Asbestos
- Trap Range Soil
- Skeet Range Soil
- Sediment/Surface Water
- Drainage Ditch (Culverted)
- Demolished Buildings
- NASA PBS Boundary
- Area Excluded from Investigation
- Parcel Boundary (New Car Dealership Construction)

NASA GLENN RESEARCH CENTER
PLUM BROOK STATION
SANDUSKY, OHIO

ECCL FIRING RANGE
TRAP & SKEET RANGE
ASBESTOS DEBRIS &
SOIL SAMPLE LOCATIONS

FIGURE
1

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Appendix B

Laboratory Sample Results - Asbestos

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Report for:

Opal Johnson
TestAmerica-Canton
4101 Shuffel St. NW
North Canton, OH 44720

Regarding: Project: NASA ECCL
EML ID: 2221073

Approved by:

Approved Signatory
Amin Suliman

Dates of Analysis:
Asbestos PLM: 08-08-2019

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the samples as received. The results include an inherent uncertainty of measurement associated with estimating percentages by polarized light microscopy. Measurement uncertainty data for sample results with >1% asbestos concentration can be provided when requested.

EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

EMLab P&K
6000 Shoreline Ct, Ste 205, So. San Francisco, CA 94080
(866) 888-6653 Fax (623) 780-7695 www.emlab.com

Client: TestAmerica-Canton
C/O: Opal Johnson
Re: NASA ECCL

Date of Sampling: 07-30-2019
Date of Receipt: 08-05-2019
Date of Report: 08-08-2019

ASBESTOS PLM REPORT

Total Samples Submitted:	3
Total Samples Analyzed:	3
Total Samples with Layer Asbestos Content > 1%:	0

Location: ECCLD0001 (240-116721-1)

Lab ID-Version‡: 10557770-1

Sample Layers	Asbestos Content
Black Roofing Shingle	ND
Black Roofing Tar and Felt	ND
Composite Non-Asbestos Content:	35% Cellulose
Sample Composite Homogeneity:	Poor

Location: ECCLD0002 (250-116721-2)

Lab ID-Version‡: 10557771-1

Sample Layers	Asbestos Content
Black Roofing Shingle	ND
Black Roofing Tar and Felt	ND
Composite Non-Asbestos Content:	35% Cellulose
Sample Composite Homogeneity:	Poor

Location: ECCLSL0290 (240-116721-3)

Lab ID-Version‡: 10557772-1

Sample Layers	Asbestos Content
Brown Soil	ND
Composite Non-Asbestos Content:	10% Cellulose
Sample Composite Homogeneity:	Poor

Comments: Due to the nature of a soil/rock sample, making proper slide mounts was not possible. It is recommended that the sample be analyzed using the CARB 435 method.

The test report shall not be reproduced except in full, without written approval of the laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by any agency of the federal government. EMLab P&K reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified.

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

leidos

7.8/C7.1

Chain of Custody Record

COC No.: NASA-ECCL-003

Page 1 of 1 Date: 7/30/2019

Name Leidos
Address: 8866 Commons Blvd. Twinsburg, OH 44087
Phone Number: 330 405-5814
Project Manager: Heather Adams
Project Name: NASA ECCL Firing Range (Asbestos Survey)
Charge Number: 327923.02.1.109.00.00.00.00001
Sampler (Signature) (Printed Name) Emerald Environmental

Laboratory Name: Test America - North Canton
Address: 4101 Shuffel Street, NW
North Canton, OH 44720
Phone: (330) 966-9279
Contact: Opal Johnson

Requested Parameters

Laboratory No.	SELECT UP TO 12 Location ID	Sample ID	Type	Depth	Date	Time	Matrix	Asbestos (1)									Total Containers	OBSERVATIONS, COMMENTS SPECIAL INSTRUCTIONS
								S	S	S	S	S	S	S	S	S		
	ECCL-DD-001	ECCLDD0001	Debris	NA	7/30/2019	0850	S	1									1	Shingles <1%, run 400 point count
	ECCL-DD-002	ECCLDD0002	Debris	NA	7/30/2019	0852	S	1									1	Shingles <1%, run 400 point count
	ECCL-SL-259	ECCLSL0290	Soil	0-0.5	7/30/2019	0900	S	1									1	Composite <1%, run 400 point count

Relinquished by	Date	Received by	Date
Signature	7/31/19	Signature	7/31/19
Ryan Laurich	Time	RKK Robson	Time
Printed Name	1508	Printed Name	1528
Leidos			
Company		Company EURO-TA	
Relinquished by	Date	Received by	Date
Signature	7/31/19	Signature	8/1/19
RICK	Time	Terry Burns	Time
Printed Name	1718	Printed Name	0800
		ETAC	
Company		Company	

Notes:
A. Cool, 4C
B. HNO3, pH<2; Cool, 4C
C. HCL, pH<2; Cool, 4C
D. 2 DI-NaHSO4
1. USEPA 600/R-93/116

Shipment Me: Test America Courier

Temperature Blank
Temp upon receipt @ Lab: NA

Leidos
8866 Commons Blvd.
Twinsburg, OH 44087
330 405-5814

240-116721 Chain of Custody

Leidos

White: Laboratory Pink: Project Manager Yellow: Project QAO Goldenrod: Field Project Manager

Eurofins TestAmerica Canton Sample Receipt Form/Narrative
Canton Facility

Login # : 116721

Client Leidos Site Name

Cooler unpacked by: Terry Burns

Cooler Received on 8/1/19 Opened on 8/1/19

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other

Receipt After-hours: Drop-off Date/Time Storage Location

TestAmerica Cooler # TA Foam Box Client Cooler Box Other

Packing material used: Bubble Wrap Foam Plastic Bag None Other

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-8 (CF **+0.1** °C) Observed Cooler Temp. 7.0 °C Corrected Cooler Temp. 7.1 °C
   IR GUN #36 (CF **+0.6**°C) Observed Cooler Temp. ____ °C Corrected Cooler Temp. ____ °C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 2 Yes No
   - Were the seals on the outside of the cooler(s) signed & dated? Yes No NA
   - Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes No
   - Were tamper/custody seals intact and uncompromised? Yes No NA
3. Shippers' packing slip attached to the cooler(s)? Yes No
4. Did custody papers accompany the sample(s)? Yes No
5. Were the custody papers relinquished & signed in the appropriate place? Yes No
6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes No
7. Did all bottles arrive in good condition (Unbroken)? Yes No
8. Could all bottle labels be reconciled with the COC? Yes No
9. Were correct bottle(s) used for the test(s) indicated? Yes No
10. Sufficient quantity received to perform indicated analyses? Yes No
11. Are these work share samples? Yes No
    If yes, Questions 12-16 have been checked at the originating laboratory.
12. Were all preserved sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# **HC984738**
13. Were VOAs on the COC? Yes No
14. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes No NA
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #____ Yes No
16. Was a LL Hg or Me Hg trip blank present? ____ Yes No

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

Contacted PM ____ Date ____ by ____ via Verbal Voice Mail Other

Concerning ____

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: JK

18. SAMPLE CONDITION

Sample(s) ____ were received after the recommended holding time had expired.

Sample(s) ____ were received in a broken container.

Sample(s) ____ were received with bubble >6 mm in diameter. (Notify PM)

19. SAMPLE PRESERVATION

Sample(s) ____ were further preserved in the laboratory.

Time preserved: ____ Preservative(s) added/Lot number(s): ____

VOA Sample Preservation - Date/Time VOAs Frozen: ____

Appendix C

Photographs

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Debris identified in the Trap Field.

Roofing shingles.

Roofing shingles.

Roofing shingles.

Fire damaged debris.

Fire damaged debris.

Fire damaged roofing shingles.

Composite soil sample.

Debris at the East Pistol Range.

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Appendix F

NASA ECCL Stabilization Study Treatability Letter Report

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1359-A Ellsworth Industrial Boulevard • Atlanta, GA 30318 • TEL 404-636-0928 • FAX 404-636-7162

December 2, 2019

Mr. Rich Sprinzl, P.E.
LEIDOS, Inc.
Richard.E.Sprinzl@leidos.com
(330) 405-5808

Re: NASA ECCL STABILIZATION STUDY
Treatability Letter Report
KEMRON Project #SH0724

Dear Mr. Sprinzl:

KEMRON Environmental Services, Inc. (KEMRON) is pleased to present this letter report summarizing the results of testing performed for LEIDOS, Inc. (Leidos). The study was conducted on soil materials sampled from the NASA ECCL Site. The primary goal of this study was to identify treatment reagents and additives capable of reducing the leachability of lead in the untreated materials to below treatment criteria of 5.0 mg/L as determined by the Toxicity Characteristic Leaching Procedure (TCLP). The following sections of this report include information regarding the protocols followed during each phase of the study and the results of testing performed.

UNTREATED MATERIAL CHARACTERIZATION

In August of 2019, KEMRON received three distinct soil samples from the site, which were labeled “ECCLSL0301”, “ECCLSL0302”, and “ECCLSL0303”. Immediately following sample receipt, KEMRON logged the materials into a sample-tracking database and placed the materials in secure temperature storage maintained at 4°Celsius (°C). A copy of the chain of custody is included in **Attachment A**.

Prior to initiating the treatability study, KEMRON separately homogenized each site soil to ensure uniform materials for testing. Homogenization was performed by placing each untreated material into a pre-clean, plastic mixing pan and gently mixing with stainless steel utensils until visually homogenous. For treatability testing, KEMRON typically removes oversized particles and debris larger than 0.5 inches in diameter in order to simulate potential full-scale particle reduction and to ensure that the material is practical for bench-scale testing. Approximately 644.5 g of oversized particles and debris was removed from the ECCLSL0301 material, approximately 1,133 g was removed from the ECCLSL0302 material and approximately 2,522.5 g was removed from ECCLSL0303 material.

Once visually homogenous, KEMRON collected representative aliquots of the untreated materials for characterization testing. The establishment of the baseline characteristics of the untreated soil is important for ensuring that the materials are similar to those expected at the site and for evaluating the effectiveness of stabilization treatment. After homogenization, KEMRON performed the following physical properties testing on each of the untreated materials:

Parameter	**Method**
Material pH	EPA Method 9045C
Bulk Unit Weight (Density)	ASTM D7263
Moisture Content	ASTM D2216
Paint Filter	EPA Method 9095

The results of untreated characterization physical properties testing, conducted by KEMRON are summarized in **Table 1** attached to this report and summarized below. Copies of all bench top testing data sheets are included as **Attachment B**.

TABLE 1

TESTING	TEST	UNIT	SAMPLE		
			ECCLSL0301	ECCLSL0302	ECCLSL0303
Material pH	EPA Method 9045	S.U.	6.73	5.09	4.62
Bulk Unit Weight (Density)	ASTM D7263	lb/ft^3	110.3	103.5	118.2
Moisture Content	ASTM D2216				
ASTM Moisture Content		%	23.15	21.18	24.41
Percent Solids		%	81.20	82.53	80.40
Paint Filter	EPA Method 9095		PASS	PASS	PASS

A review of the physical properties testing results presented in **Table 1** indicates that the three site soils exhibited pH values which ranged from 4.62 to 6.73 standard units (s.u.). Specifically site soils ECCLSL0302 (302), and ECCLSL0303 (303) were slightly acidic in nature while ECCLSL0301 (301), had a more neutral pH. The bulk unit weights of the three materials varied from 103.5 pounds per cubic foot (pcf) to 118.2 pcf. Note that these density measurements were performed on re-compacted soils and may not represent true in-situ densities at the site. The moisture contents of the three soils were relatively similar ranging from 21.18 percent (%) to 24.41%, and all three untreated soils passed paint filter testing.

In addition to physical properties characterization, KEMRON submitted aliquots of each untreated site material to Eurofins Test America, in Chicago, Illinois, for analytical characterization testing. The site materials were analyzed for Total Lead by EPA Method 6010 and TCLP Lead by EPA Method 1311/6010.

The results of analytical testing conducted on the untreated site soils are presented in **Table 2** and is also summarized below. Complete analytical data reports are included in **Attachment C**.

TABLE 2

Parameters	Units	ECCLSL0301		ECCLSL0302		ECCLSL0303	
		Result	MDL	Result	MDL	Result	MDL
Total Lead 6010							
Lead	mg/Kg	**5,230**	0.269	**1,980**	0.280	**6,090**	0.274
TCLP Lead 1311/6010							
Lead	mg/L	**114**	0.0375	**14.7**	0.00750	**75.6**	0.00750
TCLP Final Leachate pH							
pH	S.U.	**5.01**		**5.16**		**4.96**	

The data presented in **Table 2** shows that site material 301 exhibited a total lead concentration of 5,230 milligrams per kilogram (mg/Kg) and a corresponding TCLP lead concentration of 114 milligrams per Liter (mg/L). Sample 302 had a much lower total and TCLP lead concentration at 1,980 mg/Kg and 14.7 mg/L respectively. The results of analyses performed on site soil 303 indicated a total lead concentration of 6,090 mg/Kg and a TCLP lead concentration of 75.6 mg/L.

The TCLP Final Leachate pH was requested and reported by KEMRON because lead leachability is highly related to pH. The TCLP leaching procedure utilizes two leaching fluids, Leaching Fluid (LF)#1, and LF#2. Both leaching fluids are comprised of organic acids, however, LF#2 is considered more aggressive than LF#1 because of its lower pH value. The selection of the leaching fluid to be utilized in the analytical procedure is made based on the results of a leaching fluid determination step in the EPA 1311 method. This step is performed by heating an aliquot of the soil in the presence of hydrochloric acid for a certain period. After the sample is cooled to room temperature the pH of the acid and soil solution is measured and based on the pH of that mixture either LF#1 or LF#2 is used for the actual leaching step.

Based on information from Test America all of the untreated site soils were evaluated using LF#1. The final leachate pH measurements were made on the leachate material following a tumbling period of approximately 18 hours of the site soil and the leaching fluid. The leaching fluid pH value can be an important tool for potentially estimating the effectiveness of lead leaching reduction treatments. As previously noted, the leachability of lead can be highly

associated with pH. According to the species of lead present lead can be highly amphoteric. The leachability of lead is often at its lowest at either very low pH values or at high pH values. The stabilization of lead when using pH adjustment applications typically targets treatments with resulting high final leachate pH values ranging from around 9 to 11.5 s.u. The results of the final leachate pH testing shown in **Table 2** indicates that all three materials exhibited pH values of approximately 5 s.u..

PRELIMINARY STABILIZATION EVALUATIONS

KEMRON performed preliminary stabilization treatments using three primary reagents including Free Flow 200® (FF-200), Calciment and EnviroBlend® CS. FF-200 is manufactured by Free Flow Technologies, Inc. and is a high pH powder that contains various metallic oxides and may also contain phosphate based material which can turn lead into the low leachable form of lead phosphate. Calciment® (Dolomitic) is manufactured by Mintek Resources, Inc. and is also a high pH powder which is primarily comprised of lime and Portland cement, and EnviroBlend® CS, manufactured by Premier Magnesia, LLC is a pH adjusting powder that KEMRON understands is primarily a metallic oxide based material which may also contain materials such as phosphates that can turn lead into a less leachable form.

A total of 12 treatment designs for each of the materials were prepared utilizing FF-200, Calciment® (Dolomitic) or EnviroBlend® CS. Each mixture design is outlined in **Table 3** and each mixture design sheet is included in **Attachment D**. The mixtures were prepared by adding the dry reagent to the untreated material on a by-weight basis. For example, in a mixture with 2 percent (%) addition of EnviroBlend® CS, two (2) grams of EnviroBlend® CS was added to every 100 grams of untreated soil utilized in the mixture.. The mixtures were then mixed by hand until visually homogenous. After the preparation of each mixture, the treated materials were immediately sampled for TCLP Lead analysis and Paint Filter testing. The TCLP lead samples were forwarded to Eurofins Test America, and Paint Filter testing was performed in KEMRON's Atlanta laboratory.

The results of the TCLP Lead analysis, performed on the treated materials, are summarized in **Table 3**. Completed data reports pertaining to these analyses are included as **Attachment E**. The results of the Paint Filter testing are also summarized in **Table 3** and the data sheet reports are included in **Attachment E**.

Review of results in **Table 3** indicate that all of the treated materials passed the Paint Filter testing. The results also indicate that treatment using a 7 and 9% addition rate of FF-200 reduced the leachability of lead below the TCLP Regulatory Limit in the ECCLSL0301 material. Treatment of the ECCLSL0302 material indicated that only the 9% FF-200 addition rate reduced

the leachability of lead below the TCLP regulatory limit of 5.0 mg/L, and only the 7% FF-200 treatment reduced the lead concentration in the TCLP leachate to below 5.0 mg/L in the ECCLSL0303 material. Analytical testing of the higher 9% addition rate of the FF-200 applied to the ECCLSL0303 soil, indicated that the lead concentration in the TCLP leachate increased to 16.3 mg/L.

Calciment® (Dolomitic) was effective in reducing the leachability of lead in the ECCLSL0301 soil to below the TCLP lead regulatory limit of 5.0 mg/L at all addition rates including 4, 6, 8 and 12%. However, the 4% addition rate was near the regulatory limit at 4.00 mg/L. Addition rates of Calciment® applied to the ECCLSL0302 site material which achieved TCLP lead concentrations below the 5.0 mg/L criteria included 4.0% and 6.0% while addition rates of of 4, 6, and 10% were effective in reducing the lead leachability to below the criteria in the ECCLSL0303 soil.

The results also indicate that EnviroBlend® CS was successful at reducing the leachability of lead below the TCLP Regulatory Limit, in the ECCLSL0301 and ECCLSL0302 materials using addition rates of 4, 6 and 8%. In the ECCLSL0303 material, addition rates of 2, 4, 6 and 8% reduced the leachability of lead below the TCLP regulatory limit.

Based on the results of the preliminary 36 mixtures, Leidos instructed KEMRON to prepare four mixtures utilizing the EnviroBlend® CS for each of the site materials. The mixture designs are outlined below and are also presented in **Table 3**:

Untreated Material	**Addition Rate**
ECCLSL0301	3% of EnviroBlend® CS
ECCLSL0302	3% of EnviroBlend® CS
ECCLSL0303	1% of EnviroBlend® CS
ECCLSL0303	3% of EnviroBlend® CS

The mixtures were prepared following the same protocol as mentioned for the preliminary 36 mixtures. After the mixtures were prepared, the treated materials were sampled for TCLP lead analysis and Paint Filter testing. The TCLP lead samples were forwarded to Eurofins Test America for TCLP lead analysis. The Paint Filter results are summarized in **Table 3** and data sheet reports are included in **Attachment E**. The results of the TCLP lead analysis are also summarized in **Table 3** and the complete analytical report is included in **Attachment E**.

The results of testing performed on the additional four mixtures, summarized in **Table 3**, indicate that all four treated materials passed the Paint Filter testing. The results also indicate an addition rate of 3% of EnviroBlend® CS was effective in reducing the leachability of lead

below the TCLP regulatory limit in all three site materials. An addition rate of 1% of the EnviroBlend® CS did not reduce the leachability of lead in the ECCLSL0303 material.

CONCLUSIONS

KEMRON performed testing for the NASA ECCL Stabilization study to evaluate potential mixture designs capable of reducing the leachability of lead in the untreated materials to below treatment criteria of 5.0 mg/L as determined by TCLP. The treatments utilized various addition rates of FF-200, Calciment® (Dolomitic) and EnviroBlend® CS.

Untreated material characterization testing indicated that the three site materials, ECCLSL0301, ECCLSL0302 and ECCLSL0303, exhibited similar physical properties with the exception that the ECCLSL0303 material was more acidic that the other two materials. Chemical analyses showed that the ECCLSL0303 material exhibited a higher lead concentration on a total basis, but the ECCLSL0301 material had higher concentration of lead present in the TCLP leachate.

KEMRON prepared numerous mixtures for each of the untreated materials by adding the reagents dry to the appropriate untreated soil material and thoroughly blending by hand. The Paint Filter testing results, summarized in **Table 3**, indicate that all of the treated materials passed the Paint Filter test. The TCLP lead analyses performed on the treated materials, and summarized in **Table 3**, indicate a strong correlation between the final leachate pH and lead leachability. The data presented in Table 3 indicates that the following mixtures reduced the leachability of lead to below the anticipated 5.0 mg/L regulatory limit:

TABLE 3 Summary of Potential Candidate Treatments Below 5.0 mg/L TCLP Lead

Mix Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	TCLP Lead 1311/6010 (mg/L)			TCLP Final Leachate pH
				Result	Qual.	MDL	S.U.
0724-003	ECCLSL0301	Free Flow 200	7.0	**0.231**		0.00750	6.90
0724-004	ECCLSL0301	Free Flow 200	9.0	**0.0694**		0.00750	9.51
0724-005	ECCLSL0301	Calciment (Dolomitic)	4.0	**4.00**		0.00750	6.68
0724-006	ECCLSL0301	Calciment (Dolomitic)	6.0	**0.0827**		0.00750	8.53
0724-007	ECCLSL0301	Calciment (Dolomitic)	8.0	**0.0311**	**J**	0.00750	9.48

0724-008	ECCLSL0301	Calciment (Dolomitic)	12.0	**0.0121**	**J**	0.00750	10.08
0724-010	ECCLSL0301	Enviroblend CS	4.0	**0.530**		0.00750	7.83
0724-011	ECCLSL0301	Enviroblend CS	6.0	**0.360**		0.00750	8.43
0724-012	ECCLSL0301	Enviroblend CS	8.0	**0.0865**		0.00750	8.92
0724-016	ECCLSL0302	Free Flow 200	9.0	**0.133**		0.00750	7.19
0724-018	ECCLSL0302	Calciment (Dolomitic)	4.0	**3.29**		0.00750	5.80
0724-019	ECCLSL0302	Calciment (Dolomitic)	6.0	**0.0408**	**J**	0.00750	7.52
0724-022	ECCLSL0302	Enviroblend CS	4.0	**0.107**		0.00750	7.64
0724-023	ECCLSL0302	Enviroblend CS	6.0	**0.0445**	**J**	0.00750	8.54
0724-024	ECCLSL0302	Enviroblend CS	8.0	**0.0405**	**J**	0.00750	8.99
0724-027	ECCLSL0303	Free Flow 200	7.0	**0.0282**	**J**	0.00750	6.91
0724-030	ECCLSL0303	Calciment (Dolomitic)	4.0	**2.60**		0.00750	6.50
0724-031	ECCLSL0303	Calciment (Dolomitic)	6.0	**0.0188**	**J**	0.00750	7.89
0724-032	ECCLSL0303	Calciment (Dolomitic)	10.0	ND		0.00750	9.35
0724-033	ECCLSL0303	Enviroblend CS	2.0	**0.831**		0.00750	6.89
0724-034	ECCLSL0303	Enviroblend CS	4.0	**0.125**		0.00750	7.64
0724-035	ECCLSL0303	Enviroblend CS	6.0	**0.0373**	**J**	0.00750	8.77
0724-036	ECCLSL0303	Enviroblend CS	8.0	**0.0126**	**J**	0.00750	9.17
0724-037	ECCLSL0301	Enviroblend CS	3.0	**0.322**		0.00750	7.30
0724-038	ECCLSL0302	Enviroblend CS	3.0	**0.0747**		0.00750	7.59
0724-040	ECCLSL0303	Enviroblend CS	3.0	**0.152**		0.00750	7.19

This data shows that all of the reagents utilized in the study were capable of reducing the leachability of lead as determined by the TCLP. However, the FF-200 treated materials indicate

that higher addition rates of the reagent will likely be required to meet the treatment criteria compared to the Calciment® (Dolomitic) and the EnviroBlend® CS. Specifically, the Calciment® (Dolomitic) reagent at an addition rate of 6% reduced the lead leachability to below 0.05 mg/L in all three untreated materials, and an addition rate of 3% EnviroBlend® CS achieved lead concentrations below 0.5 mg/L in all three of the untreated materials.

The selection of a full-scale treatment application should take into consideration both the physical and chemical performance of the treated mixtures. Data indicates that all three reagents were effective at reducing the leachability of lead below the TCLP regulatory limit at least one of the addition rates evaluated. Therefore, the most cost effective treatment should be reviewed in the selection of a full-scale treatment application.

This report should be reviewed in its entirety including all attachments prior to making decisions concerning a remedial approach. This study is intended to suggest what will occur in the field but does not guarantee the same results.

If you have any questions concerning the data provided in this report, please do not hesitate to contact us at 404-601-6927.

Sincerely,

KEMRON Environmental Services, Inc.

Mark Clark
Senior Technologist

Tomecia Bradley, CHMM
Program Manager

Attachments:
Tables
Attachment A – Material Chain of Custody
Attachment B – Untreated Physical Properties Testing Data Sheets
Attachment C – Untreated Analytical Reports
Attachment D – Mixture Design Sheets
Attachment E – Treated Analytical Reports and Physical Properties Testing Data Sheets

LEIDOS, INC.
NASA ECCL STABILIZATION
PROJECT No. SH0724

Table 1

Stabilization Untreated Physical Properties Testing

TESTING	TEST	UNIT	SAMPLE		
			ECCLSL0301	ECCLSL0302	ECCLSL0303
Material pH	EPA Method 9045	S.U.	6.73	5.09	4.62
Bulk Unit Weight (Density)	ASTM D7263	lb/ft^3	110.3	103.5	118.2
Moisture Content	ASTM D2216				
ASTM Moisture Content		%	23.15	21.18	24.41
Percent Solids		%	81.20	82.53	80.40
Paint Filter	EPA Method 9095		PASS	PASS	PASS

Notes
%= Percent
lb/ft^3 = pounds per cubic foot
S.U. = Standard Units

LEIDOS, INC.
NASA ECCL STABILIZATION
PROJECT No. SH0724

TABLE 2

Untreated Analytical Characterization
TCLP Lead

Parameters	Units	ECCLSL0301			ECCLSL0302			ECCLSL0303		
		Result	Qual.	MDL	Result	Qual.	MDL	Result	Qual.	MDL
Total Lead 6010										
Lead	mg/Kg	**5,230**		0.269	**1,980**		0.280	**6,090**		0.274
TCLP Lead 1311/6010										
Lead	mg/L	**114**		0.0375	**14.7**		0.00750	**75.6**		0.00750
TCLP Final Leachate pH										
pH	S.U.	**5.01**			**5.16**			**4.96**		

Notes:
mg/Kg = milligram per Kilogram
mg/L = milligram per Liter
S.U. = Standard Units
MDL = Method Detection Limit

LEIDOS, INC.
NASA ECCL STABILIZATION
KEMRON PROJECT No. SH0724

Table 3

Preliminary Mixture Evaluations
Mixture Designs, TCLP Lead, and Paint Filter

Mix Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	TCLP Lead 1311/6010 mg/L			Leaching Fluid Used	TCLP Final Leachate pH	Paint Filter EPA Method 9095
				Result	Qual.	MDL		S.U.	Pass/Fail
0724-001	ECCLSL0301	Free Flow 200	3.0	**127**		0.0375	LF #1	5.38	PASS
0724-002	ECCLSL0301	Free Flow 200	5.0	**77.2**		0.00750	LF #1	5.78	PASS
0724-003	ECCLSL0301	Free Flow 200	7.0	**0.231**		0.00750	LF #1	6.90	PASS
0724-004	ECCLSL0301	Free Flow 200	9.0	**0.0694**		0.00750	LF #1	9.51	PASS
0724-005	ECCLSL0301	Calciment (Dolomitic)	4.0	**4.00**		0.00750	LF #1	6.68	PASS
0724-006	ECCLSL0301	Calciment (Dolomitic)	6.0	**0.0827**		0.00750	LF #1	8.53	PASS
0724-007	ECCLSL0301	Calciment (Dolomitic)	8.0	**0.0311**	**J**	0.00750	LF #1	9.48	PASS
0724-008	ECCLSL0301	Calciment (Dolomitic)	12.0	**0.0121**	**J**	0.00750	LF #1	10.08	PASS
0724-009	ECCLSL0301	Enviroblend CS	2.0	**9.94**		0.00750	LF #1	6.59	PASS
0724-010	ECCLSL0301	Enviroblend CS	4.0	**0.530**		0.00750	LF #1	7.83	PASS
0724-011	ECCLSL0301	Enviroblend CS	6.0	**0.360**		0.00750	LF #1	8.43	PASS
0724-012	ECCLSL0301	Enviroblend CS	8.0	**0.0865**		0.00750	LF #1	8.92	PASS
0724-013	ECCLSL0302	Free Flow 200	3.0	**58.3**		0.00750	LF #1	5.20	PASS
0724-014	ECCLSL0302	Free Flow 200	5.0	**18.7**		0.00750	LF #1	5.48	PASS
0724-015	ECCLSL0302	Free Flow 200	7.0	**11.2**		0.00750	LF #1	5.47	PASS
0724-016	ECCLSL0302	Free Flow 200	9.0	**0.133**		0.00750	LF #1	7.19	PASS
0724-017	ECCLSL0302	Calciment (Dolomitic)	2.0	**331**		0.0375	LF #1	5.27	PASS
0724-018	ECCLSL0302	Calciment (Dolomitic)	4.0	**3.29**		0.00750	LF #1	5.80	PASS
0724-019	ECCLSL0302	Calciment (Dolomitic)	6.0	**0.0408**	**J**	0.00750	LF #1	7.52	PASS
0724-020	ECCLSL0302	Calciment (Dolomitic)	10.0	**12.5**	**B**	0.00750	LF #1	5.38	PASS
0724-021	ECCLSL0302	Enviroblend CS	2.0	**7.14**		0.00750	LF #1	5.96	PASS
0724-022	ECCLSL0302	Enviroblend CS	4.0	**0.107**		0.00750	LF #1	7.64	PASS
0724-023	ECCLSL0302	Enviroblend CS	6.0	**0.0445**	**J**	0.00750	LF #1	8.54	PASS
0724-024	ECCLSL0302	Enviroblend CS	8.0	**0.0405**	**J**	0.00750	LF #1	8.99	PASS
0724-025	ECCLSL0303	Free Flow 200	3.0	**392**		0.0375	LF #1	5.36	PASS
0724-026	ECCLSL0303	Free Flow 200	5.0	**74.4**		0.00750	LF #1	5.64	PASS
0724-027	ECCLSL0303	Free Flow 200	7.0	**0.0282**	**J**	0.00750	LF #1	6.91	PASS
0724-028	ECCLSL0303	Free Flow 200	9.0	**16.3**		0.00750	LF #1	5.84	PASS
0724-029	ECCLSL0303	Calciment (Dolomitic)	2.0	**179**		0.0375	LF #1	5.58	PASS
0724-030	ECCLSL0303	Calciment (Dolomitic)	4.0	**2.60**		0.00750	LF #1	6.50	PASS
0724-031	ECCLSL0303	Calciment (Dolomitic)	6.0	**0.0188**	**J**	0.00750	LF #1	7.89	PASS
0724-032	ECCLSL0303	Calciment (Dolomitic)	10.0	ND		0.00750	LF #1	9.35	PASS
0724-033	ECCLSL0303	Enviroblend CS	2.0	**0.831**		0.00750	LF #1	6.89	PASS
0724-034	ECCLSL0303	Enviroblend CS	4.0	**0.125**		0.00750	LF #1	7.64	PASS
0724-035	ECCLSL0303	Enviroblend CS	6.0	**0.0373**	**J**	0.00750	LF #1	8.77	PASS
0724-036	ECCLSL0303	Enviroblend CS	8.0	**0.0126**	**J**	0.00750	LF #1	9.17	PASS
0724-037	ECCLSL0301	Enviroblend CS	3.0	**0.322**		0.00750	LF #1	7.30	PASS
0724-038	ECCLSL0302	Enviroblend CS	3.0	**0.0747**		0.00750	LF #1	7.59	PASS
0724-039	ECCLSL0303	Enviroblend CS	1.0	**91.4**		0.00750	LF #1	5.33	PASS
0724-040	ECCLSL0303	Enviroblend CS	3.0	**0.152**		0.00750	LF #1	7.19	PASS

Notes:
% = Percent
Wt= Weight
mg/L = milligram per Liter
MDL = Method Detection Limit
J = Result is less than the Reporting llmit (RL) but greater than or equal to the MDL and the concentration is an approximate value.
B = Compund was found in the blank and sample.
S.U. = Standard Units

Attachment A:
Material Chain of Custody

Chain of Custody Record

leidos

COC No.: NASA-ECCL-023

Page 1 of 1 Date: 8/8/2019

Name Leidos
Address: 8866 Commons Blvd. Twinsburg, OH 44087
Phone Number: 330 405-5814
Project Manager: Heather Adams
Project Name: NASA ECCL (Bench Tests)
Charge Number: 327923.02.1.109.00 00.00.00001
Sampler (Signature) (Printed Name)
RS Rich Sprinzl

Laboratory Name: KEMRON Environmental Services Inc.
Address: 1359-A Ellsworth Industrial Blvd. Atlanta GA 30318
Phone 404-214-0098
Contact: Tomecia Bradley

Requested Parameters

Laboratory No.	SELECT UP TO 12 Location ID	Sample ID	Type	Depth	Date	Time	Matrix	Bench Test (SEE REVISED ESTIMA									Total Containers	OBSERVATIONS, COMMENTS SPECIAL INSTRUCTIONS
								S		S	S	S	S	S	S	S		
	Bench Test 1	ECCLSL0301			8/8/2019	1100												
	Bench Test 2	ECCLSL0302			8/8/2019	1315												
	Bench Test 3	ECCLSL0303			8/8/2019	1340												

RS 8/8/19

Relinquished by	Date	Received by	Date
RS Signature	8/8/19	Carter Nyles Signature	8/9/2019
Rich Sprinzl Printed Name	Time 1745	Carter Nyles Printed Name	Time 1543
Leidos Company		Kemron Company	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Notes:
A. Cool, 4C
B HNO3, pH<2, Cool, 4C
C HCL, pH<2, Cool, 4C
D 2 DI-NaHSO4/1-MeOH
1 SW-846 8260B
2. SW-846 8270D
3 SW-846 8270D LL FS
4. SW-846 6020A/7471B

Shipment Method: UPS

Temperature Blank
Temp upon receipt @ Lab NA

Leidos
8866 Commons Blvd.
Twinsburg, OH 44087
330 405-5814

Attachment B:
Untreated Physical Properties Testing Data Sheets

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
TESTING DATE:	8/23/2019
TESTED BY:	MTC
TRACKING CODE:	D456

KEMRON SAMPLE No.		MATERIAL pH
1.	ECCLSL0301 A	7.54
2.	ECCLSL0301 B	6.55
3.	ECCLSL0301 C	6.09
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	6.73

UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
SAMPLE No.:	ECCLSL0301
TESTING DATE:	08/19/19
TESTED BY:	MTC
TRACKING CODE:	D456

UNIT WEIGHT (DENSITY)							
1. SAMPLE NO.	A		B		C		
2. WT OF MOLD (tare weight)	18.21	g	18.21	g	18.20	g	
3. WT OF MOLD + SOIL	383.61	g	379.84	g	383.05	g	
4. WT OF WET SOIL, W	365.40	g	361.63	g	364.85	g	
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in	
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in	
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3	
8. BULK UNIT WEIGHT	110.8	pcf	109.6	pcf	110.6	pcf	
9. BULK SPECIFIC GRAVITY	1.8		1.8		1.8		
10. AVERAGE BULK UNIT WEIGHT	110.3	pcf					
11. AVERAGE BULK SPECIFIC GRAVITY	1.8						

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
SAMPLE No.:	ECCLSL0301
TESTING DATE:	08/16/19
TESTED BY:	MTC
TRACKING CODE:	D456

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.2671	g	1.2738	g	1.2600	g
3. WT WET SOIL + TARE	22.6670	g	25.2264	g	27.1219	g
4. WT DRY SOIL + TARE	18.6564	g	20.7404	g	22.2291	g
5. WT WATER, Ww	4.0106	g	4.4860	g	4.8928	g
6. WT DRY SOIL, Ws	17.3893	g	19.4666	g	20.9691	g
7. ASTM MOISTURE CONTENT	23.06	%	23.04	%	23.33	%
8. PERCENT SOLIDS	81.26	%	81.27	%	81.08	%
9. AVERAGE ASTM MOISTURE CONTENT	23.15	%				
10. AVERAGE PERCENT SOLIDS	81.20	%				

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	8/19/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	ECCLSL0301	TRACKING CODE:	D456
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	90.17	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
TESTING DATE:	8/23/2019
TESTED BY:	MTC
TRACKING CODE:	D457

KEMRON SAMPLE No.		MATERIAL pH
1.	ECCLSL0302 A	5.29
2.	ECCLSL0302 B	5.09
3.	ECCLSL0302 C	4.90
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	5.09

UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
SAMPLE No.:	ECCLSL0302
TESTING DATE:	08/19/19
TESTED BY:	MTC
TRACKING CODE:	D457

UNIT WEIGHT (DENSITY)							
1. SAMPLE NO.	A		B		C		
2. WT OF MOLD (tare weight)	18.20	g	18.21	g	18.19	g	
3. WT OF MOLD + SOIL	355.92	g	360.48	g	362.75	g	
4. WT OF WET SOIL, W	337.72	g	342.27	g	344.56	g	
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in	
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in	
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3	
8. BULK UNIT WEIGHT	102.4	pcf	103.8	pcf	104.5	pcf	
9. BULK SPECIFIC GRAVITY	1.6		1.7		1.7		
10. AVERAGE BULK UNIT WEIGHT	103.5	pcf					
11. AVERAGE BULK SPECIFIC GRAVITY	1.7						

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
SAMPLE No.:	ECCLSL0302
TESTING DATE:	08/16/19
TESTED BY:	MTC
TRACKING CODE:	D457

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.2662	g	1.3005	g	1.2688	g
3. WT WET SOIL + TARE	19.6158	g	18.0944	g	22.1113	g
4. WT DRY SOIL + TARE	16.6506	g	15.0213	g	18.3708	g
5. WT WATER, Ww	2.9652	g	3.0731	g	3.7405	g
6. WT DRY SOIL, Ws	15.3844	g	13.7208	g	17.1020	g
7. ASTM MOISTURE CONTENT	19.27	%	22.40	%	21.87	%
8. PERCENT SOLIDS	83.84	%	81.70	%	82.05	%
9. AVERAGE ASTM MOISTURE CONTENT	21.18	%				
10. AVERAGE PERCENT SOLIDS	82.53	%				

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	8/19/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	ECCLSL0302	TRACKING CODE:	D457
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.41	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

MATERIAL pH

EPA METHOD 9045
DATA SHEET

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
TESTING DATE:	8/23/2019
TESTED BY:	MTC
TRACKING CODE:	D458

KEMRON SAMPLE No.		MATERIAL pH
1.	ECCLSL0303 A	4.97
2.	ECCLSL0303 B	4.56
3.	ECCLSL0303 C	4.34
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	AVERAGE:	4.62

UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
SAMPLE No.:	ECCLSL0303
TESTING DATE:	08/19/19
TESTED BY:	MTC
TRACKING CODE:	D458

UNIT WEIGHT (DENSITY)							
1. SAMPLE NO.	A		B		C		
2. WT OF MOLD (tare weight)	18.20	g	18.20	g	18.20	g	
3. WT OF MOLD + SOIL	406.51	g	404.01	g	413.50	g	
4. WT OF WET SOIL, W	388.31	g	385.81	g	395.30	g	
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in	
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in	
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3	
8. BULK UNIT WEIGHT	117.7	pcf	117.0	pcf	119.8	pcf	
9. BULK SPECIFIC GRAVITY	1.9		1.9		1.9		
10. AVERAGE BULK UNIT WEIGHT	118.2	pcf					
11. AVERAGE BULK SPECIFIC GRAVITY	1.9						

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	NASA ECCL Stabilization
PROJECT No.:	SH0724
SAMPLE No.:	ECCLSL0303
TESTING DATE:	08/16/19
TESTED BY:	MTC
TRACKING CODE:	D458

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.2664	g	1.2617	g	1.2641	g
3. WT WET SOIL + TARE	29.5404	g	28.2298	g	28.3250	g
4. WT DRY SOIL + TARE	23.7633	g	22.7070	g	23.4823	g
5. WT WATER, Ww	5.7771	g	5.5228	g	4.8427	g
6. WT DRY SOIL, Ws	22.4969	g	21.4453	g	22.2182	g
7. ASTM MOISTURE CONTENT	25.68	%	25.75	%	21.80	%
8. PERCENT SOLIDS	79.57	%	79.52	%	82.10	%
9. AVERAGE ASTM MOISTURE CONTENT	24.41	%				
10. AVERAGE PERCENT SOLIDS	80.40	%				

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	8/19/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	ECCLSL0303	TRACKING CODE:	D458
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	105.07	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

Attachment C:
Untreated Analytical Reports

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-168649-1
Client Project/Site: NASA ECCL

For:
Kemron Environmental Services, Inc.
1359A Ellsworth Industrial Blvd.
Atlanta, Georgia 30318

Attn: Tomecia Bradley

Therese Hargraves

Authorized for release by:
9/5/2019 5:21:54 PM

Therese Hargraves, Project Manager I
(708)793-3461
therese.hargraves@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Receipt Checklists 18

Job ID: 500-168649-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-168649-1

Comments
No additional comments.

Receipt
The samples were received on 8/21/2019 9:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.5º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Client Sample ID: ECCLSL0301 — Lab Sample ID: 500-168649-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	114		0.250	0.0375	mg/L	5		6010C	TCLP

Client Sample ID: ECCLSL0302 — Lab Sample ID: 500-168649-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	14.7		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: ECCLSL0303 — Lab Sample ID: 500-168649-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	75.6		0.0500	0.00750	mg/L	1		6010C	TCLP

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CHI
1311	TCLP Extraction	SW846	TAL CHI
3010A	Preparation, Total Metals	SW846	TAL CHI

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-168649-1	ECCLSL0301	Solid	08/20/19 11:20	08/21/19 09:05	
500-168649-2	ECCLSL0302	Solid	08/20/19 11:22	08/21/19 09:05	
500-168649-3	ECCLSL0303	Solid	08/20/19 11:24	08/21/19 09:05	

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Client Sample ID: ECCLSL0301

Date Collected: 08/20/19 11:20
Date Received: 08/21/19 09:05

Lab Sample ID: 500-168649-1

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	114		0.250	0.0375	mg/L		09/05/19 08:38	09/05/19 13:34	5

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Client Sample ID: ECCLSL0302

Date Collected: 08/20/19 11:22
Date Received: 08/21/19 09:05

Lab Sample ID: 500-168649-2

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	14.7		0.0500	0.00750	mg/L		09/05/19 08:38	09/05/19 12:40	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Client Sample ID: ECCLSL0303

Date Collected: 08/20/19 11:24
Date Received: 08/21/19 09:05

Lab Sample ID: 500-168649-3

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	75.6		0.0500	0.00750	mg/L		09/05/19 08:38	09/05/19 12:59	1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Metals

Leach Batch: 503138

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-168649-1	ECCLSL0301	TCLP	Solid	1311	
500-168649-2	ECCLSL0302	TCLP	Solid	1311	
500-168649-3	ECCLSL0303	TCLP	Solid	1311	
LB 500-503138/1-B	Method Blank	TCLP	Solid	1311	

Prep Batch: 503281

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-168649-1	ECCLSL0301	TCLP	Solid	3010A	503138
500-168649-2	ECCLSL0302	TCLP	Solid	3010A	503138
500-168649-3	ECCLSL0303	TCLP	Solid	3010A	503138
LB 500-503138/1-B	Method Blank	TCLP	Solid	3010A	503138
LCS 500-503281/2-A	Lab Control Sample	Total/NA	Solid	3010A	
LCSD 500-503281/3-A	Lab Control Sample Dup	Total/NA	Solid	3010A	

Analysis Batch: 503358

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-168649-3	ECCLSL0303	TCLP	Solid	6010C	503281

Analysis Batch: 503368

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-168649-1	ECCLSL0301	TCLP	Solid	6010C	503281
500-168649-2	ECCLSL0302	TCLP	Solid	6010C	503281
LB 500-503138/1-B	Method Blank	TCLP	Solid	6010C	503281
LCS 500-503281/2-A	Lab Control Sample	Total/NA	Solid	6010C	503281
LCSD 500-503281/3-A	Lab Control Sample Dup	Total/NA	Solid	6010C	503281

QC Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Method: 6010C - Metals (ICP)

Lab Sample ID: LCS 500-503281/2-A
Matrix: Solid
Analysis Batch: 503368

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 503281

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			0.100	0.09861		mg/L		99	80 - 120		

Lab Sample ID: LCSD 500-503281/3-A
Matrix: Solid
Analysis Batch: 503368

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 503281

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead			0.100	0.1006		mg/L		101	80 - 120	2	20

Lab Sample ID: LB 500-503138/1-B
Matrix: Solid
Analysis Batch: 503368

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 503281

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.0500	0.00750	mg/L		09/05/19 08:38	09/05/19 12:24	1

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Client Sample ID: ECCLSL0301

Lab Sample ID: 500-168649-1
Date Collected: 08/20/19 11:20
Matrix: Solid
Date Received: 08/21/19 09:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			503138	09/04/19 14:30	GCA	TAL CHI
TCLP	Prep	3010A			503281	09/05/19 08:38	SAH	TAL CHI
TCLP	Analysis	6010C		5	503368	09/05/19 13:34	JEF	TAL CHI

Client Sample ID: ECCLSL0302

Lab Sample ID: 500-168649-2
Date Collected: 08/20/19 11:22
Matrix: Solid
Date Received: 08/21/19 09:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			503138	09/04/19 14:30	GCA	TAL CHI
TCLP	Prep	3010A			503281	09/05/19 08:38	SAH	TAL CHI
TCLP	Analysis	6010C		1	503368	09/05/19 12:40	JEF	TAL CHI

Client Sample ID: ECCLSL0303

Lab Sample ID: 500-168649-3
Date Collected: 08/20/19 11:24
Matrix: Solid
Date Received: 08/21/19 09:05

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			503138	09/04/19 14:30	GCA	TAL CHI
TCLP	Prep	3010A			503281	09/05/19 08:38	SAH	TAL CHI
TCLP	Analysis	6010C		1	503358	09/05/19 12:59	JEF	TAL CHI

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Accreditation/Certification Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-168649-1

Laboratory: Eurofins TestAmerica, Chicago

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Georgia	State Program	N/A	04-30-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte

Eurofins TestAmerica, Chicago
2417 Bond Street

University Park, IL 60484-3101
phone 708.534.5200 fax 708.534.5211

Chain of Custody Record

eurofins Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	**Project Manager: Tomecia Bradley**		COC No:
KEMRON Environmental Services, Inc.	**Email: triley@kemron.com**	**Site Contact:**	**Date: 8-20-19**	___1___ of ___1___ COCs
1359 Ellsworth Industrial Blvd.	**Tel/Fax: 404-214-0098**	**Lab Contact:**	**Carrier:**	TALS Project #:
Atlanta, GA 30318	**Analysis Turnaround Time**			Sampler:
(404) 636-0928 Phone	☐ CALENDAR DAYS ☑ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx FAX	TAT if different from Below _____			Walk-in Client:
Project Name: NASA ECCL	☑ 2 weeks			Lab Sampling:
Site:	☐ 1 week			
P O # SH0724	☐ 2 days			Job / SDG No.: 500-168649
	☐ 1 day			

500-168649 COC

	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	TCLP Lead	Sample Specific Notes:
1	ECCLSL0301	8/20/19	1120	G	S	1			X	
2	ECCLSL0302	8/20/19	1122	G	S	1			X	
3	ECCLSL0303	8/20/19	1124	G	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☑ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: 3.5 Corr'd: _____ | Therm ID No.: _____

Relinquished by: Tomecia Bradley	Company: Kemron	Date/Time: 8/20/19 1155	Received by: [signature] 8/20/19	Company: GDA	Date/Time: 11:35
Relinquished by: [signature] 8/20/19	Company: ETA	Date/Time: 1610	Received by: [signature]	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: Paula Buckley	Company: TACH	Date/Time: 8/21/19 0905

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

TestAmerica Chicago
TCLP Extraction Logbook

Page Number: _____

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 9/4/19 Time 1430 Temp: Uncorrected 21.5 Corrected 22 °C Filtration Start Time: 0749
Group Number: 7753 Extr. End Date 9/5/19 Time 0657 Temp: Uncorrected 20.5 Corrected 21 °C Filtration End Time: 0854
LIMS Batch No.: 503138/503139 Min.Temp: Uncorrected/Corrected 20 / 20.5 °C Max.Temp: Uncorrected/Corrected 21.5 / 22.5 °C Filter Paper Lot #: 112167-9016
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C0038
Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	LB	LB2	500-168281-8	500-168649-1	-2
Sample Description	Extraction Fluid #1	Extraction Fluid #2	Solid		
Sample Weight (g)	N/A		50.20	50.18	50.11
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	N/A		50.20	50.18	50.11
Extraction Fluid Selection pH of Initial Solution: If <5.0 use Extraction Fluid #1	N/A		6.87	6.70	5.96
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	4.88	2.89	1.83	1.64	1.61
Extraction Fluid Type (1 or 2)	1	2	1		
Extraction Vessel Type / Pressure Check	HDPE/T(28)	HDPE			
Extraction Fluid Volume (mLs)	2000		1000		
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	4.89/4.92	3.09	5.43	5.01	5.16
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes				
ZHE: Initial psi / Final psi	N/A				

Comments:
Extraction Vessel Code: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 05189010)
Analyst: Date: 9/5/19
Reviewer: Date: 9/5/19

CHI-33-15-003/P-12/15

Extraction Vessel Codes: T = Teflon Organics/Metals VOA's Metals

Analyst: Date: 9/5/19

Date: 9/5/19

TestAmerica Chicago

TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 9/4/19 Time 1430 Temp: Uncorrected 21.5 Corrected 22 °C Filtration Start Time: 0749

Group Number: T753 Extr. End Date 9/5/19 Time 0657 Temp: Uncorrected 20.5 Corrected 21 °C Filtration End Time: 0854

LIMS Batch No.: 503138/503139 Min.Temp: Uncorrected/Corrected 20/20.5 °C Max.Temp: Uncorrected/Corrected 21.5/22.5 °C Filter Paper Lot #: 112167-9016

Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: 00038

Sample Type (Circle): TCLV SPLP TCLP ASTM

Sample Number	500-168649-3	500-168666-1	500-168965-1	500-168721-1	-2
Sample Description	Solid				
Sample Weight (g)	50.25	50.31	50.26	50.20	50.15
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	50.25	50.31	50.26	50.20	50.15
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	5.06	7.77	3.99	7.17	8.73
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	1.57	2.03	N/A	4.83	1.81
Extraction Fluid Type (1 or 2)	1				
Extraction Vessel Type / Pressure Check	HDPE	T(17)	HDPE		
Extraction Fluid Volume (mLs)	1000				
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	4.96	6.48	5.45	7.23	5.07
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes m				
ZHE: Initial psi / Final psi	N/A				

Comments:

Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 051090ID

Analyst: Metals Date: 9/5/19

Reviewer: BMM Date: 9/5/19

CHI-22-15-003/P-12/15

Login Sample Receipt Checklist

Client: Kemron Environmental Services, Inc.

Job Number: 500-168649-1

Login Number: 168649
List Number: 1
Creator: Buckley, Paula M

List Source: Eurofins TestAmerica, Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.5
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-171547-1
Client Project/Site: NASA ECCL

For:
Kemron Environmental Services, Inc.
1359A Ellsworth Industrial Blvd.
Atlanta, Georgia 30318

Attn: Tomecia Bradley

Authorized for release by:
10/22/2019 2:38:42 PM
Eric Lang, Manager of Project Management
(708)534-5200
eric.lang@testamericainc.com

Designee for

Therese Hargraves, Project Manager I
(708)793-3461
therese.hargraves@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 500-171547-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-171547-1

Comments
No additional comments.

Receipt
The samples were received on 10/10/2019 8:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.3º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Client Sample ID: ECCLSL0301 — Lab Sample ID: 500-171547-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	5230		0.582	0.269	mg/Kg	1	☼	6010C	Total/NA

Client Sample ID: ECCLSL0302 — Lab Sample ID: 500-171547-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	1980		0.605	0.280	mg/Kg	1	☼	6010C	Total/NA

Client Sample ID: ECCLSL0303 — Lab Sample ID: 500-171547-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	6090		0.594	0.274	mg/Kg	1	☼	6010C	Total/NA

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI
3050B	Preparation, Metals	SW846	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-171547-1	ECCLSL0301	Solid	10/09/19 09:00	10/10/19 08:40	
500-171547-2	ECCLSL0302	Solid	10/09/19 09:05	10/10/19 08:40	
500-171547-3	ECCLSL0303	Solid	10/09/19 09:10	10/10/19 08:40	

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Client Sample ID: ECCLSL0301

Date Collected: 10/09/19 09:00
Date Received: 10/10/19 08:40

Lab Sample ID: 500-171547-1

Matrix: Solid
Percent Solids: 81.5

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	5230		0.582	0.269	mg/Kg	☼	10/21/19 09:47	10/22/19 09:56	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Client Sample ID: ECCLSL0302

Date Collected: 10/09/19 09:05
Date Received: 10/10/19 08:40

Lab Sample ID: 500-171547-2

Matrix: Solid
Percent Solids: 81.7

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	1980		0.605	0.280	mg/Kg	☼	10/21/19 09:47	10/22/19 10:00	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Client Sample ID: ECCLSL0303

Date Collected: 10/09/19 09:10
Date Received: 10/10/19 08:40

Lab Sample ID: 500-171547-3

Matrix: Solid
Percent Solids: 81.7

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	6090		0.594	0.274	mg/Kg	☼	10/21/19 09:47	10/22/19 10:20	1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Metals

Prep Batch: 511037

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171547-1	ECCLSL0301	Total/NA	Solid	3050B	
500-171547-2	ECCLSL0302	Total/NA	Solid	3050B	
500-171547-3	ECCLSL0303	Total/NA	Solid	3050B	
MB 500-511037/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 500-511037/2-A	Lab Control Sample	Total/NA	Solid	3050B	

Analysis Batch: 511300

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171547-1	ECCLSL0301	Total/NA	Solid	6010C	511037
500-171547-2	ECCLSL0302	Total/NA	Solid	6010C	511037
MB 500-511037/1-A	Method Blank	Total/NA	Solid	6010C	511037
LCS 500-511037/2-A	Lab Control Sample	Total/NA	Solid	6010C	511037

Analysis Batch: 511333

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171547-3	ECCLSL0303	Total/NA	Solid	6010C	511037

General Chemistry

Analysis Batch: 509672

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171547-1	ECCLSL0301	Total/NA	Solid	Moisture	
500-171547-2	ECCLSL0302	Total/NA	Solid	Moisture	
500-171547-3	ECCLSL0303	Total/NA	Solid	Moisture	

QC Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 500-511037/1-A
Matrix: Solid
Analysis Batch: 511300

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 511037

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.500	0.231	mg/Kg		10/21/19 09:47	10/22/19 09:44	1

Lab Sample ID: LCS 500-511037/2-A
Matrix: Solid
Analysis Batch: 511300

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 511037

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			10.0	9.382		mg/Kg		94	80 - 120		

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Client Sample ID: ECCLSL0301
Lab Sample ID: 500-171547-1
Date Collected: 10/09/19 09:00
Matrix: Solid
Date Received: 10/10/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	509672	10/11/19 15:05	LWN	TAL CHI

Client Sample ID: ECCLSL0301
Lab Sample ID: 500-171547-1
Date Collected: 10/09/19 09:00
Matrix: Solid
Date Received: 10/10/19 08:40
Percent Solids: 81.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			511037	10/21/19 09:47	JEK	TAL CHI
Total/NA	Analysis	6010C		1	511300	10/22/19 09:56	JEF	TAL CHI

Client Sample ID: ECCLSL0302
Lab Sample ID: 500-171547-2
Date Collected: 10/09/19 09:05
Matrix: Solid
Date Received: 10/10/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	509672	10/11/19 15:05	LWN	TAL CHI

Client Sample ID: ECCLSL0302
Lab Sample ID: 500-171547-2
Date Collected: 10/09/19 09:05
Matrix: Solid
Date Received: 10/10/19 08:40
Percent Solids: 81.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			511037	10/21/19 09:47	JEK	TAL CHI
Total/NA	Analysis	6010C		1	511300	10/22/19 10:00	JEF	TAL CHI

Client Sample ID: ECCLSL0303
Lab Sample ID: 500-171547-3
Date Collected: 10/09/19 09:10
Matrix: Solid
Date Received: 10/10/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	509672	10/11/19 15:05	LWN	TAL CHI

Client Sample ID: ECCLSL0303
Lab Sample ID: 500-171547-3
Date Collected: 10/09/19 09:10
Matrix: Solid
Date Received: 10/10/19 08:40
Percent Solids: 81.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			511037	10/21/19 09:47	JEK	TAL CHI
Total/NA	Analysis	6010C		1	511333	10/22/19 10:20	EEN	TAL CHI

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Accreditation/Certification Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL

Job ID: 500-171547-1

Laboratory: Eurofins TestAmerica, Chicago

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Georgia	State Program	N/A	04-30-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Eurofins TestAmerica, Chicago
2417 Bond Street

681 Atlanta

University Park, IL 60484-3101
phone 708.534.5200 fax 708.534.5211

Chain of Custody Record

eurofins

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

	Project Manager: Tomecia Bradley		COC No:
Client Contact	Email: triley@kemron.com	Site Contact:	Date: 10-9-19	___1___ of __1___ COCs
KEMRON Environmental Services, Inc	Tel/Fax: 404-214-0098	Lab Contact:	Carrier:	TALS Project #:
1359 Ellsworth Industrial Blvd	Analysis Turnaround Time			Sampler:
Atlanta, GA 30318	☐ CALENDAR DAYS ☑ WORKING DAYS			For Lab Use Only:
(404) 636-0928 Phone	TAT if different from Below _____			Walk-in Client:
(xxx) xxx-xxxx FAX	☑ 2 weeks			Lab Sampling:
Project Name: NASA ECCL	☐ 1 week		500-171547 COC	
Site:	☐ 2 days			Job / SDG No.: 500-171547
P O # SH0724	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	Total Lead 6010C	Sample Specific Notes:
1 ECCLSL0301	10/9/19	900	G	S	1			X	
2 ECCLSL0302	10/9/19	905	G	S	1			X	
3 ECCLSL0303	10/9/19	910	G	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: 2.3 Corr'd: 2.3 | Therm ID No.: _____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Cheshia McDaniel	Kemron	10/9/19 1326	[signature]	10-9-19	1326
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	10-9-19	1414	[signature]	TA	10/10/19 0840
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2018

10/22/2019

Login Sample Receipt Checklist

Client: Kemron Environmental Services, Inc.

Job Number: 500-171547-1

Login Number: 171547
List Number: 1
Creator: James, Jeff A

List Source: Eurofins TestAmerica, Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.3
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Attachment D:
Mixture Design Sheets

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-001
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	3.00 %	12.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

12g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-002
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	5.00 %	20.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

20g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-003
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	7.00 %	28.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

28g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-004
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	9.00 %	36.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

36g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-005
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	4.00 %	16.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

16g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-006
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	6.00 %	24.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

24g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-007
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	8.00 %	32.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

32g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-008
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	12.00 %	48.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

48g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-009
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	2.00 %	8.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

8g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-010
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	4.00 %	16.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

16g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-011
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	6.00 %	24.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

24g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-012
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	8.00 %	32.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

32g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-013
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	3.00 %	12.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

12g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-014
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	5.00 %	20.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

20g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-015
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	7.00 %	28.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

28g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-016
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	9.00 %	36.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

36g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-017
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	2.00 %	8.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

8g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-018
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	4.00 %	16.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

16g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-019
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	6.00 %	24.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

24g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-020
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	10.00 %	40.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

40g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-021
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	2.00 %	8.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

8g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-022
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	4.00 %	16.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

16g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-023
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	6.00 %	24.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

24g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-024
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	8.00 %	32.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

32g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-025
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	3.00 %	12.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

12g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-026
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	5.00 %	20.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

20g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-027
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	7.00 %	28.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

28g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-028
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Free Flow 200	9.00 %	36.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

36g of Free Flow 200 was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-029
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	2.00 %	8.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

8g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-030
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	4.00 %	16.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

16g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-031
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	6.00 %	24.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

24g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-032
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Calciment (Dolomitic) #1135	10.00 %	40.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

40g of Calciment (Dolomitic) was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-033
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	2.00 %	8.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

8g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-034
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	4.00 %	16.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

16g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-035
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	6.00 %	24.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

24g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-036
MIXING DATE:	16-Oct-19	MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	8.00 %	32.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

32g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-037
MIXING DATE:		MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0301**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	3.00 %	12.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

12g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-038
MIXING DATE:		MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0302**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	3.00 %	12.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

12g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-039
MIXING DATE:		MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	1.00 %	4.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

4g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

MIX DEVELOPMENT DATA SHEET

PROJECT:	NASA ECCL Stabilization	MIX No.	
PROJECT No.:	SH0724		0724-040
MIXING DATE:		MIXED BY:	MTC

UNTREATED MATERIAL TYPE		**ECCL SL 0303**
WEIGHT OF UNTREATED MATERIAL		**400 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Enviroblend CS	3.00 %	12.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	%	0.0 g

OBSERVATIONS / NOTES

12g of Enviroblend CS was added to the material on a dry basis.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

Attachment E:
Treated Analytical Reports and Physical Properties Testing Data Sheets

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-171906-1
Client Project/Site: NASA ECCL Stabilization

For:
Kemron Environmental Services, Inc.
1359A Ellsworth Industrial Blvd.
Atlanta, Georgia 30318

Attn: Tomecia Bradley

Therese Hargraves

Authorized for release by:
10/31/2019 3:45:29 PM

Therese Hargraves, Project Manager I
(708)793-3461
therese.hargraves@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 500-171906-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-171906-1

Comments
No additional comments.

Receipt
The samples were received on 10/17/2019 8:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.6º C and 1.8º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-001 — Lab Sample ID: 500-171906-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	127		0.250	0.0375	mg/L	5		6010C	TCLP

Client Sample ID: 0724-002 — Lab Sample ID: 500-171906-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	77.2		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-003 — Lab Sample ID: 500-171906-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.231		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-004 — Lab Sample ID: 500-171906-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0694		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-005 — Lab Sample ID: 500-171906-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	4.00		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-006 — Lab Sample ID: 500-171906-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0827		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-007 — Lab Sample ID: 500-171906-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0311	J	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-008 — Lab Sample ID: 500-171906-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0121	J	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-009 — Lab Sample ID: 500-171906-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	9.94		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-010 — Lab Sample ID: 500-171906-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.530		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-011 — Lab Sample ID: 500-171906-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.360		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-012 — Lab Sample ID: 500-171906-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0865		0.0500	0.00750	mg/L	1		6010C	TCLP

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-013 — Lab Sample ID: 500-171906-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	58.3		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-014 — Lab Sample ID: 500-171906-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	18.7		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-015 — Lab Sample ID: 500-171906-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	11.2		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-016 — Lab Sample ID: 500-171906-16

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.133		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-017 — Lab Sample ID: 500-171906-17

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	331		0.250	0.0375	mg/L	5		6010C	TCLP

Client Sample ID: 0724-018 — Lab Sample ID: 500-171906-18

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	3.29		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-019 — Lab Sample ID: 500-171906-19

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0408	J	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-020 — Lab Sample ID: 500-171906-20

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	12.5	B	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-021 — Lab Sample ID: 500-171906-21

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	7.14		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-022 — Lab Sample ID: 500-171906-22

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.107		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-023 — Lab Sample ID: 500-171906-23

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0445	J	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-024 — Lab Sample ID: 500-171906-24

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0405	J	0.0500	0.00750	mg/L	1		6010C	TCLP

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-025 — Lab Sample ID: 500-171906-25

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	392		0.250	0.0375	mg/L	5		6010C	TCLP

Client Sample ID: 0724-026 — Lab Sample ID: 500-171906-26

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	74.4		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-027 — Lab Sample ID: 500-171906-27

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0282	J	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-028 — Lab Sample ID: 500-171906-28

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	16.3		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-029 — Lab Sample ID: 500-171906-29

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	179		0.250	0.0375	mg/L	5		6010C	TCLP

Client Sample ID: 0724-030 — Lab Sample ID: 500-171906-30

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	2.60		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-031 — Lab Sample ID: 500-171906-31

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0188	J	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-032 — Lab Sample ID: 500-171906-32

No Detections.

Client Sample ID: 0724-033 — Lab Sample ID: 500-171906-33

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.831		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-034 — Lab Sample ID: 500-171906-34

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.125		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-035 — Lab Sample ID: 500-171906-35

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0373	J	0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-036 — Lab Sample ID: 500-171906-36

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0126	J	0.0500	0.00750	mg/L	1		6010C	TCLP

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CHI
1311	TCLP Extraction	SW846	TAL CHI
3010A	Preparation, Total Metals	SW846	TAL CHI

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-171906-1	0724-001	Solid	10/16/19 09:00	10/17/19 08:40	
500-171906-2	0724-002	Solid	10/16/19 09:05	10/17/19 08:40	
500-171906-3	0724-003	Solid	10/16/19 09:10	10/17/19 08:40	
500-171906-4	0724-004	Solid	10/16/19 09:15	10/17/19 08:40	
500-171906-5	0724-005	Solid	10/16/19 09:20	10/17/19 08:40	
500-171906-6	0724-006	Solid	10/16/19 09:25	10/17/19 08:40	
500-171906-7	0724-007	Solid	10/16/19 09:30	10/17/19 08:40	
500-171906-8	0724-008	Solid	10/16/19 09:35	10/17/19 08:40	
500-171906-9	0724-009	Solid	10/16/19 09:40	10/17/19 08:40	
500-171906-10	0724-010	Solid	10/16/19 09:45	10/17/19 08:40	
500-171906-11	0724-011	Solid	10/16/19 09:50	10/17/19 08:40	
500-171906-12	0724-012	Solid	10/16/19 09:55	10/17/19 08:40	
500-171906-13	0724-013	Solid	10/16/19 10:00	10/17/19 08:40	
500-171906-14	0724-014	Solid	10/16/19 10:05	10/17/19 08:40	
500-171906-15	0724-015	Solid	10/16/19 10:10	10/17/19 08:40	
500-171906-16	0724-016	Solid	10/16/19 10:15	10/17/19 08:40	
500-171906-17	0724-017	Solid	10/16/19 10:20	10/17/19 08:40	
500-171906-18	0724-018	Solid	10/16/19 10:25	10/17/19 08:40	
500-171906-19	0724-019	Solid	10/16/19 10:30	10/17/19 08:40	
500-171906-20	0724-020	Solid	10/16/19 10:35	10/17/19 08:40	
500-171906-21	0724-021	Solid	10/16/19 10:40	10/17/19 08:40	
500-171906-22	0724-022	Solid	10/16/19 10:45	10/17/19 08:40	
500-171906-23	0724-023	Solid	10/16/19 10:50	10/17/19 08:40	
500-171906-24	0724-024	Solid	10/16/19 10:55	10/17/19 08:40	
500-171906-25	0724-025	Solid	10/16/19 11:00	10/17/19 08:40	
500-171906-26	0724-026	Solid	10/16/19 11:05	10/17/19 08:40	
500-171906-27	0724-027	Solid	10/16/19 11:10	10/17/19 08:40	
500-171906-28	0724-028	Solid	10/16/19 11:15	10/17/19 08:40	
500-171906-29	0724-029	Solid	10/16/19 11:20	10/17/19 08:40	
500-171906-30	0724-030	Solid	10/16/19 11:25	10/17/19 08:40	
500-171906-31	0724-031	Solid	10/16/19 11:30	10/17/19 08:40	
500-171906-32	0724-032	Solid	10/16/19 11:35	10/17/19 08:40	
500-171906-33	0724-033	Solid	10/16/19 11:40	10/17/19 08:40	
500-171906-34	0724-034	Solid	10/16/19 11:45	10/17/19 08:40	
500-171906-35	0724-035	Solid	10/16/19 11:50	10/17/19 08:40	
500-171906-36	0724-036	Solid	10/16/19 11:55	10/17/19 08:40	

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-001

Date Collected: 10/16/19 09:00
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-1

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	127		0.250	0.0375	mg/L		10/29/19 14:55	10/31/19 12:16	5

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-002

Date Collected: 10/16/19 09:05
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-2

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	77.2		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 12:20	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-003

Date Collected: 10/16/19 09:10
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-3

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.231		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 12:24	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-004

Date Collected: 10/16/19 09:15
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-4

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0694		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 12:29	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-005

Date Collected: 10/16/19 09:20
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-5

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	4.00		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 00:29	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-006

Date Collected: 10/16/19 09:25
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-6

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0827		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 00:33	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-007

Date Collected: 10/16/19 09:30
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-7

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0311	J	0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 00:37	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-008

Date Collected: 10/16/19 09:35
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-8

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0121	J	0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 00:42	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-009

Date Collected: 10/16/19 09:40
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-9

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	9.94		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 00:54	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-010

Date Collected: 10/16/19 09:45
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-10

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.530		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 00:58	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-011

Date Collected: 10/16/19 09:50
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-11

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.360		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 01:03	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-012

Date Collected: 10/16/19 09:55
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-12

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0865		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 01:07	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-013

Date Collected: 10/16/19 10:00
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-13

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	58.3		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 01:11	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-014

Date Collected: 10/16/19 10:05
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-14

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	18.7		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 01:15	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-015

Date Collected: 10/16/19 10:10
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-15

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	11.2		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 01:20	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-016

Date Collected: 10/16/19 10:15
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-16

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.133		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 12:49	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-017

Date Collected: 10/16/19 10:20
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-17

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	331		0.250	0.0375	mg/L		10/29/19 14:55	10/31/19 13:21	5

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-018

Date Collected: 10/16/19 10:25
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-18

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	3.29		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 01:33	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-019

Date Collected: 10/16/19 10:30
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-19

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0408	J	0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 01:45	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-020

Date Collected: 10/16/19 10:35
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-20

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	12.5	B	0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 13:05	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-021

Date Collected: 10/16/19 10:40
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-21

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	7.14		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:02	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-022

Date Collected: 10/16/19 10:45
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-22

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.107		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:15	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-023

Date Collected: 10/16/19 10:50
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-23

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0445	J	0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:19	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-024

Date Collected: 10/16/19 10:55
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-24

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0405	J	0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:23	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-025

Date Collected: 10/16/19 11:00
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-25

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	392		0.250	0.0375	mg/L		10/29/19 15:59	10/31/19 13:09	5

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-026

Date Collected: 10/16/19 11:05
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-26

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	74.4		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:31	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-027

Date Collected: 10/16/19 11:10
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-27

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0282	J	0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:35	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-028

Date Collected: 10/16/19 11:15
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-28

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	16.3		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:40	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-029

Date Collected: 10/16/19 11:20
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-29

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	179		0.250	0.0375	mg/L		10/29/19 15:59	10/31/19 13:14	5

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-030

Date Collected: 10/16/19 11:25
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-30

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	2.60		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:48	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-031

Date Collected: 10/16/19 11:30
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-31

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0188	J	0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 03:52	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-032

Date Collected: 10/16/19 11:35
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-32

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 04:04	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-033

Date Collected: 10/16/19 11:40
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-33

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.831		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 04:09	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-034

Date Collected: 10/16/19 11:45
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-34

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.125		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 04:13	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-035

Date Collected: 10/16/19 11:50
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-35

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0373	J	0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 04:17	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-036

Date Collected: 10/16/19 11:55
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-36

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0126	J	0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 04:21	1

Definitions/Glossary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F5	Duplicate RPD exceeds limit, and one or both sample results are less than 5 times RL. The data are considered valid because the absolute difference is less than the RL.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Metals

Leach Batch: 512263

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-1	0724-001	TCLP	Solid	1311	
500-171906-2	0724-002	TCLP	Solid	1311	
500-171906-3	0724-003	TCLP	Solid	1311	
500-171906-4	0724-004	TCLP	Solid	1311	
500-171906-5	0724-005	TCLP	Solid	1311	
500-171906-6	0724-006	TCLP	Solid	1311	
500-171906-7	0724-007	TCLP	Solid	1311	
500-171906-8	0724-008	TCLP	Solid	1311	
500-171906-9	0724-009	TCLP	Solid	1311	
500-171906-10	0724-010	TCLP	Solid	1311	
500-171906-11	0724-011	TCLP	Solid	1311	
500-171906-12	0724-012	TCLP	Solid	1311	
500-171906-13	0724-013	TCLP	Solid	1311	
500-171906-14	0724-014	TCLP	Solid	1311	
500-171906-15	0724-015	TCLP	Solid	1311	
500-171906-16	0724-016	TCLP	Solid	1311	
500-171906-17	0724-017	TCLP	Solid	1311	
500-171906-18	0724-018	TCLP	Solid	1311	
500-171906-19	0724-019	TCLP	Solid	1311	
LB 500-512263/1-B	Method Blank	TCLP	Solid	1311	
500-171906-19 MS	0724-019	TCLP	Solid	1311	
500-171906-19 DU	0724-019	TCLP	Solid	1311	

Leach Batch: 512264

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-20	0724-020	TCLP	Solid	1311	
LB2 500-512264/1-B	Method Blank	TCLP	Solid	1311	

Leach Batch: 512265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-21	0724-021	TCLP	Solid	1311	
500-171906-22	0724-022	TCLP	Solid	1311	
500-171906-23	0724-023	TCLP	Solid	1311	
500-171906-24	0724-024	TCLP	Solid	1311	
500-171906-25	0724-025	TCLP	Solid	1311	
500-171906-26	0724-026	TCLP	Solid	1311	
500-171906-27	0724-027	TCLP	Solid	1311	
500-171906-28	0724-028	TCLP	Solid	1311	
500-171906-29	0724-029	TCLP	Solid	1311	
500-171906-30	0724-030	TCLP	Solid	1311	
500-171906-31	0724-031	TCLP	Solid	1311	
500-171906-32	0724-032	TCLP	Solid	1311	
500-171906-33	0724-033	TCLP	Solid	1311	
500-171906-34	0724-034	TCLP	Solid	1311	
500-171906-35	0724-035	TCLP	Solid	1311	
500-171906-36	0724-036	TCLP	Solid	1311	
LB 500-512265/1-B	Method Blank	TCLP	Solid	1311	
500-171906-36 MS	0724-036	TCLP	Solid	1311	
500-171906-36 DU	0724-036	TCLP	Solid	1311	

QC Association Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Metals

Prep Batch: 512522

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-1	0724-001	TCLP	Solid	3010A	512263
500-171906-2	0724-002	TCLP	Solid	3010A	512263
500-171906-3	0724-003	TCLP	Solid	3010A	512263
500-171906-4	0724-004	TCLP	Solid	3010A	512263
500-171906-5	0724-005	TCLP	Solid	3010A	512263
500-171906-6	0724-006	TCLP	Solid	3010A	512263
500-171906-7	0724-007	TCLP	Solid	3010A	512263
500-171906-8	0724-008	TCLP	Solid	3010A	512263
500-171906-9	0724-009	TCLP	Solid	3010A	512263
500-171906-10	0724-010	TCLP	Solid	3010A	512263
500-171906-11	0724-011	TCLP	Solid	3010A	512263
500-171906-12	0724-012	TCLP	Solid	3010A	512263
500-171906-13	0724-013	TCLP	Solid	3010A	512263
500-171906-14	0724-014	TCLP	Solid	3010A	512263
500-171906-15	0724-015	TCLP	Solid	3010A	512263
500-171906-16	0724-016	TCLP	Solid	3010A	512263
500-171906-17	0724-017	TCLP	Solid	3010A	512263
500-171906-18	0724-018	TCLP	Solid	3010A	512263
500-171906-19	0724-019	TCLP	Solid	3010A	512263
500-171906-20	0724-020	TCLP	Solid	3010A	512264
LB 500-512263/1-B	Method Blank	TCLP	Solid	3010A	512263
LB2 500-512264/1-B	Method Blank	TCLP	Solid	3010A	512264
LCS 500-512522/2-A	Lab Control Sample	Total/NA	Solid	3010A	
500-171906-19 MS	0724-019	TCLP	Solid	3010A	512263
500-171906-19 DU	0724-019	TCLP	Solid	3010A	512263

Prep Batch: 512534

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-21	0724-021	TCLP	Solid	3010A	512265
500-171906-22	0724-022	TCLP	Solid	3010A	512265
500-171906-23	0724-023	TCLP	Solid	3010A	512265
500-171906-24	0724-024	TCLP	Solid	3010A	512265
500-171906-25	0724-025	TCLP	Solid	3010A	512265
500-171906-26	0724-026	TCLP	Solid	3010A	512265
500-171906-27	0724-027	TCLP	Solid	3010A	512265
500-171906-28	0724-028	TCLP	Solid	3010A	512265
500-171906-29	0724-029	TCLP	Solid	3010A	512265
500-171906-30	0724-030	TCLP	Solid	3010A	512265
500-171906-31	0724-031	TCLP	Solid	3010A	512265
500-171906-32	0724-032	TCLP	Solid	3010A	512265
500-171906-33	0724-033	TCLP	Solid	3010A	512265
500-171906-34	0724-034	TCLP	Solid	3010A	512265
500-171906-35	0724-035	TCLP	Solid	3010A	512265
500-171906-36	0724-036	TCLP	Solid	3010A	512265
LB 500-512265/1-B	Method Blank	TCLP	Solid	3010A	512265
LCS 500-512534/2-A	Lab Control Sample	Total/NA	Solid	3010A	
500-171906-36 MS	0724-036	TCLP	Solid	3010A	512265
500-171906-36 DU	0724-036	TCLP	Solid	3010A	512265

QC Association Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Metals

Analysis Batch: 512844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-5	0724-005	TCLP	Solid	6010C	512522
500-171906-6	0724-006	TCLP	Solid	6010C	512522
500-171906-7	0724-007	TCLP	Solid	6010C	512522
500-171906-8	0724-008	TCLP	Solid	6010C	512522
500-171906-9	0724-009	TCLP	Solid	6010C	512522
500-171906-10	0724-010	TCLP	Solid	6010C	512522
500-171906-11	0724-011	TCLP	Solid	6010C	512522
500-171906-12	0724-012	TCLP	Solid	6010C	512522
500-171906-13	0724-013	TCLP	Solid	6010C	512522
500-171906-14	0724-014	TCLP	Solid	6010C	512522
500-171906-15	0724-015	TCLP	Solid	6010C	512522
500-171906-18	0724-018	TCLP	Solid	6010C	512522
500-171906-19	0724-019	TCLP	Solid	6010C	512522
LB 500-512263/1-B	Method Blank	TCLP	Solid	6010C	512522
LB2 500-512264/1-B	Method Blank	TCLP	Solid	6010C	512522
LCS 500-512522/2-A	Lab Control Sample	Total/NA	Solid	6010C	512522
500-171906-19 MS	0724-019	TCLP	Solid	6010C	512522
500-171906-19 DU	0724-019	TCLP	Solid	6010C	512522

Analysis Batch: 512850

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-21	0724-021	TCLP	Solid	6010C	512534
500-171906-22	0724-022	TCLP	Solid	6010C	512534
500-171906-23	0724-023	TCLP	Solid	6010C	512534
500-171906-24	0724-024	TCLP	Solid	6010C	512534
500-171906-26	0724-026	TCLP	Solid	6010C	512534
500-171906-27	0724-027	TCLP	Solid	6010C	512534
500-171906-28	0724-028	TCLP	Solid	6010C	512534
500-171906-30	0724-030	TCLP	Solid	6010C	512534
500-171906-31	0724-031	TCLP	Solid	6010C	512534
500-171906-32	0724-032	TCLP	Solid	6010C	512534
500-171906-33	0724-033	TCLP	Solid	6010C	512534
500-171906-34	0724-034	TCLP	Solid	6010C	512534
500-171906-35	0724-035	TCLP	Solid	6010C	512534
500-171906-36	0724-036	TCLP	Solid	6010C	512534
LB 500-512265/1-B	Method Blank	TCLP	Solid	6010C	512534
LCS 500-512534/2-A	Lab Control Sample	Total/NA	Solid	6010C	512534
500-171906-36 MS	0724-036	TCLP	Solid	6010C	512534
500-171906-36 DU	0724-036	TCLP	Solid	6010C	512534

Analysis Batch: 512965

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-17	0724-017	TCLP	Solid	6010C	512522

Analysis Batch: 512977

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-1	0724-001	TCLP	Solid	6010C	512522
500-171906-2	0724-002	TCLP	Solid	6010C	512522
500-171906-3	0724-003	TCLP	Solid	6010C	512522
500-171906-4	0724-004	TCLP	Solid	6010C	512522
500-171906-16	0724-016	TCLP	Solid	6010C	512522

Metals (Continued)

Analysis Batch: 512977 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-171906-20	0724-020	TCLP	Solid	6010C	512522
500-171906-25	0724-025	TCLP	Solid	6010C	512534
500-171906-29	0724-029	TCLP	Solid	6010C	512534

Method: 6010C - Metals (ICP)

Lab Sample ID: LCS 500-512522/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 512844 — **Prep Batch: 512522**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	0.100	0.1003		mg/L		100	80 - 120

Lab Sample ID: LCS 500-512534/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 512850 — **Prep Batch: 512534**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	0.100	0.1001		mg/L		100	80 - 120

Lab Sample ID: LB 500-512263/1-B — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 512844 — **Prep Batch: 512522**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 00:03	1

Lab Sample ID: LB2 500-512264/1-B — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 512844 — **Prep Batch: 512522**

Analyte	LB2 Result	LB2 Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.008015	J	0.0500	0.00750	mg/L		10/29/19 14:55	10/31/19 02:02	1

Lab Sample ID: 500-171906-19 MS — **Client Sample ID: 0724-019**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 512844 — **Prep Batch: 512522**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	0.0408	J	0.100	0.1259		mg/L		85	75 - 125

Lab Sample ID: 500-171906-19 DU — **Client Sample ID: 0724-019**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 512844 — **Prep Batch: 512522**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Lead	0.0408	J	0.03831	J	mg/L		6	20

Lab Sample ID: LB 500-512265/1-B — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 512850 — **Prep Batch: 512534**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.0500	0.00750	mg/L		10/29/19 15:59	10/31/19 02:54	1

Lab Sample ID: 500-171906-36 MS — **Client Sample ID: 0724-036**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 512850 — **Prep Batch: 512534**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	0.0126	J	0.100	0.1269		mg/L		114	75 - 125

QC Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Method: 6010C - Metals (ICP)

Lab Sample ID: 500-171906-36 DU
Matrix: Solid
Analysis Batch: 512850

Client Sample ID: 0724-036
Prep Type: TCLP
Prep Batch: 512534

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Lead	0.0126	J		0.01736	J F5	mg/L				32	20

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-001 — Lab Sample ID: 500-171906-1

Date Collected: 10/16/19 09:00 — **Matrix: Solid**
Date Received: 10/17/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		5	512977	10/31/19 12:16	EEN	TAL CHI

Client Sample ID: 0724-002 — Lab Sample ID: 500-171906-2

Date Collected: 10/16/19 09:05 — **Matrix: Solid**
Date Received: 10/17/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512977	10/31/19 12:20	EEN	TAL CHI

Client Sample ID: 0724-003 — Lab Sample ID: 500-171906-3

Date Collected: 10/16/19 09:10 — **Matrix: Solid**
Date Received: 10/17/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512977	10/31/19 12:24	EEN	TAL CHI

Client Sample ID: 0724-004 — Lab Sample ID: 500-171906-4

Date Collected: 10/16/19 09:15 — **Matrix: Solid**
Date Received: 10/17/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512977	10/31/19 12:29	EEN	TAL CHI

Client Sample ID: 0724-005 — Lab Sample ID: 500-171906-5

Date Collected: 10/16/19 09:20 — **Matrix: Solid**
Date Received: 10/17/19 08:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 00:29	EEN	TAL CHI

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-006
Date Collected: 10/16/19 09:25
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 00:33	EEN	TAL CHI

Client Sample ID: 0724-007
Date Collected: 10/16/19 09:30
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-7
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 00:37	EEN	TAL CHI

Client Sample ID: 0724-008
Date Collected: 10/16/19 09:35
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 00:42	EEN	TAL CHI

Client Sample ID: 0724-009
Date Collected: 10/16/19 09:40
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-9
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 00:54	EEN	TAL CHI

Client Sample ID: 0724-010
Date Collected: 10/16/19 09:45
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-10
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 00:58	EEN	TAL CHI

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-011
Date Collected: 10/16/19 09:50
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-11
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 01:03	EEN	TAL CHI

Client Sample ID: 0724-012
Date Collected: 10/16/19 09:55
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-12
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 01:07	EEN	TAL CHI

Client Sample ID: 0724-013
Date Collected: 10/16/19 10:00
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-13
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 01:11	EEN	TAL CHI

Client Sample ID: 0724-014
Date Collected: 10/16/19 10:05
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-14
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 01:15	EEN	TAL CHI

Client Sample ID: 0724-015
Date Collected: 10/16/19 10:10
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-15
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 01:20	EEN	TAL CHI

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-016
Date Collected: 10/16/19 10:15
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-16
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512977	10/31/19 12:49	EEN	TAL CHI

Client Sample ID: 0724-017
Date Collected: 10/16/19 10:20
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-17
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		5	512965	10/31/19 13:21	EEN	TAL CHI

Client Sample ID: 0724-018
Date Collected: 10/16/19 10:25
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-18
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 01:33	EEN	TAL CHI

Client Sample ID: 0724-019
Date Collected: 10/16/19 10:30
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-19
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512263	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512844	10/31/19 01:45	EEN	TAL CHI

Client Sample ID: 0724-020
Date Collected: 10/16/19 10:35
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-20
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512264	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512522	10/29/19 14:55	BDE	TAL CHI
TCLP	Analysis	6010C		1	512977	10/31/19 13:05	EEN	TAL CHI

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-021
Date Collected: 10/16/19 10:40
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-21
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:02	EEN	TAL CHI

Client Sample ID: 0724-022
Date Collected: 10/16/19 10:45
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-22
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:15	EEN	TAL CHI

Client Sample ID: 0724-023
Date Collected: 10/16/19 10:50
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-23
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:19	EEN	TAL CHI

Client Sample ID: 0724-024
Date Collected: 10/16/19 10:55
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-24
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:23	EEN	TAL CHI

Client Sample ID: 0724-025
Date Collected: 10/16/19 11:00
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-25
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		5	512977	10/31/19 13:09	EEN	TAL CHI

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-026
Date Collected: 10/16/19 11:05
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-26
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:31	EEN	TAL CHI

Client Sample ID: 0724-027
Date Collected: 10/16/19 11:10
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-27
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:35	EEN	TAL CHI

Client Sample ID: 0724-028
Date Collected: 10/16/19 11:15
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-28
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:40	EEN	TAL CHI

Client Sample ID: 0724-029
Date Collected: 10/16/19 11:20
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-29
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		5	512977	10/31/19 13:14	EEN	TAL CHI

Client Sample ID: 0724-030
Date Collected: 10/16/19 11:25
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-30
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:48	EEN	TAL CHI

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-031
Date Collected: 10/16/19 11:30
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-31
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 03:52	EEN	TAL CHI

Client Sample ID: 0724-032
Date Collected: 10/16/19 11:35
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-32
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 04:04	EEN	TAL CHI

Client Sample ID: 0724-033
Date Collected: 10/16/19 11:40
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-33
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 04:09	EEN	TAL CHI

Client Sample ID: 0724-034
Date Collected: 10/16/19 11:45
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-34
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 04:13	EEN	TAL CHI

Client Sample ID: 0724-035
Date Collected: 10/16/19 11:50
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-35
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 04:17	EEN	TAL CHI

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Client Sample ID: 0724-036

Date Collected: 10/16/19 11:55
Date Received: 10/17/19 08:40

Lab Sample ID: 500-171906-36

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			512265	10/28/19 11:45	GCA	TAL CHI
TCLP	Prep	3010A			512534	10/29/19 15:59	BDE	TAL CHI
TCLP	Analysis	6010C		1	512850	10/31/19 04:21	EEN	TAL CHI

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Accreditation/Certification Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-171906-1

Laboratory: Eurofins TestAmerica, Chicago

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Georgia	State Program	N/A	04-30-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte

Eurofins TestAmerica, Chicago
2417 Bind Street

University Park, IL 60464-3101
phone 708.534.5200 fax 708.534.5211

Chain of Custody Record

eurofins

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	**Project Manager:** T. Bradley		COC No:
	Email: triley@kemron.com	**Site Contact:**	**Date:** 10-16-19	___1___ of ___3___ COCs
KEMRON Environmental Services, Inc.	**Tel/Fax:** 404-636-0928	**Lab Contact:**	**Carrier:**	TALS Project #:
1359 Ellsworth Industrial Blvd	**Analysis Turnaround Time**			Sampler:
Atlanta, GA 30318	☐ CALENDAR DAYS ☑ WORKING DAYS			**For Lab Use Only:**
(404) 636-0928 Phor	TAT if different from Below _____			Walk-in Client:
(xxx) xxx-xxxx FAX	☑ 2 weeks			Lab Sampling:
Project Name:	☐ 1 week			
Site: 500-171906 COC	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			500-171906

	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	TCLP Lead	Sample Specific Notes:
1	0724-001	10/16/19	900	G	S	1			X	
2	0724-002	10/16/19	905	G	S	1			X	
3	0724-003	10/16/19	910	G	S	1			X	
4	0724-004	10/16/19	915	G	S	1			X	
5	0724-005	10/16/19	920	G	S	1			X	
6	0724-006	10/16/19	925	G	S	1			X	
7	0724-007	10/16/19	930	G	S	1			X	
8	0724-008	10/16/19	935	G	S	1			X	
9	0724-009	10/16/19	940	G	S	1			X	
10	0724-010	10/16/19	945	G	S	1			X	
11	0724-011	10/16/19	950	G	S	1			X	
12	0724-012	10/16/19	955	G	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments: **Please include ph logs**

118/16

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ | Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	10-16-19	1351	[signature]	10-16-19	1351
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	10-16-19	1435			
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:
			[signature]	TA-CHI	10/17/19 0840

Eurofins TestAmerica, Chicago
2417 Bind Street

University Park, IL 60464-3101
phone 708.534.5200 fax 708.534.5211

Chain of Custody Record

eurofins

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	**Project Manager: T. Bradley**		COC No:
KEMRON Environmental Services, Inc.	**Email: triley@kemron.com**	**Site Contact:**	**Date: 10-16-19**	___2___ of ___3___ COCs
1359 Ellsworth Industrial Blvd	**Tel/Fax: 404-636-0928**	**Lab Contact:**	**Carrier:**	TALS Project #:
Atlanta, GA 30318	**Analysis Turnaround Time**			Sampler:
(404) 636-0928 Phone	☐ CALENDAR DAYS ☑ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx FAX	TAT if different from Below _____			Walk-in Client:
Project Name:	☑ 2 weeks			Lab Sampling:
Site:	☐ 1 week			
P O #	☐ 2 days			Job / SDG No.: 500-171906
	☐ 1 day			

	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	TCLP Lead	Sample Specific Notes:
13	0724-013	10/16/19	1000	G	S	1			X	
14	0724-014	10/16/19	1005	G	S	1			X	
15	0724-015	10/16/19	1010	G	S	1			X	
16	0724-016	10/16/19	1015	G	S	1			X	
17	0724-017	10/16/19	1020	G	S	1			X	
18	0724-018	10/16/19	1025	G	S	1			X	
19	0724-019	10/16/19	1030	G	S	1			X	
20	0724-020	10/16/19	1035	G	S	1			X	
21	0724-021	10/16/19	1040	G	S	1			X	
22	0724-022	10/16/19	1045	G	S	1			X	
23	0724-023	10/16/19	1050	G	S	1			X	
24	0724-024	10/16/19	1055	G	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments: **Please include pH logs**

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ | Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Kemron	10/16/19 16	[signature]	10-16-19	1351
Relinquished by: [signature]	Company: 10-16-19	Date/Time: 1433	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: [signature]	Company: TA-CHI	Date/Time: 10/17/19 0840

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

Eurofins TestAmerica, Chicago
2417 Bind Street

University Park, IL 60464-3101
phone 708.534.5200 fax 708.534.5211

Chain of Custody Record

eurofins

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	**Project Manager: T. Bradley**		COC No:
KEMRON Environmental Services, Inc.	**Email: triley@kemron.com**	**Site Contact:**	**Date: 10-16-19**	___3___ of ___3___ COCs
1359 Ellsworth Industrial Blvd	**Tel/Fax: 404-636-0928**	**Lab Contact:**	**Carrier:**	TALS Project #:
Atlanta, GA 30318	**Analysis Turnaround Time**			Sampler:
(404) 636-0928 Phone	☐ CALENDAR DAYS ☑ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx FAX	TAT if different from Below _____			Walk-in Client:
Project Name:	☑ 2 weeks			Lab Sampling:
Site:	☐ 1 week			
P O #	☐ 2 days			Job / SDG No.:
	☐ 1 day			500-171906

	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	TCLP Lead	Sample Specific Notes:
25	0724-025	10/16/19	1100	G	S	1			X	
26	0724-026	10/16/19	1105	G	S	1			X	
27	0724-027	10/16/19	1110	G	S	1			X	
28	0724-028	10/16/19	1115	G	S	1			X	
29	0724-029	10/16/19	1120	G	S	1			X	
30	0724-030	10/16/19	1125	G	S	1			X	
31	0724-031	10/16/19	1130	G	S	1			X	
32	0724-032	10/16/19	1135	G	S	1			X	
33	0724-033	10/16/19	1140	G	S	1			X	
34	0724-034	10/16/19	1145	G	S	1			X	
35	0724-035	10/16/19	1150	G	S	1			X	
36	0724-036	10/16/19	1155	G	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☑ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments: **Please include pH logs**

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ | Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Kemron	1159 10/16/19	[signature]	10-16-19	1351
[signature]	10-16-19	1733	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: [signature]	Company: TA Chi	Date/Time: 10/17/19 0840

Form No. CA-C-WI-002, Rev. 4.26, dated 7/25/2019

Analyst: [illegible]
Reviewer:

VOA's

Metals
Date: 10/28/19
Date:

Testamerica Chicago
TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: C2393 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration Start Time: 1120
Group Number: T986 Extr. End Date 10/29/19 Time 0345 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration End Time: 1245
LIMS Batch No.: 512263/512264 Min.Temp: Uncorrected/Corrected 19.5 / 19.5 °C Max.Temp: Uncorrected/Corrected 20.5 / 21 °C Filter Paper Lot #: 112167-9259
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: L0042
Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	LB	LB2	500-171906-1	-2	-3
Sample Description	Extraction fluid #1	Extraction fluid #2	Solid	→	→
Sample Weight (g)	N/A	→	50.48	50.18	50.43
Liquid-Solid Separation (Yes/No)	No	→	→	→	→
Volume of Mother Liquid (mLs)	N/A	→	→	→	→
Solid Extraction Material (g)	N/A	→	50.48	50.18	50.43
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	N/A	→	10.28	10.85	11.02
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	4.92	2.85	1.83	1.76	1.83
Extraction Fluid Type (1 or 2)	1	2	1	→	→
Extraction Vessel Type / Pressure Check	HDPE	→	→	→	→
Extraction Fluid Volume (mLs)	2000	→	1000	→	→
Extract Filtered (Yes or No)	Yes	→	→	→	→
Mother Liquid Added (mLs)	N/A	→	→	→	→
Combined Filtrate Volume (mLs)	250	→	→	→	→
Final pH Reading	4.85	3.35	5.38	5.78	6.90
Spike Source ID # / Volume Added (mLs)	N/A	→	→	→	→
Filtrate Preserved	Yes/M	→	→	→	→
ZHE: Initial psi / Final psi	N/A	→	→	→	→

Comments:
Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 05109012)

Analyst: [signature]
Reviewer: [signature]

Metals
Date: 10/28/19
Date: 10/31/19

CHI-22-15-003/P-12/15

TestAmerica Chicago
TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: 12393 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration Start Time: 1120
Group Number: T986 Extr. End Date 10/29/19 Time 0545 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration End Time: 1245
LIMS Batch No.: 54863/512264 Min.Temp: Uncorrected/Corrected 19.4 / 19.5 °C Max.Temp: Uncorrected/Corrected 20.5 / 21 °C Filter Paper Lot #: 112167-9259
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C0042
Sample Type (Circle): TCLV SPLP TCLP ASTM HA 10/29/19

Sample Number	500-171906-4	-5	-6	-7	-8
Sample Description	solid				
Sample Weight (g)	50.31	50.06	50.40	50.50	50.43
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	50.31	50.06	50.40	50.50	50.43
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	11.04	10.14	10.29	10.70	11.06
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	2.06	1.83	2.10	2.39	3.79
Extraction Fluid Type (1 or 2)	1				
Extraction Vessel Type / Pressure Check	HDPE				
Extraction Fluid Volume (mLs)	1000				
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	9.51	6.68	8.53	9.48	10.08
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes/N				
ZHE: Initial psi / Final psi	N/A				

Comments:
Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 051090113) Metals
Analyst: Date: 10/28/19
Reviewer: Date: 10/30/19

CHI-22-15-003/P-12/16

Organics/Metals

ZHE = Zero Headspace VOA's

HDPE = High Density Polyethylene (Lot # 051090JP) Metals

Analyst: [signature] Date: 10/28/19

Reviewer: [signature] Date: 10/31/19

CHI-22-15-003/P-12/15

Page Number:

TCLP Extraction Logbook

Rotator RPM:30 ± 2 RPMs ID#: C2593 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration Start Time: 1120

Group Number: T986 Extr. End Date 10/29/19 Time 0545 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration End Time: 1245

LIMS Batch No.: 512263/512264 Min.Temp: Uncorrected/Corrected 19.5 / 19.5 °C Max.Temp: Uncorrected/Corrected 20.5 / 21 °C Filter Paper Lot #: 112167-9259

Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C0042

Sample Type (Circle): TCLV SPLP TCLP ASTM

Sample Number	500-171906-9	-10	-11	-12	-13
Sample Description	solid	→	→	→	→
Sample Weight (g)	50.26	50.45	50.37	50.24	50.39
Liquid-Solid Separation (Yes/No)	NO	→	→	→	→
Volume of Mother Liquid (mLs)	N/A	→	→	→	→
Solid Extraction Material (g)	50.26	50.45	50.37	50.24	50.39
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	9.38	9.74	10.02	10.12	10.55
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1; If >5.0, use Extraction Fluid #2	1.72	1.86	2.01	2.27	1.70
Extraction Fluid Type (1 or 2)	1	→	→	→	→
Extraction Vessel Type / Pressure Check	HDPE	→	→	→	→
Extraction Fluid Volume (mLs)	1000	→	→	→	→
Extract Filtered (Yes or No)	Yes	→	→	→	→
Mother Liquid Added (mLs)	N/A	→	→	→	→
Combined Filtrate Volume (mLs)	250	→	→	→	→
Final pH Reading	6.59	7.83	8.43	8.92	5.20
Spike Source ID # / Volume Added (mLs)	N/A	→	→	→	→
Filtrate Preserved	Yes/M	→	→	→	→
ZHE: Initial psi / Final psi	N/A	→	→	→	→

Comments:

Extraction Vessel Codes: T = Teflon

ZHE = Zero Headspace VOA's

HDPE = High Density Polyethylene (Lot # 051090JP) Metals

Analyst: [signature] Date: 10/28/19

Reviewer: [signature] Date: 10/31/19

CHI-22-15-003/P-12/15

TestAmerica Chicago
TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: C2393 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration Start Time: 1120
Group Number: T986 Extr. End Date 10/29/19 Time 0845 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration End Time: 1245
LIMS Batch No.: 512263/512264 Min.Temp: Uncorrected/Corrected 19.5/19.5 °C Max.Temp: Uncorrected/Corrected 20.5/21 °C Filter Paper Lot #: 112167-9259
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C0042
Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	500-171906-14	-15	-16	-17	-18
Sample Description	Solid				
Sample Weight (g)	50.35	50.21	50.48	50.22	50.35
Liquid-Solid Separation (Yes/No)	NO				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	50.35	50.21	50.48	50.22	50.35
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	10.99	11.04	11.45	9.50	10.28
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1; If >5.0, use Extraction Fluid #2	1.92	1.85	2.06	1.81	1.98
Extraction Fluid Type (1 or 2)	1				
Extraction Vessel Type / Pressure Check	HDPE				
Extraction Fluid Volume (mLs)	1000				
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	5.48	5.47	7.19	5.27	5.80
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes M				
ZHE: Initial psi / Final psi	N/A				

Comments:
Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 05104010 Metals)
Analyst: Date: 10/28/19
Reviewer: Date: 10/31/19

CHI-22-15-003/P-12/16

TestAmerica Chicago
TCLP Extraction Logbook
Page Number: 299
Rotator RPM:30 ± 2 RPMs ID#: C2393 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration Start Time: 1120

Analyst: [signature] Date: 10/28/19
Reviewer: [signature] Date: 10/31/19

CHI-22-15-003/P-12/15

Pace Analytical Chicago
TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: C2313 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration Start Time: 1120
Group Number: T986 Extr. End Date 10/29/19 Time 1545 Temp: Uncorrected 20.5 Corrected 20.5 °C Filtration End Time: 1245
LIMS Batch No.: 512263/512264 Min.Temp: Uncorrected/Corrected ~~20.5~~ 19.5 / ~~20.5~~ 19.5 °C Max.Temp: Uncorrected/Corrected ~~19.5~~ 20.5 / ~~19.5~~ 20.5 °C Filter Paper Lot #: 112167-9259
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C0042
Sample Type (Circle): TCLV SPLP TCLP ASTM HA 10/29/19 AA 10/29/19

Sample Number	500-179166-19	-20			
Sample Description	Solid				
Sample Weight (g)	50.23	50.48			
Liquid-Solid Separation (Yes/No)	NO				
Volume of Mother Liquid (mLs)	NA				
Solid Extraction Material (g)	50.23	50.48			
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	10.75	11.09			
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	2.26	5.90			HA 10/28/19
Extraction Fluid Type (1 or 2)	1	2			
Extraction Vessel Type / Pressure Check	HDPE				
Extraction Fluid Volume (mLs)	1000				
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	NA				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	7.52	5.38			
Spike Source ID # / Volume Added (mLs)	NA				
Filtrate Preserved	~~Yes~~ NA				
ZHE: Initial psi / Final psi	NA				

Comments:
Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 051090115) Metals
Analyst: [signature] Date: 10/28/19
Reviewer: [signature] Date: 10/31/19

CHI-22-15-003/P-12/15

TestAmerica Chicago
TCLP Extraction Logbook

Page Number: _____

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected ~~20.5~~ 20.7 HA 10/28/19 °C Filtration Start Time: 1335

Group Number: T487 Extr. End Date 10/29/19 Time 0545 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1525

LIMS Batch No.: 512265 Min.Temp: Uncorrected/Corrected 20 / 20.2 °C Max.Temp: Uncorrected/Corrected 21.5 / 22.2 °C Filter Paper Lot #: 112167-4259

Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024

Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	LB	500-171906-21	-22	-23	-24
Sample Description	Extraction fluid #1	Solid	HA 10/28/19		
Sample Weight (g)	N/A	50.43	~~50.43~~ 50.36	~~50.36~~ 50.21	~~50.21~~ 50.43
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	N/A	50.43	50.3	50.21	50.43
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	N/A	8.89	9.75	10.06	10.09
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	4.92	1.62	1.70	2.04	2.00
Extraction Fluid Type (1 or 2)	1				
Extraction Vessel Type / Pressure Check	HDPE				
Extraction Fluid Volume (mLs)	1000				
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	4.85	5.96	7.64	8.54	8.99
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes/N				
ZHE: Initial psi / Final psi	N/A				

Comments:

Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 051090ID) Metals

Analyst: [signature] Date: 10/28/19

Reviewer: [signature] Date: 10/31/19

CHI-22-15-003/P-12/15

TCLP Extraction Logbook Page Number: _____

Extraction Vessel Codes: T = Teflon Organics/Metals; ZHE = Zero Headspace VOA's; HDPE = High Density Polyethylene (Lot # 05109011) Metals

Analyst: [signature] Date: 10/28/19

Reviewer: [signature] Date: 10/31/19

CHI-22-15-003/P-12/15

TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1335

Group Number: T987 Extr. End Date 10/29/19 Time 0545 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1525

LIMS Batch No.: 512265 Min.Temp: Uncorrected/Corrected 20 / 20.2 °C Max.Temp: Uncorrected/Corrected 21.5 / 22.2 °C Filter Paper Lot #: N2167-9259

Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024

Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	500-171906-25	-26	-27	-28	-29
Sample Description	Solid	→	→	→	→
Sample Weight (g)	50.28	50.05	50.24	50.24	50.42
Liquid-Solid Separation (Yes/No)	NO	→	→	→	→
Volume of Mother Liquid (mLs)	NA	→	→	→	→
Solid Extraction Material (g)	50.28	50.05	50.24	50.24	50.42
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	10.14	10.48	11.04	11.11	9.42
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1; If >5.0, use Extraction Fluid #2	1.59	1.61	1.77	1.76	1.63
Extraction Fluid Type (1 or 2)	1	→	→	→	→
Extraction Vessel Type / Pressure Check	HDPE	→	→	→	→
Extraction Fluid Volume (mLs)	1000	→	→	→	→
Extract Filtered (Yes or No)	Yes	→	→	→	→
Mother Liquid Added (mLs)	N/A	→	→	→	→
Combined Filtrate Volume (mLs)	250	→	→	→	→
Final pH Reading	5.36	5.64	6.91	5.84	5.58
Spike Source ID # / Volume Added (mLs)	N/A	→	→	→	→
Filtrate Preserved	Yes/M	→	→	→	→
ZHE: Initial psi / Final psi	N/A	→	→	→	→

Comments:

Extraction Vessel Codes: T = Teflon Organics/Metals; ZHE = Zero Headspace VOA's; HDPE = High Density Polyethylene (Lot # 05109011) Metals

Analyst: [signature] Date: 10/28/19

Reviewer: [signature] Date: 10/31/19

CHI-22-15-003/P-12/15

TestAmerica Chicago
TCLP Extraction Logbook

302

Page Number: 11-A 10/29/19

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: ~~1530~~ 1335

Group Number: T987 Extr. End Date 10/29/19 Time 0545 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1525

LIMS Batch No.: 512265 Min.Temp: Uncorrected/Corrected 20 20.2 °C Max.Temp: Uncorrected/Corrected 21.5 22.2 °C Filter Paper Lot #: 112167-9251

Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024

Sample Type (Circle): TCLV SPLP TCLP ASTM

Sample Number	500-171906-30	-31	-32	-33	-34
Sample Description	solid				
Sample Weight (g)	50.21	50.30	50.48	50.21	50.48
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	50.21	50.30	50.48	50.21	50.48
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	9.52	10.19	10.83	9.31	9.67
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	1.83	1.83	3.49	1.64	1.92
Extraction Fluid Type (1 or 2)	1				
Extraction Vessel Type / Pressure Check	HDPE				
Extraction Fluid Volume (mLs)	1000				
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	6.50	7.89	9.35	6.89	7.64
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes N				
ZHE: Initial psi / Final psi	N/A				

Comments:

Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 05170901) Metals

Analyst: Date: 10/28/19

Reviewer: Date: 10/31/19

CHI-22-15-003/P-12/15

Analyst: [illegible] Organics/Metals VOA's Metals Date: 10/28/19
Reviewer: [illegible] Date: 10/31/19

CHI-22-15-003/P-12/15

TestAmerica Chicago
TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: C2859 Extr. Start Date 10/28/19 Time 1145 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1355
Group Number: T987 Extr. End Date 10/29/19 Time 0545 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1525
LIMS Batch No.: 512265 Min.Temp: Uncorrected/Corrected 20 / 20.2 °C Max.Temp: Uncorrected/Corrected 21.5 / 22.2 °C Filter Paper Lot #: 112167-9259
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024
Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	500-171906-35	-36			
Sample Description	Solid →				
Sample Weight (g)	50.14	50.33			
Liquid-Solid Separation (Yes/No)	No →				
Volume of Mother Liquid (mLs)	N/A →				
Solid Extraction Material (g)	50.14	50.33			
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	9.89	9.94			
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	1.84	1.85			HA 10/28/19
Extraction Fluid Type (1 or 2)	1 →				
Extraction Vessel Type / Pressure Check	HDPE →				
Extraction Fluid Volume (mLs)	1000 →				
Extract Filtered (Yes or No)	Yes →				
Mother Liquid Added (mLs)	N/A →				
Combined Filtrate Volume (mLs)	250 →				
Final pH Reading	8.77	9.17			
Spike Source ID # / Volume Added (mLs)	N/A →				
Filtrate Preserved	Yes M →				
ZHE: Initial psi / Final psi	N/A →				

Comments:
Extraction Vessel Codes: T = Teflon ZHE = Zero Headspace HDPE = High Density Polyethylene (Lot # 05D7015)
Analyst: [illegible] Organics/Metals VOA's Metals Date: 10/28/19
Reviewer: [illegible] Date: 10/31/19

CHI-22-15-003/P-12/15

Login Sample Receipt Checklist

Client: Kemron Environmental Services, Inc.

Job Number: 500-171906-1

Login Number: 171906
List Number: 1
Creator: Scott, Sherri L

List Source: Eurofins TestAmerica, Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.8,1.6
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-173080-1
Client Project/Site: NASA ECCL Stabilization
Revision: 1

For:
Kemron Environmental Services, Inc.
1359A Ellsworth Industrial Blvd.
Atlanta, Georgia 30318

Attn: Tomecia Bradley

Therese Hargraves

Authorized for release by:
11/19/2019 2:53:31 PM

Therese Hargraves, Project Manager I
(708)793-3461
therese.hargraves@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 500-173080-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-173080-1

Comments
No additional comments.

Receipt
The samples were received on 11/7/2019 8:09 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.2º C.

Revised Report
TCLP Extraction Logs added to report.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Client Sample ID: 0724-037 — Lab Sample ID: 500-173080-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.322		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-038 — Lab Sample ID: 500-173080-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0747		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-039 — Lab Sample ID: 500-173080-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	91.4		0.0500	0.00750	mg/L	1		6010C	TCLP

Client Sample ID: 0724-040 — Lab Sample ID: 500-173080-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.152		0.0500	0.00750	mg/L	1		6010C	TCLP

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CHI
1311	TCLP Extraction	SW846	TAL CHI
3010A	Preparation, Total Metals	SW846	TAL CHI

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-173080-1	0724-037	Solid	11/06/19 10:00	11/07/19 20:09	
500-173080-2	0724-038	Solid	11/06/19 10:05	11/07/19 20:09	
500-173080-3	0724-039	Solid	11/06/19 10:10	11/07/19 20:09	
500-173080-4	0724-040	Solid	11/06/19 10:15	11/07/19 20:09	

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Client Sample ID: 0724-037

Date Collected: 11/06/19 10:00
Date Received: 11/07/19 20:09

Lab Sample ID: 500-173080-1

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.322		0.0500	0.00750	mg/L		11/15/19 15:16	11/18/19 16:45	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Client Sample ID: 0724-038

Date Collected: 11/06/19 10:05
Date Received: 11/07/19 20:09

Lab Sample ID: 500-173080-2

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.0747		0.0500	0.00750	mg/L		11/15/19 15:16	11/18/19 16:50	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Client Sample ID: 0724-039

Date Collected: 11/06/19 10:10
Date Received: 11/07/19 20:09

Lab Sample ID: 500-173080-3

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	91.4		0.0500	0.00750	mg/L		11/15/19 15:16	11/18/19 16:54	1

Client Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Client Sample ID: 0724-040

Date Collected: 11/06/19 10:15
Date Received: 11/07/19 20:09

Lab Sample ID: 500-173080-4

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.152		0.0500	0.00750	mg/L		11/15/19 15:16	11/18/19 16:58	1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Metals

Leach Batch: 515389

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173080-1	0724-037	TCLP	Solid	1311	
500-173080-2	0724-038	TCLP	Solid	1311	
500-173080-3	0724-039	TCLP	Solid	1311	
500-173080-4	0724-040	TCLP	Solid	1311	
LB 500-515389/1-B	Method Blank	TCLP	Solid	1311	

Prep Batch: 515643

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173080-1	0724-037	TCLP	Solid	3010A	515389
500-173080-2	0724-038	TCLP	Solid	3010A	515389
500-173080-3	0724-039	TCLP	Solid	3010A	515389
500-173080-4	0724-040	TCLP	Solid	3010A	515389
LB 500-515389/1-B	Method Blank	TCLP	Solid	3010A	515389
LCS 500-515643/2-A	Lab Control Sample	Total/NA	Solid	3010A	

Analysis Batch: 516075

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173080-1	0724-037	TCLP	Solid	6010C	515643
500-173080-2	0724-038	TCLP	Solid	6010C	515643
500-173080-3	0724-039	TCLP	Solid	6010C	515643
500-173080-4	0724-040	TCLP	Solid	6010C	515643
LB 500-515389/1-B	Method Blank	TCLP	Solid	6010C	515643
LCS 500-515643/2-A	Lab Control Sample	Total/NA	Solid	6010C	515643

QC Sample Results

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Method: 6010C - Metals (ICP)

Lab Sample ID: LCS 500-515643/2-A
Matrix: Solid
Analysis Batch: 516075

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 515643

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Lead			0.100	0.1004		mg/L		100	80 - 120		

Lab Sample ID: LB 500-515389/1-B
Matrix: Solid
Analysis Batch: 516075

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 515643

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.0500	0.00750	mg/L		11/15/19 15:16	11/18/19 16:28	1

Lab Chronicle

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Client Sample ID: 0724-037 — Lab Sample ID: 500-173080-1

Date Collected: 11/06/19 10:00
Date Received: 11/07/19 20:09
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			515389	11/14/19 13:43	GCA	TAL CHI
TCLP	Prep	3010A			515643	11/15/19 15:16	BDE	TAL CHI
TCLP	Analysis	6010C		1	516075	11/18/19 16:45	EEN	TAL CHI

Client Sample ID: 0724-038 — Lab Sample ID: 500-173080-2

Date Collected: 11/06/19 10:05
Date Received: 11/07/19 20:09
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			515389	11/14/19 13:43	GCA	TAL CHI
TCLP	Prep	3010A			515643	11/15/19 15:16	BDE	TAL CHI
TCLP	Analysis	6010C		1	516075	11/18/19 16:50	EEN	TAL CHI

Client Sample ID: 0724-039 — Lab Sample ID: 500-173080-3

Date Collected: 11/06/19 10:10
Date Received: 11/07/19 20:09
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			515389	11/14/19 13:43	GCA	TAL CHI
TCLP	Prep	3010A			515643	11/15/19 15:16	BDE	TAL CHI
TCLP	Analysis	6010C		1	516075	11/18/19 16:54	EEN	TAL CHI

Client Sample ID: 0724-040 — Lab Sample ID: 500-173080-4

Date Collected: 11/06/19 10:15
Date Received: 11/07/19 20:09
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			515389	11/14/19 13:43	GCA	TAL CHI
TCLP	Prep	3010A			515643	11/15/19 15:16	BDE	TAL CHI
TCLP	Analysis	6010C		1	516075	11/18/19 16:58	EEN	TAL CHI

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Accreditation/Certification Summary

Client: Kemron Environmental Services, Inc.
Project/Site: NASA ECCL Stabilization

Job ID: 500-173080-1

Laboratory: Eurofins TestAmerica, Chicago

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Georgia	State Program	N/A	04-30-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte

Eurofins TestAmerica, Chicago
2417 Bond Street

University Park, IL 60484-3101
phone 708.534.5200 fax 708.534.5211

Chain of Custody Record

eurofins Environment Testing TestAmerica

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact	
KEMRON Environmental Services, Inc.	
1359 Ellsworth Industrial Blvd.	
Atlanta, GA 30318	
(xxx) xxx-xxxx	Phone
(xxx) xxx-xxxx	FAX
Project Name: NASA ECCL Stabilization	
Site:	
P O # SH0724	

Project Manager: T. Bradley
Email: triley119@gmail.com
Tel/Fax: 404-636-0928

Analysis Turnaround Time
☐ CALENDAR DAYS ☑ WORKING DAYS
TAT if different from Below _____
☑ 2 weeks
☐ 1 week
☐ 2 days
☐ 1 day

Site Contact:
Lab Contact:
Date: 10-16-19
Carrier:

500-173080 COC

COC No: 1 of 1 COCs
TALS Project #:
Sampler:
For Lab Use Only:
Walk-in Client:
Lab Sampling:
Job / SDG No.: 500-173080

	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	TCLP Lead	Sample Specific Notes:
1	0724-037	11/6/19	1000	G	S	1			X	
2	0724-038	11/6/19	1005	G	S	1			X	
3	0724-039	11/6/19	1010	G	S	1			X	
4	0724-040	11/6/19	1015	G	S	1			X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: 1.2 Corr'd: _____ | Therm ID No.: _____

Relinquished by: Jomecia Bradly	Company: KEMRON	Date/Time: 10:50	Received by:	Company: ETA	Date/Time: 10:50 11/6/19
Relinquished by:	Company: ETA 16:00	Date/Time: 11/6/19	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: Donna Bulley	Company: TA	Date/Time: 11/7/19 0900

Form No. CA-C-WI-002, Rev. 4.27, dated 01/22/2019 (Rev. 1)

Analyst: [illegible] Date: _____

Instrumental Chemistry 99

TCLP Extraction Logbook Page Number: _____

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 11/14/19 Time 1343 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1195

Group Number: T064 Extr. End Date 11/15/19 Time 0743 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1235

LIMS Batch No.: 515389/515391 Min.Temp: Uncorrected/Corrected 19.5/19.7 °C Max.Temp: Uncorrected/Corrected 21/21.7 °C Filter Paper Lot #: 112167-9301

Sample Size Specifications: ____<9.5 mm___ Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024

Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	LB	LB2	500-173080-1	-2	-3
Sample Description	Extraction Fluid #1	Extraction Fluid #2	Solid	→	→
Sample Weight (g)	N/A	→	50.35	50.25	50.31
Liquid-Solid Separation (Yes/No)	No	→	→	→	→
Volume of Mother Liquid (mLs)	N/A	→	→	→	→
Solid Extraction Material (g)	N/A	→	50.35	50.25	50.31
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	N/A	→	9.46	9.38	8.43
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	4.92	2.89	1.56	1.58	1.43
Extraction Fluid Type (1 or 2)	1	2	1	→	→
Extraction Vessel Type / Pressure Check	HDPE	→	→	→	→
Extraction Fluid Volume (mLs)	2000	→	1000	→	→
Extract Filtered (Yes or No)	Yes	→	→	→	→
Mother Liquid Added (mLs)	N/A	→	→	→	→
Combined Filtrate Volume (mLs)	250	→	→	→	→
Final pH Reading	4.82	2.88	7.30	7.59	5.33
Spike Source ID # / Volume Added (mLs)	N/A	→	→	→	→
Filtrate Preserved	Yes	→	→	→	→
ZHE: Initial psi / Final psi	N/A	→	→	→	→

Comments: _____

Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene Metals (Lot # 0510901D)

Analyst: [signature] Date: 11/14/19

Reviewer: [signature] Date: 11/19/19

CHI-22-15-003/P-12/15

TestAmerica Chicago
TCLP Extraction Logbook

Page Number: _____

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 11/14/19 Time 1343 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1105
Group Number: T064 Extr. End Date 11/15/19 Time 0743 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1235
LIMS Batch No.: 515389/515391 Min.Temp: Uncorrected/Corrected 19.5/19.7 °C Max.Temp: Uncorrected/Corrected 21/21.7 °C Filter Paper Lot #: 112167-9301
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024
Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	500-173080-4	500-173292-1	500-173308-1	-2	-3
Sample Description	Solid				
Sample Weight (g)	50.30	50.10	25.10	10.09	10.38
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	50.30	50.10	25.10	10.09	10.38
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	9.28	10.70	9.45	11.94	11.71
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1; If >5.0, use Extraction Fluid #2	1.49	1.66	1.65	11.35	5.62
Extraction Fluid Type (1 or 2)	1			2	
Extraction Vessel Type / Pressure Check	HDPE				
Extraction Fluid Volume (mLs)	1000		500	200	
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250			150	
Final pH Reading	7.19	10.58	5.06	5.52	4.65
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes m				
ZHE; Initial psi / Final psi	N/A				

Comments:
Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 05090ID) Metals
Analyst: [signature] Date: 11/14/19
Reviewer: Date: 11/15/19

TestAmerica Chicago
TCLP Extraction Logbook
Page Number:
Rotator RPM:30 + 2 RPMs ID#: C2854 Extr. Start Date 11/14/19 Time 1343 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1105

Analyst: [illegible] Date: 11/19/19

Page Number: 101

TCLP Extraction Logbook

Rotator RPM: 30 ± 2 RPMs ID#: 62854 Extr. Start Date 11/19/19 Time 1343 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1105

Group Number: T064 Extr. End Date 11/19/19 Time 0745 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1235

LIMS Batch No.: 515389/515391 Min.Temp: Uncorrected/Corrected 19.5 / 19.7 °C Max.Temp: Uncorrected/Corrected 21 / 21.7 °C Filter Paper Lot #: 112167-930)

Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024

Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	500-173308-4	500-173337-1	-2	-3	310-169780-1
Sample Description	Solid				
Sample Weight (g)	15.34	50.26	50.37	50.03	50.07
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	15.34	50.26	25.37	50.03	50.07
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	11.80	11.72	9.60	9.41	6.87
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	2.20	2.01	1.63	1.66	6.87
Extraction Fluid Type (1 or 2)	1				
Extraction Vessel Type / Pressure Check	HDPE				
Extraction Fluid Volume (mLs)	300	1000			
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	7.93	8.04	6.42	5.88	5.02
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes m				
ZHE: Initial psi / Final psi	N/A				

Comments:

Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 05109010) Metals

Analyst: [signature] Date: 11/14/19

Reviewer: [signature] Date: 11/19/19

CHI-22-15-003/P-12/15

TestAmerica Chicago
TCLP Extraction Logbook

Page Number:

Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 11/14/19 Time 1343 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1105
Group Number: T064 Extr. End Date 11/15/19 Time 0743 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration End Time: 1235
LIMS Batch No.: 515389/515391 Min.Temp: Uncorrected/Corrected 19.5/19.7 °C Max.Temp: Uncorrected/Corrected 21/21.7 °C Filter Paper Lot #: 112167-9301
Sample Size Specifications: <9.5 mm Control Limits: 10 ± 5 PSI; 23 ± 2 °C Thermometer ID: C3024
Sample Type (Circle): TCLV SPLP (TCLP) ASTM

Sample Number	500-173164-1	-2	-3		
Sample Description	Solid				
Sample Weight (g)	50.12	50.29	50.35		
Liquid-Solid Separation (Yes/No)	No				
Volume of Mother Liquid (mLs)	N/A				
Solid Extraction Material (g)	50.12	50.29	50.35		
Extraction Fluid Selection pH of Initial Solution: If <5.0, use Extraction Fluid #1	5.78	5.56	5.84		
pH of Acid/Heat Treated Solution: If <5.0, use Extraction Fluid #1 If >5.0, use Extraction Fluid #2	1.37	1.34	1.35		
Extraction Fluid Type (1 or 2)	1				
Extraction Vessel Type / Pressure Check	HDPE				BC 11/14/19
Extraction Fluid Volume (mLs)	1000				
Extract Filtered (Yes or No)	Yes				
Mother Liquid Added (mLs)	N/A				
Combined Filtrate Volume (mLs)	250				
Final pH Reading	500	4.98	4.97		
Spike Source ID # / Volume Added (mLs)	N/A				
Filtrate Preserved	Yes m				
ZHE: Initial psi / Final psi	N/A				

Comments:
Extraction Vessel Codes: T = Teflon Organics/Metals ZHE = Zero Headspace VOA's HDPE = High Density Polyethylene (Lot # 051090ID) Metals
Analyst: Date: 11/14/19
Reviewer: Date:

TCLP Extraction Logbook Rev. Number
Rotator RPM:30 ± 2 RPMs ID#: C2854 Extr. Start Date 11/14/19 Time 1343 Temp: Uncorrected 20.5 Corrected 20.7 °C Filtration Start Time: 1105
Min.Temp: Uncorrected/Corrected 19.5/19.7 °C Max.Temp: Uncorrected/Corrected 21/21.7 °C Filtration End Time: 1235

Login Sample Receipt Checklist

Client: Kemron Environmental Services, Inc.

Job Number: 500-173080-1

Login Number: 173080
List Number: 1
Creator: Buckley, Paula M

List Source: Eurofins TestAmerica, Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.2
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-001	TRACKING CODE:	D586
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-002	TRACKING CODE:	D587
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-003	TRACKING CODE:	D588
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-004	TRACKING CODE:	D589
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-005	TRACKING CODE:	D590
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-006	TRACKING CODE:	D591
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-007	TRACKING CODE:	D592
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-008	TRACKING CODE:	D593
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-009	TRACKING CODE:	D594
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-010	TRACKING CODE:	D595
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-011	TRACKING CODE:	D596
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-012	TRACKING CODE:	D597
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-013	TRACKING CODE:	D598
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-014	TRACKING CODE:	D599
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-015	TRACKING CODE:	D600
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-016	TRACKING CODE:	D601
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-017	TRACKING CODE:	D602
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-018	TRACKING CODE:	D603
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-019	TRACKING CODE:	D604
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-020	TRACKING CODE:	D605
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-021	TRACKING CODE:	D606
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-022	TRACKING CODE:	D607
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-023	TRACKING CODE:	D608
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-024	TRACKING CODE:	D609
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-025	TRACKING CODE:	D610
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-026	TRACKING CODE:	D611
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-027	TRACKING CODE:	D612
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-028	TRACKING CODE:	D613
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-029	TRACKING CODE:	D614
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-030	TRACKING CODE:	D615
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-031	TRACKING CODE:	D616
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-032	TRACKING CODE:	D617
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-033	TRACKING CODE:	D618
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-034	TRACKING CODE:	D619
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-035	TRACKING CODE:	D620
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	10/16/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-036	TRACKING CODE:	D621
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	11/6/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-037	TRACKING CODE:	D712
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	11/6/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-038	TRACKING CODE:	D713
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	11/6/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-039	TRACKING CODE:	D714
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

PAINT FILTER TEST

SUMMARY OF RESULTS

PROJECT:	NASA ECCL Stabilization	TESTING DATE:	11/6/2019
PROJECT No.:	SH0724	TESTED BY:	MTC
SAMPLE No.:	0724-040	TRACKING CODE:	D715
TESTING METHOD:	EPA Method 9095		

TESTING PARAMETER AND RESULTS		
QUANTITY OF MATERIAL	100.00	**g**
LENGTH OF TEST	5.0	**min.**
QUANTITY OF LIQUID	0.00	**g**
RESULTS (PASS / FAIL) *	PASS	

* In accordance with EPA Method 9095, if any liquid from the test material collects after 5 minutes of testing, the material is deemed to contain free liquids, and therefore has failed the paint filter test.

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Appendix G

ProUCL Output for ECCL Firing Range

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ProUCL Output for ECCL Firing Range Former Clubhouse and Garage Exposure Unit Surface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 2:34:53 PM								
5	From File			SOIL17_ECCL_20191016_FCHGSurf.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	VALUE (benz(a)anthracene)											
11												
12	General Statistics											
13	Total Number of Observations					4	Number of Distinct Observations					4
14	Number of Detects					3	Number of Non-Detects					1
15	Number of Distinct Detects					3	Number of Distinct Non-Detects					1
16	Minimum Detect					0.063	Minimum Non-Detect					0.018
17	Maximum Detect					2	Maximum Non-Detect					0.018
18	Variance Detects					1.242	Percent Non-Detects					25%
19	Mean Detects					0.713	SD Detects					1.114
20	Median Detects					0.077	CV Detects					1.562
21	Skewness Detects					1.732	Kurtosis Detects					N/A
22	Mean of Logged Detects					-1.545	SD of Logged Detects					1.941
23												
24	Warning: Data set has only 3 Detected Values.											
25	This is not enough to compute meaningful or reliable statistics and estimates.											
26												
27												
28	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
29	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
30	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
31	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
32												
33	Normal GOF Test on Detects Only											
34	Shapiro Wilk Test Statistic					0.755	Shapiro Wilk GOF Test					
35	5% Shapiro Wilk Critical Value					0.767	Detected Data Not Normal at 5% Significance Level					
36	Lilliefors Test Statistic					0.383	Lilliefors GOF Test					
37	5% Lilliefors Critical Value					0.425	Detected Data appear Normal at 5% Significance Level					
38	Detected Data appear Approximate Normal at 5% Significance Level											
39												
40	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
41	KM Mean					0.54	KM Standard Error of Mean					0.517
42	KM SD					0.844	95% KM (BCA) UCL					N/A
43	95% KM (t) UCL					1.755	95% KM (Percentile Bootstrap) UCL					N/A
44	95% KM (z) UCL					1.389	95% KM Bootstrap t UCL					N/A
45	90% KM Chebyshev UCL					2.089	95% KM Chebyshev UCL					2.791
46	97.5% KM Chebyshev UCL					3.765	99% KM Chebyshev UCL					5.679
47												
48	Gamma GOF Tests on Detected Observations Only											
49	Not Enough Data to Perform GOF Test											
50												
51	Gamma Statistics on Detected Data Only											
52	k hat (MLE)					0.523	k star (bias corrected MLE)					N/A
53	Theta hat (MLE)					1.365	Theta star (bias corrected MLE)					N/A

	A	B	C	D	E	F	G	H	I	J	K	L
54					nu hat (MLE)	3.135				nu star (bias corrected)		N/A
55					Mean (detects)	0.713						
56												
57					Gamma ROS Statistics using Imputed Non-Detects							
58					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
59					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
60					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
61					This is especially true when the sample size is small.							
62					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
63					Minimum	0.01				Mean		0.538
64					Maximum	2				Median		0.07
65					SD	0.975				CV		1.815
66					k hat (MLE)	0.391				k star (bias corrected MLE)		0.264
67					Theta hat (MLE)	1.375				Theta star (bias corrected MLE)		2.033
68					nu hat (MLE)	3.128				nu star (bias corrected)		2.115
69					Adjusted Level of Significance (β)	0.00498						
70					Approximate Chi Square Value (2.12, α)	0.167				Adjusted Chi Square Value (2.12, β)		N/A
71					95% Gamma Approximate UCL (use when n>=50)	6.798				95% Gamma Adjusted UCL (use when n<50)		N/A
72												
73					Estimates of Gamma Parameters using KM Estimates							
74					Mean (KM)	0.54				SD (KM)		0.844
75					Variance (KM)	0.711				SE of Mean (KM)		0.517
76					k hat (KM)	0.409				k star (KM)		0.269
77					nu hat (KM)	3.273				nu star (KM)		2.151
78					theta hat (KM)	1.319				theta star (KM)		2.006
79					80% gamma percentile (KM)	0.803				90% gamma percentile (KM)		1.61
80					95% gamma percentile (KM)	2.554				99% gamma percentile (KM)		5.044
81												
82					Gamma Kaplan-Meier (KM) Statistics							
83					Approximate Chi Square Value (2.15, α)	0.173				Adjusted Chi Square Value (2.15, β)		0.0446
84					95% Gamma Approximate KM-UCL (use when n>=50)	6.708				95% Gamma Adjusted KM-UCL (use when n<50)		26
85												
86					Lognormal GOF Test on Detected Observations Only							
87					Shapiro Wilk Test Statistic	0.793				Shapiro Wilk GOF Test		
88					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Lognormal at 5% Significance Level		
89					Lilliefors Test Statistic	0.367				Lilliefors GOF Test		
90					5% Lilliefors Critical Value	0.425				Detected Data appear Lognormal at 5% Significance Level		
91					Detected Data appear Lognormal at 5% Significance Level							
92												
93					Lognormal ROS Statistics Using Imputed Non-Detects							
94					Mean in Original Scale	0.535				Mean in Log Scale		-2.816
95					SD in Original Scale	0.977				SD in Log Scale		2.995
96					95% t UCL (assumes normality of ROS data)	1.685				95% Percentile Bootstrap UCL		N/A
97					95% BCA Bootstrap UCL	N/A				95% Bootstrap t UCL		N/A
98					95% H-UCL (Log ROS)	2.600E+15						
99												
100					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
101					KM Mean (logged)	-2.163				KM Geo Mean		0.115
102					KM SD (logged)	1.741				95% Critical H Value (KM-Log)		11.43
103					KM Standard Error of Mean (logged)	1.066				95% H-UCL (KM -Log)		50892
104					KM SD (logged)	1.741				95% Critical H Value (KM-Log)		11.43
105					KM Standard Error of Mean (logged)	1.066						
106												

	A	B	C	D	E	F	G	H	I	J	K	L
107	DL/2 Statistics											
108	DL/2 Normal						DL/2 Log-Transformed					
109					Mean in Original Scale	0.537				Mean in Log Scale		-2.336
110					SD in Original Scale	0.976				SD in Log Scale		2.24
111					95% t UCL (Assumes normality)	1.685				95% H-Stat UCL		2.041E+8
112	DL/2 is not a recommended method, provided for comparisons and historical reasons											
113												
114	Nonparametric Distribution Free UCL Statistics											
115	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
116												
117	Suggested UCL to Use											
118					95% KM (t) UCL	1.755						
119												
120	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
121	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
122												
123	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
124	Recommendations are based upon data size, data distribution, and skewness.											
125	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
126	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
127												
128	VALUE (benzo(a)pyrene)											
129												
130	General Statistics											
131					Total Number of Observations	4				Number of Distinct Observations		4
132					Number of Detects	3				Number of Non-Detects		1
133					Number of Distinct Detects	3				Number of Distinct Non-Detects		1
134					Minimum Detect	0.061				Minimum Non-Detect		0.018
135					Maximum Detect	1.8				Maximum Non-Detect		0.018
136					Variance Detects	0.995				Percent Non-Detects		25%
137					Mean Detects	0.648				SD Detects		0.997
138					Median Detects	0.084				CV Detects		1.538
139					Skewness Detects	1.731				Kurtosis Detects		N/A
140					Mean of Logged Detects	-1.562				SD of Logged Detects		1.869
141												
142	Warning: Data set has only 3 Detected Values.											
143	This is not enough to compute meaningful or reliable statistics and estimates.											
144												
145												
146	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
147	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
148	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
149	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
150												
151	Normal GOF Test on Detects Only											
152					Shapiro Wilk Test Statistic	0.76	Shapiro Wilk GOF Test					
153					5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level					
154					Lilliefors Test Statistic	0.381	Lilliefors GOF Test					
155					5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level					
156	Detected Data appear Approximate Normal at 5% Significance Level											
157												
158	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
159					KM Mean	0.491				KM Standard Error of Mean		0.463

	A	B	C	D	E	F	G	H	I	J	K	L
160					KM SD	0.756				95% KM (BCA) UCL		N/A
161					95% KM (t) UCL	1.581				95% KM (Percentile Bootstrap) UCL		N/A
162					95% KM (z) UCL	1.253				95% KM Bootstrap t UCL		N/A
163					90% KM Chebyshev UCL	1.88				95% KM Chebyshev UCL		2.509
164					97.5% KM Chebyshev UCL	3.383				99% KM Chebyshev UCL		5.099
165												
166					Gamma GOF Tests on Detected Observations Only							
167					Not Enough Data to Perform GOF Test							
168												
169					Gamma Statistics on Detected Data Only							
170					k hat (MLE)	0.554				k star (bias corrected MLE)		N/A
171					Theta hat (MLE)	1.17				Theta star (bias corrected MLE)		N/A
172					nu hat (MLE)	3.324				nu star (bias corrected)		N/A
173					Mean (detects)	0.648						
174												
175					Gamma ROS Statistics using Imputed Non-Detects							
176					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
177					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
178					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
179					This is especially true when the sample size is small.							
180					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
181					Minimum	0.01				Mean		0.489
182					Maximum	1.8				Median		0.0725
183					SD	0.875				CV		1.79
184					k hat (MLE)	0.408				k star (bias corrected MLE)		0.269
185					Theta hat (MLE)	1.197				Theta star (bias corrected MLE)		1.819
186					nu hat (MLE)	3.265				nu star (bias corrected)		2.15
187					Adjusted Level of Significance (β)	0.00498						
188					Approximate Chi Square Value (2.15, α)	0.173				Adjusted Chi Square Value (2.15, β)		N/A
189					95% Gamma Approximate UCL (use when n>=50)	6.083				95% Gamma Adjusted UCL (use when n<50)		N/A
190												
191					Estimates of Gamma Parameters using KM Estimates							
192					Mean (KM)	0.491				SD (KM)		0.756
193					Variance (KM)	0.572				SE of Mean (KM)		0.463
194					k hat (KM)	0.421				k star (KM)		0.272
195					nu hat (KM)	3.369				nu star (KM)		2.176
196					theta hat (KM)	1.165				theta star (KM)		1.805
197					80% gamma percentile (KM)	0.733				90% gamma percentile (KM)		1.463
198					95% gamma percentile (KM)	2.316				99% gamma percentile (KM)		4.56
199												
200					Gamma Kaplan-Meier (KM) Statistics							
201					Approximate Chi Square Value (2.18, α)	0.177				Adjusted Chi Square Value (2.18, β)		0.046
202					95% Gamma Approximate KM-UCL (use when n>=50)	6.032				95% Gamma Adjusted KM-UCL (use when n<50)		23.2
203												
204					Lognormal GOF Test on Detected Observations Only							
205					Shapiro Wilk Test Statistic	0.82				Shapiro Wilk GOF Test		
206					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Lognormal at 5% Significance Level		
207					Lilliefors Test Statistic	0.354				Lilliefors GOF Test		
208					5% Lilliefors Critical Value	0.425				Detected Data appear Lognormal at 5% Significance Level		
209					Detected Data appear Lognormal at 5% Significance Level							
210												
211					Lognormal ROS Statistics Using Imputed Non-Detects							
212					Mean in Original Scale	0.487				Mean in Log Scale		-2.803

213	SD in Original Scale	0.876	SD in Log Scale	2.913
214	95% t UCL (assumes normality of ROS data)	1.518	95% Percentile Bootstrap UCL	N/A
215	95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
216	95% H-UCL (Log ROS)	3.402E+14		
217				
218	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
219	KM Mean (logged)	-2.176	KM Geo Mean	0.114
220	KM SD (logged)	1.696	95% Critical H Value (KM-Log)	11.14
221	KM Standard Error of Mean (logged)	1.039	95% H-UCL (KM -Log)	26119
222	KM SD (logged)	1.696	95% Critical H Value (KM-Log)	11.14
223	KM Standard Error of Mean (logged)	1.039		
224				
225	DL/2 Statistics			
226	DL/2 Normal		DL/2 Log-Transformed	
227	Mean in Original Scale	0.489	Mean in Log Scale	-2.349
228	SD in Original Scale	0.875	SD in Log Scale	2.192
229	95% t UCL (Assumes normality)	1.518	95% H-Stat UCL	82209997
230	DL/2 is not a recommended method, provided for comparisons and historical reasons			
231				
232	Nonparametric Distribution Free UCL Statistics			
233	Detected Data appear Approximate Normal Distributed at 5% Significance Level			
234				
235	Suggested UCL to Use			
236	95% KM (t) UCL	1.581		
237				
238	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
239	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
240				
241	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
242	Recommendations are based upon data size, data distribution, and skewness.			
243	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
244	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
245				
246				
247	VALUE (benzo(b)fluoranthene)			
248				
249	General Statistics			
250	Total Number of Observations	4	Number of Distinct Observations	4
251			Number of Missing Observations	0
252	Minimum	0.018	Mean	0.724
253	Maximum	2.7	Median	0.089
254	SD	1.318	Std. Error of Mean	0.659
255	Coefficient of Variation	1.821	Skewness	1.992
256				
257	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use			
258	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.			
259	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).			
260	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1			
261				
262	Normal GOF Test			
263	Shapiro Wilk Test Statistic	0.661	Shapiro Wilk GOF Test	
264	5% Shapiro Wilk Critical Value	0.748	Data Not Normal at 5% Significance Level	
265	Lilliefors Test Statistic	0.424	Lilliefors GOF Test	

266				5% Lilliefors Critical Value	0.375			Data Not Normal at 5% Significance Level			
267				Data Not Normal at 5% Significance Level							
268											
269				Assuming Normal Distribution							
270			95% Normal UCL					95% UCLs (Adjusted for Skewness)			
271				95% Student's-t UCL	2.275			95% Adjusted-CLT UCL (Chen-1995)			2.51
272								95% Modified-t UCL (Johnson-1978)			2.385
273											
274				Gamma GOF Test							
275				A-D Test Statistic	0.503			Anderson-Darling Gamma GOF Test			
276				5% A-D Critical Value	0.694			Detected data appear Gamma Distributed at 5% Significance Level			
277				K-S Test Statistic	0.357			Kolmogorov-Smirnov Gamma GOF Test			
278				5% K-S Critical Value	0.415			Detected data appear Gamma Distributed at 5% Significance Level			
279				Detected data appear Gamma Distributed at 5% Significance Level							
280											
281				Gamma Statistics							
282				k hat (MLE)	0.388			k star (bias corrected MLE)			0.264
283				Theta hat (MLE)	1.864			Theta star (bias corrected MLE)			2.745
284				nu hat (MLE)	3.107			nu star (bias corrected)			2.11
285				MLE Mean (bias corrected)	0.724			MLE Sd (bias corrected)			1.41
286								Approximate Chi Square Value (0.05)			0.166
287				Adjusted Level of Significance	N/A			Adjusted Chi Square Value			N/A
288											
289				Assuming Gamma Distribution							
290				95% Approximate Gamma UCL (use when n>=50)	9.178			95% Adjusted Gamma UCL (use when n<50)			N/A
291											
292				Lognormal GOF Test							
293				Shapiro Wilk Test Statistic	0.924			Shapiro Wilk Lognormal GOF Test			
294				5% Shapiro Wilk Critical Value	0.748			Data appear Lognormal at 5% Significance Level			
295				Lilliefors Test Statistic	0.253			Lilliefors Lognormal GOF Test			
296				5% Lilliefors Critical Value	0.375			Data appear Lognormal at 5% Significance Level			
297				Data appear Lognormal at 5% Significance Level							
298											
299				Lognormal Statistics							
300				Minimum of Logged Data	-4.017			Mean of logged Data			-2.025
301				Maximum of Logged Data	0.993			SD of logged Data			2.168
302											
303				Assuming Lognormal Distribution							
304				95% H-UCL	72597089			90% Chebyshev (MVUE) UCL			1.779
305				95% Chebyshev (MVUE) UCL	2.348			97.5% Chebyshev (MVUE) UCL			3.137
306				99% Chebyshev (MVUE) UCL	4.687						
307											
308				Nonparametric Distribution Free UCL Statistics							
309				Data appear to follow a Discernible Distribution at 5% Significance Level							
310											
311				Nonparametric Distribution Free UCLs							
312				95% CLT UCL	1.808			95% Jackknife UCL			2.275
313				95% Standard Bootstrap UCL	N/A			95% Bootstrap-t UCL			N/A
314				95% Hall's Bootstrap UCL	N/A			95% Percentile Bootstrap UCL			N/A
315				95% BCA Bootstrap UCL	N/A						
316				90% Chebyshev(Mean, Sd) UCL	2.701			95% Chebyshev(Mean, Sd) UCL			3.597
317				97.5% Chebyshev(Mean, Sd) UCL	4.84			99% Chebyshev(Mean, Sd) UCL			7.282
318											

319	Suggested UCL to Use										
320			95% Adjusted Gamma UCL		N/A						
321											
322	Warning: One or more Recommended UCL(s) not available!										
323											
324	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
325	Recommendations are based upon data size, data distribution, and skewness.										
326	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
327	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
328											
329	VALUE (carbazole)										
330											
331	General Statistics										
332			Total Number of Observations		4			Number of Distinct Observations		3	
333			Number of Detects		1			Number of Non-Detects		3	
334			Number of Distinct Detects		1			Number of Distinct Non-Detects		2	
335											
336	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!										
337	s suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT										
338											
339	The data set for variable VALUE (carbazole) was not processed!										
340											
341											
342	VALUE (dibenz(a,h)anthracene)										
343											
344	General Statistics										
345			Total Number of Observations		4			Number of Distinct Observations		2	
346			Number of Detects		2			Number of Non-Detects		2	
347			Number of Distinct Detects		2			Number of Distinct Non-Detects		1	
348			Minimum Detect		0.018			Minimum Non-Detect		0.018	
349			Maximum Detect		0.325			Maximum Non-Detect		0.018	
350			Variance Detects		0.0471			Percent Non-Detects		50%	
351			Mean Detects		0.172			SD Detects		0.217	
352			Median Detects		0.172			CV Detects		1.266	
353			Skewness Detects		N/A			Kurtosis Detects		N/A	
354			Mean of Logged Detects		-2.571			SD of Logged Detects		2.046	
355											
356	Warning: Data set has only 2 Detected Values.										
357	This is not enough to compute meaningful or reliable statistics and estimates.										
358											
359											
360	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
361	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
362	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
363	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
364											
365	Normal GOF Test on Detects Only										
366	Not Enough Data to Perform GOF Test										
367											
368	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs										
369			KM Mean		0.0948			KM Standard Error of Mean		0.094	
370			KM SD		0.133			95% KM (BCA) UCL		N/A	
371			95% KM (t) UCL		0.316			95% KM (Percentile Bootstrap) UCL		N/A	

372	95% KM (z) UCL	0.249	95% KM Bootstrap t UCL	N/A
373	90% KM Chebyshev UCL	0.377	95% KM Chebyshev UCL	0.504
374	97.5% KM Chebyshev UCL	0.682	99% KM Chebyshev UCL	1.03
375				
376	Gamma GOF Tests on Detected Observations Only			
377	Not Enough Data to Perform GOF Test			
378				
379	Gamma Statistics on Detected Data Only			
380	k hat (MLE)	0.742	k star (bias corrected MLE)	N/A
381	Theta hat (MLE)	0.231	Theta star (bias corrected MLE)	N/A
382	nu hat (MLE)	2.97	nu star (bias corrected)	N/A
383	Mean (detects)	0.172		
384				
385	Estimates of Gamma Parameters using KM Estimates			
386	Mean (KM)	0.0948	SD (KM)	0.133
387	Variance (KM)	0.0177	SE of Mean (KM)	0.094
388	k hat (KM)	0.508	k star (KM)	0.294
389	nu hat (KM)	4.064	nu star (KM)	2.349
390	theta hat (KM)	0.187	theta star (KM)	0.323
391	80% gamma percentile (KM)	0.145	90% gamma percentile (KM)	0.28
392	95% gamma percentile (KM)	0.436	99% gamma percentile (KM)	0.844
393				
394	Gamma Kaplan-Meier (KM) Statistics			
395			Adjusted Level of Significance (β)	0.00498
396	Approximate Chi Square Value (2.35, α)	0.209	Adjusted Chi Square Value (2.35, β)	0.0559
397	95% Gamma Approximate KM-UCL (use when n>=50)	1.065	95% Gamma Adjusted KM-UCL (use when n<50)	3.983
398				
399	Lognormal GOF Test on Detected Observations Only			
400	Not Enough Data to Perform GOF Test			
401				
402	Lognormal ROS Statistics Using Imputed Non-Detects			
403	Mean in Original Scale	0.0858	Mean in Log Scale	-6.34
404	SD in Original Scale	0.16	SD in Log Scale	4.662
405	95% t UCL (assumes normality of ROS data)	0.274	95% Percentile Bootstrap UCL	N/A
406	95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
407	95% H-UCL (Log ROS)	3.253E+37		
408				
409	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
410	KM Mean (logged)	-3.294	KM Geo Mean	0.0371
411	KM SD (logged)	1.253	95% Critical H Value (KM-Log)	8.284
412	KM Standard Error of Mean (logged)	0.886	95% H-UCL (KM -Log)	32.55
413	KM SD (logged)	1.253	95% Critical H Value (KM-Log)	8.284
414	KM Standard Error of Mean (logged)	0.886		
415				
416	DL/2 Statistics			
417	DL/2 Normal		DL/2 Log-Transformed	
418	Mean in Original Scale	0.0903	Mean in Log Scale	-3.641
419	SD in Original Scale	0.157	SD in Log Scale	1.709
420	95% t UCL (Assumes normality)	0.274	95% H-Stat UCL	7326
421	DL/2 is not a recommended method, provided for comparisons and historical reasons			
422				
423	Nonparametric Distribution Free UCL Statistics			
424	Data do not follow a Discernible Distribution at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
425												
426						Suggested UCL to Use						
427					KM Bootstrap t UCL	N/A						
428												
429					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
430					Recommendations are based upon data size, data distribution, and skewness.							
431					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
432					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
433												
434	VALUE (methylcyclohexane)											
435												
436						General Statistics						
437					Total Number of Observations	2			Number of Distinct Observations			1
438					Number of Detects	1			Number of Non-Detects			1
439					Number of Distinct Detects	1			Number of Distinct Non-Detects			1
440												
441					Warning: This data set only has 2 observations!							
442					Data set is too small to compute reliable and meaningful statistics and estimates!							
443					The data set for variable VALUE (methylcyclohexane) was not processed!							
444												
445					It is suggested to collect at least 8 to 10 observations before using these statistical methods!							
446					If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.							
447												
448												
449	VALUE (thallium)											
450												
451						General Statistics						
452					Total Number of Observations	4			Number of Distinct Observations			4
453					Number of Detects	1			Number of Non-Detects			3
454					Number of Distinct Detects	1			Number of Distinct Non-Detects			3
455												
456					Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!							
457					s suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT							
458												
459					The data set for variable VALUE (thallium) was not processed!							
460												
461												

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ProUCL Output for ECCL Firing Range
Pistol Range (East) Exposure Unit
Surface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 3:54:04 PM								
5	From File			SOIL17_ECCL_20191016_PRESurf.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	VALUE (antimony)											
11												
12	General Statistics											
13	Total Number of Observations					28	Number of Distinct Observations					24
14	Number of Detects					26	Number of Non-Detects					2
15	Number of Distinct Detects					23	Number of Distinct Non-Detects					2
16	Minimum Detect					0.55	Minimum Non-Detect					2.1
17	Maximum Detect					460	Maximum Non-Detect					2.3
18	Variance Detects					8111	Percent Non-Detects					7.143%
19	Mean Detects					22.49	SD Detects					90.06
20	Median Detects					1.85	CV Detects					4.005
21	Skewness Detects					4.96	Kurtosis Detects					24.94
22	Mean of Logged Detects					1.002	SD of Logged Detects					1.454
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.254	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.92	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.493	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.17	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					20.97	KM Standard Error of Mean					16.44
33	KM SD					85.28	95% KM (BCA) UCL					53.54
34	95% KM (t) UCL					48.97	95% KM (Percentile Bootstrap) UCL					53.55
35	95% KM (z) UCL					48	95% KM Bootstrap t UCL					968.5
36	90% KM Chebyshev UCL					70.28	95% KM Chebyshev UCL					92.61
37	97.5% KM Chebyshev UCL					123.6	99% KM Chebyshev UCL					184.5
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					5.155	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.847	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.412	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.185	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.323	k star (bias corrected MLE)					0.311
48	Theta hat (MLE)					69.68	Theta star (bias corrected MLE)					72.28
49	nu hat (MLE)					16.78	nu star (bias corrected)					16.18
50	Mean (detects)					22.49						
51												
52	Gamma ROS Statistics using Imputed Non-Detects											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											

	A	B	C	D	E	F	G	H	I	J	K	L
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean	20.88	
59					Maximum	460				Median	1.8	
60					SD	86.86				CV	4.159	
61					k hat (MLE)	0.285				k star (bias corrected MLE)	0.278	
62					Theta hat (MLE)	73.22				Theta star (bias corrected MLE)	74.99	
63					nu hat (MLE)	15.97				nu star (bias corrected)	15.59	
64					Adjusted Level of Significance (β)	0.0404						
65					Approximate Chi Square Value (15.59, α)	7.677				Adjusted Chi Square Value (15.59, β)	7.334	
66					95% Gamma Approximate UCL (use when n>=50)	42.42				95% Gamma Adjusted UCL (use when n<50)	44.41	
67												
68	Estimates of Gamma Parameters using KM Estimates											
69					Mean (KM)	20.97				SD (KM)	85.28	
70					Variance (KM)	7272				SE of Mean (KM)	16.44	
71					k hat (KM)	0.0605				k star (KM)	0.0778	
72					nu hat (KM)	3.387				nu star (KM)	4.357	
73					theta hat (KM)	346.8				theta star (KM)	269.5	
74					80% gamma percentile (KM)	9.446				90% gamma percentile (KM)	48.84	
75					95% gamma percentile (KM)	121.8				99% gamma percentile (KM)	376.3	
76												
77	Gamma Kaplan-Meier (KM) Statistics											
78					Approximate Chi Square Value (4.36, α)	0.868				Adjusted Chi Square Value (4.36, β)	0.779	
79					95% Gamma Approximate KM-UCL (use when n>=50)	105.3				95% Gamma Adjusted KM-UCL (use when n<50)	117.4	
80	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)											
81												
82	Lognormal GOF Test on Detected Observations Only											
83					Shapiro Wilk Test Statistic	0.798				Shapiro Wilk GOF Test		
84					5% Shapiro Wilk Critical Value	0.92				Detected Data Not Lognormal at 5% Significance Level		
85					Lilliefors Test Statistic	0.194				Lilliefors GOF Test		
86					5% Lilliefors Critical Value	0.17				Detected Data Not Lognormal at 5% Significance Level		
87	Detected Data Not Lognormal at 5% Significance Level											
88												
89	Lognormal ROS Statistics Using Imputed Non-Detects											
90					Mean in Original Scale	20.97				Mean in Log Scale	0.942	
91					SD in Original Scale	86.84				SD in Log Scale	1.416	
92					95% t UCL (assumes normality of ROS data)	48.92				95% Percentile Bootstrap UCL	51.82	
93					95% BCA Bootstrap UCL	72				95% Bootstrap t UCL	931.7	
94					95% H-UCL (Log ROS)	15.89						
95												
96	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
97					KM Mean (logged)	0.939				KM Geo Mean	2.557	
98					KM SD (logged)	1.398				95% Critical H Value (KM-Log)	2.983	
99					KM Standard Error of Mean (logged)	0.271				95% H-UCL (KM -Log)	15.15	
100					KM SD (logged)	1.398				95% Critical H Value (KM-Log)	2.983	
101					KM Standard Error of Mean (logged)	0.271						
102												
103	DL/2 Statistics											
104					DL/2 Normal					DL/2 Log-Transformed		
105					Mean in Original Scale	20.96				Mean in Log Scale	0.937	
106					SD in Original Scale	86.84				SD in Log Scale	1.419	

107	95% t UCL (Assumes normality)	48.92	95% H-Stat UCL	15.92
108	DL/2 is not a recommended method, provided for comparisons and historical reasons			
109				
110	Nonparametric Distribution Free UCL Statistics			
111	Data do not follow a Discernible Distribution at 5% Significance Level			
112				
113	Suggested UCL to Use			
114	95% KM (Chebyshev) UCL	92.61		
115				
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
117	Recommendations are based upon data size, data distribution, and skewness.			
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
120				
121	VALUE (benzo(a)pyrene)			
122				
123	General Statistics			
124	Total Number of Observations	33	Number of Distinct Observations	27
125	Number of Detects	25	Number of Non-Detects	8
126	Number of Distinct Detects	23	Number of Distinct Non-Detects	5
127	Minimum Detect	0.0064	Minimum Non-Detect	0.0073
128	Maximum Detect	0.18	Maximum Non-Detect	0.032
129	Variance Detects	0.00269	Percent Non-Detects	24.24%
130	Mean Detects	0.0482	SD Detects	0.0519
131	Median Detects	0.021	CV Detects	1.076
132	Skewness Detects	1.39	Kurtosis Detects	0.684
133	Mean of Logged Detects	-3.54	SD of Logged Detects	1.008
134				
135	Normal GOF Test on Detects Only			
136	Shapiro Wilk Test Statistic	0.755	Shapiro Wilk GOF Test	
137	5% Shapiro Wilk Critical Value	0.918	Detected Data Not Normal at 5% Significance Level	
138	Lilliefors Test Statistic	0.285	Lilliefors GOF Test	
139	5% Lilliefors Critical Value	0.173	Detected Data Not Normal at 5% Significance Level	
140	Detected Data Not Normal at 5% Significance Level			
141				
142	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
143	KM Mean	0.0387	KM Standard Error of Mean	0.00843
144	KM SD	0.0474	95% KM (BCA) UCL	0.0527
145	95% KM (t) UCL	0.053	95% KM (Percentile Bootstrap) UCL	0.0533
146	95% KM (z) UCL	0.0526	95% KM Bootstrap t UCL	0.0566
147	90% KM Chebyshev UCL	0.064	95% KM Chebyshev UCL	0.0754
148	97.5% KM Chebyshev UCL	0.0913	99% KM Chebyshev UCL	0.123
149				
150	Gamma GOF Tests on Detected Observations Only			
151	A-D Test Statistic	1.327	Anderson-Darling GOF Test	
152	5% A-D Critical Value	0.77	Detected Data Not Gamma Distributed at 5% Significance Level	
153	K-S Test Statistic	0.216	Kolmogorov-Smirnov GOF	
154	5% K-S Critical Value	0.179	Detected Data Not Gamma Distributed at 5% Significance Level	
155	Detected Data Not Gamma Distributed at 5% Significance Level			
156				
157	Gamma Statistics on Detected Data Only			
158	k hat (MLE)	1.122	k star (bias corrected MLE)	1.014
159	Theta hat (MLE)	0.043	Theta star (bias corrected MLE)	0.0476

160					nu hat (MLE)	56.08				nu star (bias corrected)	50.68
161					Mean (detects)	0.0482					
162											
163					Gamma ROS Statistics using Imputed Non-Detects						
164					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
165					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)						
166					For such situations, GROS method may yield incorrect values of UCLs and BTVs						
167					This is especially true when the sample size is small.						
168					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						
169					Minimum	0.0064				Mean	0.039
170					Maximum	0.18				Median	0.016
171					SD	0.0479				CV	1.23
172					k hat (MLE)	1.039				k star (bias corrected MLE)	0.965
173					Theta hat (MLE)	0.0375				Theta star (bias corrected MLE)	0.0404
174					nu hat (MLE)	68.6				nu star (bias corrected)	63.7
175					Adjusted Level of Significance (β)	0.0419					
176					Approximate Chi Square Value (63.70, α)	46.33				Adjusted Chi Square Value (63.70, β)	45.57
177					95% Gamma Approximate UCL (use when n>=50)	0.0536				95% Gamma Adjusted UCL (use when n<50)	0.0545
178											
179					Estimates of Gamma Parameters using KM Estimates						
180					Mean (KM)	0.0387				SD (KM)	0.0474
181					Variance (KM)	0.00225				SE of Mean (KM)	0.00843
182					k hat (KM)	0.667				k star (KM)	0.627
183					nu hat (KM)	44.05				nu star (KM)	41.38
184					theta hat (KM)	0.058				theta star (KM)	0.0617
185					80% gamma percentile (KM)	0.0638				90% gamma percentile (KM)	0.0997
186					95% gamma percentile (KM)	0.137				99% gamma percentile (KM)	0.227
187											
188					Gamma Kaplan-Meier (KM) Statistics						
189					Approximate Chi Square Value (41.38, α)	27.64				Adjusted Chi Square Value (41.38, β)	27.06
190					95% Gamma Approximate KM-UCL (use when n>=50)	0.058				95% Gamma Adjusted KM-UCL (use when n<50)	0.0592
191											
192					Lognormal GOF Test on Detected Observations Only						
193					Shapiro Wilk Test Statistic	0.917				Shapiro Wilk GOF Test	
194					5% Shapiro Wilk Critical Value	0.918				Detected Data Not Lognormal at 5% Significance Level	
195					Lilliefors Test Statistic	0.159				Lilliefors GOF Test	
196					5% Lilliefors Critical Value	0.173				Detected Data appear Lognormal at 5% Significance Level	
197					Detected Data appear Approximate Lognormal at 5% Significance Level						
198											
199					Lognormal ROS Statistics Using Imputed Non-Detects						
200					Mean in Original Scale	0.0383				Mean in Log Scale	-3.915
201					SD in Original Scale	0.0484				SD in Log Scale	1.137
202					95% t UCL (assumes normality of ROS data)	0.0526				95% Percentile Bootstrap UCL	0.0524
203					95% BCA Bootstrap UCL	0.055				95% Bootstrap t UCL	0.0566
204					95% H-UCL (Log ROS)	0.0644					
205											
206					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution						
207					KM Mean (logged)	-3.845				KM Geo Mean	0.0214
208					KM SD (logged)	1.033				95% Critical H Value (KM-Log)	2.479
209					KM Standard Error of Mean (logged)	0.186				95% H-UCL (KM -Log)	0.0573
210					KM SD (logged)	1.033				95% Critical H Value (KM-Log)	2.479
211					KM Standard Error of Mean (logged)	0.186					
212											

	A	B	C	D	E	F	G	H	I	J	K	L
213	DL/2 Statistics											
214	DL/2 Normal						DL/2 Log-Transformed					
215					Mean in Original Scale	0.0383				Mean in Log Scale		-3.91
216					SD in Original Scale	0.0484				SD in Log Scale		1.131
217					95% t UCL (Assumes normality)	0.0526				95% H-Stat UCL		0.0639
218	DL/2 is not a recommended method, provided for comparisons and historical reasons											
219												
220	Nonparametric Distribution Free UCL Statistics											
221	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
222												
223	Suggested UCL to Use											
224					KM H-UCL	0.0573						
225												
226	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
227	Recommendations are based upon data size, data distribution, and skewness.											
228	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
229	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
230												
231												
232	VALUE (lead)											
233												
234	General Statistics											
235					Total Number of Observations	37				Number of Distinct Observations		31
236										Number of Missing Observations		0
237					Minimum	13				Mean		4879
238					Maximum	88000				Median		470
239					SD	15520				Std. Error of Mean		2552
240					Coefficient of Variation	3.181				Skewness		4.726
241												
242	Normal GOF Test											
243					Shapiro Wilk Test Statistic	0.354				Shapiro Wilk GOF Test		
244					5% Shapiro Wilk Critical Value	0.936				Data Not Normal at 5% Significance Level		
245					Lilliefors Test Statistic	0.414				Lilliefors GOF Test		
246					5% Lilliefors Critical Value	0.144				Data Not Normal at 5% Significance Level		
247	Data Not Normal at 5% Significance Level											
248												
249	Assuming Normal Distribution											
250	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
251					95% Student's-t UCL	9187				95% Adjusted-CLT UCL (Chen-1995)		11194
252										95% Modified-t UCL (Johnson-1978)		9517
253												
254	Gamma GOF Test											
255					A-D Test Statistic	3.704				Anderson-Darling Gamma GOF Test		
256					5% A-D Critical Value	0.855				Data Not Gamma Distributed at 5% Significance Level		
257					K-S Test Statistic	0.282				Kolmogorov-Smirnov Gamma GOF Test		
258					5% K-S Critical Value	0.157				Data Not Gamma Distributed at 5% Significance Level		
259	Data Not Gamma Distributed at 5% Significance Level											
260												
261	Gamma Statistics											
262					k hat (MLE)	0.307				k star (bias corrected MLE)		0.3
263					Theta hat (MLE)	15875				Theta star (bias corrected MLE)		16240
264					nu hat (MLE)	22.74				nu star (bias corrected)		22.23
265					MLE Mean (bias corrected)	4879				MLE Sd (bias corrected)		8901

266									Approximate Chi Square Value (0.05)		12.51
267					Adjusted Level of Significance	0.0431			Adjusted Chi Square Value		12.19
268											
269					Assuming Gamma Distribution						
270					95% Approximate Gamma UCL (use when n>=50))	8669			95% Adjusted Gamma UCL (use when n<50)		8894
271											
272					Lognormal GOF Test						
273					Shapiro Wilk Test Statistic	0.955			Shapiro Wilk Lognormal GOF Test		
274					5% Shapiro Wilk Critical Value	0.936			Data appear Lognormal at 5% Significance Level		
275					Lilliefors Test Statistic	0.106			Lilliefors Lognormal GOF Test		
276					5% Lilliefors Critical Value	0.144			Data appear Lognormal at 5% Significance Level		
277					Data appear Lognormal at 5% Significance Level						
278											
279					Lognormal Statistics						
280					Minimum of Logged Data	2.565			Mean of logged Data		6.258
281					Maximum of Logged Data	11.39			SD of logged Data		1.961
282											
283					Assuming Lognormal Distribution						
284					95% H-UCL	11869			90% Chebyshev (MVUE) UCL		7318
285					95% Chebyshev (MVUE) UCL	9218			97.5% Chebyshev (MVUE) UCL		11855
286					99% Chebyshev (MVUE) UCL	17034					
287											
288					Nonparametric Distribution Free UCL Statistics						
289					Data appear to follow a Discernible Distribution at 5% Significance Level						
290											
291					Nonparametric Distribution Free UCLs						
292					95% CLT UCL	9076			95% Jackknife UCL		9187
293					95% Standard Bootstrap UCL	8933			95% Bootstrap-t UCL		20134
294					95% Hall's Bootstrap UCL	23175			95% Percentile Bootstrap UCL		9571
295					95% BCA Bootstrap UCL	12240					
296					90% Chebyshev(Mean, Sd) UCL	12533			95% Chebyshev(Mean, Sd) UCL		16001
297					97.5% Chebyshev(Mean, Sd) UCL	20813			99% Chebyshev(Mean, Sd) UCL		30266
298											
299					Suggested UCL to Use						
300					95% Chebyshev (Mean, Sd) UCL	16001					
301											
302					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
303					Recommendations are based upon data size, data distribution, and skewness.						
304					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).						
305					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
306											

ProUCL Output for ECCL Firing Range
Pistol Range (East) Exposure Unit
Subsurface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 4:02:00 PM								
5	From File			SOIL17_ECCL_20191016_PRESub.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	VALUE (lead)											
12												
13	General Statistics											
14	Total Number of Observations					4	Number of Distinct Observations					4
15							Number of Missing Observations					0
16	Minimum					15	Mean					593.8
17	Maximum					1700	Median					330
18	SD					752.5	Std. Error of Mean					376.2
19	Coefficient of Variation					1.267	Skewness					1.757
20												
21	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
22	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
23	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
24	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
25												
26	Normal GOF Test											
27	Shapiro Wilk Test Statistic					0.798	Shapiro Wilk GOF Test					
28	5% Shapiro Wilk Critical Value					0.748	Data appear Normal at 5% Significance Level					
29	Lilliefors Test Statistic					0.377	Lilliefors GOF Test					
30	5% Lilliefors Critical Value					0.375	Data Not Normal at 5% Significance Level					
31	Data appear Approximate Normal at 5% Significance Level											
32												
33	Assuming Normal Distribution											
34	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
35	95% Student's-t UCL					1479	95% Adjusted-CLT UCL (Chen-1995)					1566
36							95% Modified-t UCL (Johnson-1978)					1534
37												
38	Gamma GOF Test											
39	A-D Test Statistic					0.3	Anderson-Darling Gamma GOF Test					
40	5% A-D Critical Value					0.675	Detected data appear Gamma Distributed at 5% Significance Level					
41	K-S Test Statistic					0.236	Kolmogorov-Smirnov Gamma GOF Test					
42	5% K-S Critical Value					0.407	Detected data appear Gamma Distributed at 5% Significance Level					
43	Detected data appear Gamma Distributed at 5% Significance Level											
44												
45	Gamma Statistics											
46	k hat (MLE)					0.643	k star (bias corrected MLE)					0.327
47	Theta hat (MLE)					923.4	Theta star (bias corrected MLE)					1813
48	nu hat (MLE)					5.144	nu star (bias corrected)					2.619
49	MLE Mean (bias corrected)					593.8	MLE Sd (bias corrected)					1038
50							Approximate Chi Square Value (0.05)					0.269
51	Adjusted Level of Significance					N/A	Adjusted Chi Square Value					N/A
52												
53	Assuming Gamma Distribution											

54	95% Approximate Gamma UCL (use when n>=50))	5777	95% Adjusted Gamma UCL (use when n<50)	N/A
55				
56	Lognormal GOF Test			
57	Shapiro Wilk Test Statistic	0.913	Shapiro Wilk Lognormal GOF Test	
58	5% Shapiro Wilk Critical Value	0.748	Data appear Lognormal at 5% Significance Level	
59	Lilliefors Test Statistic	0.311	Lilliefors Lognormal GOF Test	
60	5% Lilliefors Critical Value	0.375	Data appear Lognormal at 5% Significance Level	
61	Data appear Lognormal at 5% Significance Level			
62				
63	Lognormal Statistics			
64	Minimum of Logged Data	2.708	Mean of logged Data	5.435
65	Maximum of Logged Data	7.438	SD of logged Data	1.976
66				
67	Assuming Lognormal Distribution			
68	95% H-UCL	4.269E+9	90% Chebyshev (MVUE) UCL	2456
69	95% Chebyshev (MVUE) UCL	3229	97.5% Chebyshev (MVUE) UCL	4303
70	99% Chebyshev (MVUE) UCL	6412		
71				
72	Nonparametric Distribution Free UCL Statistics			
73	Data appear to follow a Discernible Distribution at 5% Significance Level			
74				
75	Nonparametric Distribution Free UCLs			
76	95% CLT UCL	1213	95% Jackknife UCL	1479
77	95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
78	95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
79	95% BCA Bootstrap UCL	N/A		
80	90% Chebyshev(Mean, Sd) UCL	1722	95% Chebyshev(Mean, Sd) UCL	2234
81	97.5% Chebyshev(Mean, Sd) UCL	2943	99% Chebyshev(Mean, Sd) UCL	4337
82				
83	Suggested UCL to Use			
84	95% Student's-t UCL	1479		
85				
86	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
87	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
88				
89	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
90	Recommendations are based upon data size, data distribution, and skewness.			
91	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
92	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
93				

ProUCL Output for ECCL Firing Range
Pistol Range (West) Exposure Unit
Surface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 4:05:50 PM								
5	From File			SOIL17_ECCL_20191016_PRWSurf.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	VALUE (antimony)											
11												
12	General Statistics											
13	Total Number of Observations					39	Number of Distinct Observations					35
14	Number of Detects					29	Number of Non-Detects					10
15	Number of Distinct Detects					28	Number of Distinct Non-Detects					8
16	Minimum Detect					0.58	Minimum Non-Detect					1.9
17	Maximum Detect					57	Maximum Non-Detect					2.7
18	Variance Detects					283.7	Percent Non-Detects					25.64%
19	Mean Detects					12.14	SD Detects					16.84
20	Median Detects					4.4	CV Detects					1.388
21	Skewness Detects					1.807	Kurtosis Detects					2.182
22	Mean of Logged Detects					1.625	SD of Logged Detects					1.373
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.68	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.926	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.33	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.161	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					9.28	KM Standard Error of Mean					2.458
33	KM SD					15.08	95% KM (BCA) UCL					13.67
34	95% KM (t) UCL					13.42	95% KM (Percentile Bootstrap) UCL					13.5
35	95% KM (z) UCL					13.32	95% KM Bootstrap t UCL					14.81
36	90% KM Chebyshev UCL					16.65	95% KM Chebyshev UCL					19.99
37	97.5% KM Chebyshev UCL					24.63	99% KM Chebyshev UCL					33.73
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					1.121	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.79	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.186	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.17	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.695	k star (bias corrected MLE)					0.646
48	Theta hat (MLE)					17.47	Theta star (bias corrected MLE)					18.79
49	nu hat (MLE)					40.29	nu star (bias corrected)					37.45
50	Mean (detects)					12.14						
51												
52	Gamma ROS Statistics using Imputed Non-Detects											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											

	A	B	C	D	E	F	G	H	I	J	K	L
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean		9.027
59					Maximum	57				Median		2.8
60					SD	15.42				CV		1.709
61					k hat (MLE)	0.315				k star (bias corrected MLE)		0.308
62					Theta hat (MLE)	28.66				Theta star (bias corrected MLE)		29.33
63					nu hat (MLE)	24.56				nu star (bias corrected)		24.01
64					Adjusted Level of Significance (β)	0.0437						
65					Approximate Chi Square Value (24.01, α)	13.85				Adjusted Chi Square Value (24.01, β)		13.55
66					95% Gamma Approximate UCL (use when n>=50)	15.64				95% Gamma Adjusted UCL (use when n<50)		15.99
67												
68	Estimates of Gamma Parameters using KM Estimates											
69					Mean (KM)	9.28				SD (KM)		15.08
70					Variance (KM)	227.4				SE of Mean (KM)		2.458
71					k hat (KM)	0.379				k star (KM)		0.367
72					nu hat (KM)	29.54				nu star (KM)		28.6
73					theta hat (KM)	24.51				theta star (KM)		25.31
74					80% gamma percentile (KM)	14.8				90% gamma percentile (KM)		26.6
75					95% gamma percentile (KM)	39.72				99% gamma percentile (KM)		73.04
76												
77	Gamma Kaplan-Meier (KM) Statistics											
78					Approximate Chi Square Value (28.60, α)	17.39				Adjusted Chi Square Value (28.60, β)		17.05
79					95% Gamma Approximate KM-UCL (use when n>=50)	15.26				95% Gamma Adjusted KM-UCL (use when n<50)		15.57
80												
81	Lognormal GOF Test on Detected Observations Only											
82					Shapiro Wilk Test Statistic	0.947				Shapiro Wilk GOF Test		
83					5% Shapiro Wilk Critical Value	0.926				Detected Data appear Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.0941				Lilliefors GOF Test		
85					5% Lilliefors Critical Value	0.161				Detected Data appear Lognormal at 5% Significance Level		
86	Detected Data appear Lognormal at 5% Significance Level											
87												
88	Lognormal ROS Statistics Using Imputed Non-Detects											
89					Mean in Original Scale	9.285				Mean in Log Scale		1.204
90					SD in Original Scale	15.27				SD in Log Scale		1.39
91					95% t UCL (assumes normality of ROS data)	13.41				95% Percentile Bootstrap UCL		13.51
92					95% BCA Bootstrap UCL	14.6				95% Bootstrap t UCL		15.47
93					95% H-UCL (Log ROS)	16.82						
94												
95	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
96					KM Mean (logged)	1.193				KM Geo Mean		3.298
97					KM SD (logged)	1.386				95% Critical H Value (KM-Log)		2.884
98					KM Standard Error of Mean (logged)	0.229				95% H-UCL (KM -Log)		16.48
99					KM SD (logged)	1.386				95% Critical H Value (KM-Log)		2.884
100					KM Standard Error of Mean (logged)	0.229						
101												
102	DL/2 Statistics											
103					DL/2 Normal					DL/2 Log-Transformed		
104					Mean in Original Scale	9.306				Mean in Log Scale		1.232
105					SD in Original Scale	15.26				SD in Log Scale		1.361
106					95% t UCL (Assumes normality)	13.43				95% H-Stat UCL		16.23

	A	B	C	D	E	F	G	H	I	J	K	L
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Lognormal Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	KM H-UCL					16.48						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												
120	VALUE (benzo(a)pyrene)											
121												
122	General Statistics											
123	Total Number of Observations					45	Number of Distinct Observations					35
124	Number of Detects					34	Number of Non-Detects					11
125	Number of Distinct Detects					30	Number of Distinct Non-Detects					6
126	Minimum Detect					0.0074	Minimum Non-Detect					0.0076
127	Maximum Detect					0.6	Maximum Non-Detect					0.019
128	Variance Detects					0.0196	Percent Non-Detects					24.44%
129	Mean Detects					0.108	SD Detects					0.14
130	Median Detects					0.0655	CV Detects					1.302
131	Skewness Detects					2.626	Kurtosis Detects					6.926
132	Mean of Logged Detects					-2.831	SD of Logged Detects					1.132
133												
134	Normal GOF Test on Detects Only											
135	Shapiro Wilk Test Statistic					0.647	Shapiro Wilk GOF Test					
136	5% Shapiro Wilk Critical Value					0.933	Detected Data Not Normal at 5% Significance Level					
137	Lilliefors Test Statistic					0.264	Lilliefors GOF Test					
138	5% Lilliefors Critical Value					0.15	Detected Data Not Normal at 5% Significance Level					
139	Detected Data Not Normal at 5% Significance Level											
140												
141	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
142	KM Mean					0.0834	KM Standard Error of Mean					0.0193
143	KM SD					0.127	95% KM (BCA) UCL					0.119
144	95% KM (t) UCL					0.116	95% KM (Percentile Bootstrap) UCL					0.118
145	95% KM (z) UCL					0.115	95% KM Bootstrap t UCL					0.134
146	90% KM Chebyshev UCL					0.141	95% KM Chebyshev UCL					0.167
147	97.5% KM Chebyshev UCL					0.204	99% KM Chebyshev UCL					0.275
148												
149	Gamma GOF Tests on Detected Observations Only											
150	A-D Test Statistic					0.742	Anderson-Darling GOF Test					
151	5% A-D Critical Value					0.777	Detected data appear Gamma Distributed at 5% Significance Level					
152	K-S Test Statistic					0.131	Kolmogorov-Smirnov GOF					
153	5% K-S Critical Value					0.156	Detected data appear Gamma Distributed at 5% Significance Level					
154	Detected data appear Gamma Distributed at 5% Significance Level											
155												
156	Gamma Statistics on Detected Data Only											
157	k hat (MLE)					0.963	k star (bias corrected MLE)					0.898
158	Theta hat (MLE)					0.112	Theta star (bias corrected MLE)					0.12
159	nu hat (MLE)					65.49	nu star (bias corrected)					61.04

	A	B	C	D	E	F	G	H	I	J	K	L
160					Mean (detects)	0.108						
161												
162					Gamma ROS Statistics using Imputed Non-Detects							
163					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
164					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
165					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
166					This is especially true when the sample size is small.							
167					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
168					Minimum	0.0074				Mean		0.0838
169					Maximum	0.6				Median		0.047
170					SD	0.129				CV		1.535
171					k hat (MLE)	0.761				k star (bias corrected MLE)		0.725
172					Theta hat (MLE)	0.11				Theta star (bias corrected MLE)		0.116
173					nu hat (MLE)	68.5				nu star (bias corrected)		65.26
174					Adjusted Level of Significance (β)	0.0447						
175					Approximate Chi Square Value (65.26, α)	47.67				Adjusted Chi Square Value (65.26, β)		47.18
176					95% Gamma Approximate UCL (use when n>=50)	0.115				95% Gamma Adjusted UCL (use when n<50)		0.116
177												
178					Estimates of Gamma Parameters using KM Estimates							
179					Mean (KM)	0.0834				SD (KM)		0.127
180					Variance (KM)	0.0162				SE of Mean (KM)		0.0193
181					k hat (KM)	0.429				k star (KM)		0.415
182					nu hat (KM)	38.62				nu star (KM)		37.38
183					theta hat (KM)	0.194				theta star (KM)		0.201
184					80% gamma percentile (KM)	0.135				90% gamma percentile (KM)		0.234
185					95% gamma percentile (KM)	0.342				99% gamma percentile (KM)		0.613
186												
187					Gamma Kaplan-Meier (KM) Statistics							
188					Approximate Chi Square Value (37.38, α)	24.38				Adjusted Chi Square Value (37.38, β)		24.03
189					95% Gamma Approximate KM-UCL (use when n>=50)	0.128				95% Gamma Adjusted KM-UCL (use when n<50)		0.13
190												
191					Lognormal GOF Test on Detected Observations Only							
192					Shapiro Wilk Test Statistic	0.966				Shapiro Wilk GOF Test		
193					5% Shapiro Wilk Critical Value	0.933				Detected Data appear Lognormal at 5% Significance Level		
194					Lilliefors Test Statistic	0.0972				Lilliefors GOF Test		
195					5% Lilliefors Critical Value	0.15				Detected Data appear Lognormal at 5% Significance Level		
196					Detected Data appear Lognormal at 5% Significance Level							
197												
198					Lognormal ROS Statistics Using Imputed Non-Detects							
199					Mean in Original Scale	0.0833				Mean in Log Scale		-3.34
200					SD in Original Scale	0.129				SD in Log Scale		1.351
201					95% t UCL (assumes normality of ROS data)	0.116				95% Percentile Bootstrap UCL		0.118
202					95% BCA Bootstrap UCL	0.127				95% Bootstrap t UCL		0.136
203					95% H-UCL (Log ROS)	0.156						
204												
205					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
206					KM Mean (logged)	-3.307				KM Geo Mean		0.0366
207					KM SD (logged)	1.285				95% Critical H Value (KM-Log)		2.711
208					KM Standard Error of Mean (logged)	0.195				95% H-UCL (KM -Log)		0.141
209					KM SD (logged)	1.285				95% Critical H Value (KM-Log)		2.711
210					KM Standard Error of Mean (logged)	0.195						
211												
212					DL/2 Statistics							

213	DL/2 Normal		DL/2 Log-Transformed	
214	Mean in Original Scale	0.0832	Mean in Log Scale	-3.341
215	SD in Original Scale	0.129	SD in Log Scale	1.347
216	95% t UCL (Assumes normality)	0.115	95% H-Stat UCL	0.154
217	DL/2 is not a recommended method, provided for comparisons and historical reasons			
218				
219	Nonparametric Distribution Free UCL Statistics			
220	Detected Data appear Gamma Distributed at 5% Significance Level			
221				
222	Suggested UCL to Use			
223	ljusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.13		
224				
225	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
226	Recommendations are based upon data size, data distribution, and skewness.			
227	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
228	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
229				
230	VALUE (benzo(b)fluoranthene)			
231				
232	General Statistics			
233	Total Number of Observations	45	Number of Distinct Observations	36
234	Number of Detects	39	Number of Non-Detects	6
235	Number of Distinct Detects	34	Number of Distinct Non-Detects	3
236	Minimum Detect	0.0097	Minimum Non-Detect	0.017
237	Maximum Detect	1.4	Maximum Non-Detect	0.019
238	Variance Detects	0.0755	Percent Non-Detects	13.33%
239	Mean Detects	0.149	SD Detects	0.275
240	Median Detects	0.071	CV Detects	1.842
241	Skewness Detects	3.52	Kurtosis Detects	13.06
242	Mean of Logged Detects	-2.754	SD of Logged Detects	1.225
243				
244	Normal GOF Test on Detects Only			
245	Shapiro Wilk Test Statistic	0.512	Shapiro Wilk GOF Test	
246	5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level	
247	Lilliefors Test Statistic	0.327	Lilliefors GOF Test	
248	5% Lilliefors Critical Value	0.14	Detected Data Not Normal at 5% Significance Level	
249	Detected Data Not Normal at 5% Significance Level			
250				
251	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
252	KM Mean	0.131	KM Standard Error of Mean	0.0388
253	KM SD	0.257	95% KM (BCA) UCL	0.193
254	95% KM (t) UCL	0.196	95% KM (Percentile Bootstrap) UCL	0.202
255	95% KM (z) UCL	0.195	95% KM Bootstrap t UCL	0.281
256	90% KM Chebyshev UCL	0.247	95% KM Chebyshev UCL	0.3
257	97.5% KM Chebyshev UCL	0.373	99% KM Chebyshev UCL	0.517
258				
259	Gamma GOF Tests on Detected Observations Only			
260	A-D Test Statistic	1.954	Anderson-Darling GOF Test	
261	5% A-D Critical Value	0.793	Detected Data Not Gamma Distributed at 5% Significance Level	
262	K-S Test Statistic	0.182	Kolmogorov-Smirnov GOF	
263	5% K-S Critical Value	0.147	Detected Data Not Gamma Distributed at 5% Significance Level	
264	Detected Data Not Gamma Distributed at 5% Significance Level			
265				

	A	B	C	D	E	F	G	H	I	J	K	L
266	Gamma Statistics on Detected Data Only											
267					k hat (MLE)	0.708				k star (bias corrected MLE)		0.671
268					Theta hat (MLE)	0.211				Theta star (bias corrected MLE)		0.222
269					nu hat (MLE)	55.26				nu star (bias corrected)		52.34
270					Mean (detects)	0.149						
271												
272	Gamma ROS Statistics using Imputed Non-Detects											
273	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
274	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
275	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
276	This is especially true when the sample size is small.											
277	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
278					Minimum	0.0097				Mean		0.131
279					Maximum	1.4				Median		0.053
280					SD	0.26				CV		1.989
281					k hat (MLE)	0.635				k star (bias corrected MLE)		0.607
282					Theta hat (MLE)	0.206				Theta star (bias corrected MLE)		0.215
283					nu hat (MLE)	57.12				nu star (bias corrected)		54.64
284					Adjusted Level of Significance (β)	0.0447						
285					Approximate Chi Square Value (54.64, α)	38.66				Adjusted Chi Square Value (54.64, β)		38.21
286					95% Gamma Approximate UCL (use when n>=50)	0.185				95% Gamma Adjusted UCL (use when n<50)		0.187
287												
288	Estimates of Gamma Parameters using KM Estimates											
289					Mean (KM)	0.131				SD (KM)		0.257
290					Variance (KM)	0.0659				SE of Mean (KM)		0.0388
291					k hat (KM)	0.261				k star (KM)		0.258
292					nu hat (KM)	23.47				nu star (KM)		23.24
293					theta hat (KM)	0.503				theta star (KM)		0.508
294					80% gamma percentile (KM)	0.193				90% gamma percentile (KM)		0.393
295					95% gamma percentile (KM)	0.628				99% gamma percentile (KM)		1.254
296												
297	Gamma Kaplan-Meier (KM) Statistics											
298					Approximate Chi Square Value (23.24, α)	13.27				Adjusted Chi Square Value (23.24, β)		13.02
299					95% Gamma Approximate KM-UCL (use when n>=50)	0.23				95% Gamma Adjusted KM-UCL (use when n<50)		0.234
300												
301	Lognormal GOF Test on Detected Observations Only											
302					Shapiro Wilk Test Statistic	0.947				Shapiro Wilk GOF Test		
303					5% Shapiro Wilk Critical Value	0.939				Detected Data appear Lognormal at 5% Significance Level		
304					Lilliefors Test Statistic	0.101				Lilliefors GOF Test		
305					5% Lilliefors Critical Value	0.14				Detected Data appear Lognormal at 5% Significance Level		
306	Detected Data appear Lognormal at 5% Significance Level											
307												
308	Lognormal ROS Statistics Using Imputed Non-Detects											
309					Mean in Original Scale	0.131				Mean in Log Scale		-2.991
310					SD in Original Scale	0.26				SD in Log Scale		1.297
311					95% t UCL (assumes normality of ROS data)	0.196				95% Percentile Bootstrap UCL		0.2
312					95% BCA Bootstrap UCL	0.226				95% Bootstrap t UCL		0.282
313					95% H-UCL (Log ROS)	0.199						
314												
315	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
316					KM Mean (logged)	-2.962				KM Geo Mean		0.0517
317					KM SD (logged)	1.247				95% Critical H Value (KM-Log)		2.664
318					KM Standard Error of Mean (logged)	0.189				95% H-UCL (KM -Log)		0.185

319					KM SD (logged)	1.247				95% Critical H Value (KM-Log)		2.664
320					KM Standard Error of Mean (logged)	0.189						
321												
322					DL/2 Statistics							
323					DL/2 Normal					DL/2 Log-Transformed		
324					Mean in Original Scale	0.131				Mean in Log Scale		-3.013
325					SD in Original Scale	0.26				SD in Log Scale		1.32
326					95% t UCL (Assumes normality)	0.196				95% H-Stat UCL		0.203
327					DL/2 is not a recommended method, provided for comparisons and historical reasons							
328												
329					Nonparametric Distribution Free UCL Statistics							
330					Detected Data appear Lognormal Distributed at 5% Significance Level							
331												
332					Suggested UCL to Use							
333					KM H-UCL	0.185						
334												
335					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
336					Recommendations are based upon data size, data distribution, and skewness.							
337					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
338					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
339												
340	VALUE (carbazole)											
341												
342					General Statistics							
343					Total Number of Observations	28				Number of Distinct Observations		14
344					Number of Detects	1				Number of Non-Detects		27
345					Number of Distinct Detects	1				Number of Distinct Non-Detects		13
346												
347					Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!							
348	s suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT											
349												
350					The data set for variable VALUE (carbazole) was not processed!							
351												
352												
353												
354	VALUE (copper)											
355												
356					General Statistics							
357					Total Number of Observations	32				Number of Distinct Observations		31
358										Number of Missing Observations		0
359					Minimum	25				Mean		503.9
360					Maximum	8700				Median		103
361					SD	1520				Std. Error of Mean		268.7
362					Coefficient of Variation	3.017				Skewness		5.381
363												
364					Normal GOF Test							
365					Shapiro Wilk Test Statistic	0.304				Shapiro Wilk GOF Test		
366					5% Shapiro Wilk Critical Value	0.93				Data Not Normal at 5% Significance Level		
367					Lilliefors Test Statistic	0.376				Lilliefors GOF Test		
368					5% Lilliefors Critical Value	0.154				Data Not Normal at 5% Significance Level		
369					Data Not Normal at 5% Significance Level							
370												
371					Assuming Normal Distribution							

372	95% Normal UCL		95% UCLs (Adjusted for Skewness)	
373	95% Student's-t UCL	959.5	95% Adjusted-CLT UCL (Chen-1995)	1219
374			95% Modified-t UCL (Johnson-1978)	1002
375				
376	Gamma GOF Test			
377	A-D Test Statistic	2.687	Anderson-Darling Gamma GOF Test	
378	5% A-D Critical Value	0.807	Data Not Gamma Distributed at 5% Significance Level	
379	K-S Test Statistic	0.212	Kolmogorov-Smirnov Gamma GOF Test	
380	5% K-S Critical Value	0.164	Data Not Gamma Distributed at 5% Significance Level	
381	Data Not Gamma Distributed at 5% Significance Level			
382				
383	Gamma Statistics			
384	k hat (MLE)	0.536	k star (bias corrected MLE)	0.506
385	Theta hat (MLE)	940.5	Theta star (bias corrected MLE)	995.1
386	nu hat (MLE)	34.29	nu star (bias corrected)	32.4
387	MLE Mean (bias corrected)	503.9	MLE Sd (bias corrected)	708.1
388			Approximate Chi Square Value (0.05)	20.39
389	Adjusted Level of Significance	0.0416	Adjusted Chi Square Value	19.88
390				
391	Assuming Gamma Distribution			
392	95% Approximate Gamma UCL (use when n>=50))	800.6	95% Adjusted Gamma UCL (use when n<50)	821.2
393				
394	Lognormal GOF Test			
395	Shapiro Wilk Test Statistic	0.93	Shapiro Wilk Lognormal GOF Test	
396	5% Shapiro Wilk Critical Value	0.93	Data Not Lognormal at 5% Significance Level	
397	Lilliefors Test Statistic	0.147	Lilliefors Lognormal GOF Test	
398	5% Lilliefors Critical Value	0.154	Data appear Lognormal at 5% Significance Level	
399	Data appear Approximate Lognormal at 5% Significance Level			
400				
401	Lognormal Statistics			
402	Minimum of Logged Data	3.219	Mean of logged Data	5.049
403	Maximum of Logged Data	9.071	SD of logged Data	1.284
404				
405	Assuming Lognormal Distribution			
406	95% H-UCL	676.2	90% Chebyshev (MVUE) UCL	622.7
407	95% Chebyshev (MVUE) UCL	750.8	97.5% Chebyshev (MVUE) UCL	928.6
408	99% Chebyshev (MVUE) UCL	1278		
409				
410	Nonparametric Distribution Free UCL Statistics			
411	Data appear to follow a Discernible Distribution at 5% Significance Level			
412				
413	Nonparametric Distribution Free UCLs			
414	95% CLT UCL	945.9	95% Jackknife UCL	959.5
415	95% Standard Bootstrap UCL	928.3	95% Bootstrap-t UCL	2848
416	95% Hall's Bootstrap UCL	2536	95% Percentile Bootstrap UCL	1038
417	95% BCA Bootstrap UCL	1305		
418	90% Chebyshev(Mean, Sd) UCL	1310	95% Chebyshev(Mean, Sd) UCL	1675
419	97.5% Chebyshev(Mean, Sd) UCL	2182	99% Chebyshev(Mean, Sd) UCL	3178
420				
421	Suggested UCL to Use			
422	95% H-UCL	676.2		
423				
424	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			

	A	B	C	D	E	F	G	H	I	J	K	L
425	Recommendations are based upon data size, data distribution, and skewness.											
426	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
427	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
428												
429	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
430	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
431	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
432	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
433												
434												
435	VALUE (lead)											
436												
437	General Statistics											
438	Total Number of Observations					45	Number of Distinct Observations					42
439							Number of Missing Observations					0
440	Minimum					26	Mean					2303
441	Maximum					29000	Median					680
442	SD					4927	Std. Error of Mean					734.4
443	Coefficient of Variation					2.14	Skewness					4.076
444												
445	Normal GOF Test											
446	Shapiro Wilk Test Statistic					0.503	Shapiro Wilk GOF Test					
447	5% Shapiro Wilk Critical Value					0.945	Data Not Normal at 5% Significance Level					
448	Lilliefors Test Statistic					0.334	Lilliefors GOF Test					
449	5% Lilliefors Critical Value					0.131	Data Not Normal at 5% Significance Level					
450	Data Not Normal at 5% Significance Level											
451												
452	Assuming Normal Distribution											
453	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
454	95% Student's-t UCL					3537	95% Adjusted-CLT UCL (Chen-1995)					3988
455							95% Modified-t UCL (Johnson-1978)					3611
456												
457	Gamma GOF Test											
458	A-D Test Statistic					1.461	Anderson-Darling Gamma GOF Test					
459	5% A-D Critical Value					0.831	Data Not Gamma Distributed at 5% Significance Level					
460	K-S Test Statistic					0.171	Kolmogorov-Smirnov Gamma GOF Test					
461	5% K-S Critical Value					0.141	Data Not Gamma Distributed at 5% Significance Level					
462	Data Not Gamma Distributed at 5% Significance Level											
463												
464	Gamma Statistics											
465	k hat (MLE)					0.426	k star (bias corrected MLE)					0.412
466	Theta hat (MLE)					5411	Theta star (bias corrected MLE)					5589
467	nu hat (MLE)					38.3	nu star (bias corrected)					37.08
468	MLE Mean (bias corrected)					2303	MLE Sd (bias corrected)					3587
469							Approximate Chi Square Value (0.05)					24.14
470	Adjusted Level of Significance					0.0447	Adjusted Chi Square Value					23.8
471												
472	Assuming Gamma Distribution											
473	95% Approximate Gamma UCL (use when n>=50))					3537	95% Adjusted Gamma UCL (use when n<50)					3589
474												
475	Lognormal GOF Test											
476	Shapiro Wilk Test Statistic					0.943	Shapiro Wilk Lognormal GOF Test					
477	5% Shapiro Wilk Critical Value					0.945	Data Not Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
478					Lilliefors Test Statistic	0.117	Lilliefors Lognormal GOF Test					
479					5% Lilliefors Critical Value	0.131	Data appear Lognormal at 5% Significance Level					
480	Data appear Approximate Lognormal at 5% Significance Level											
481												
482	Lognormal Statistics											
483					Minimum of Logged Data	3.258			Mean of logged Data			6.211
484					Maximum of Logged Data	10.28			SD of logged Data			1.908
485												
486	Assuming Lognormal Distribution											
487					95% H-UCL	8555			90% Chebyshev (MVUE) UCL			6134
488					95% Chebyshev (MVUE) UCL	7655			97.5% Chebyshev (MVUE) UCL			9767
489					99% Chebyshev (MVUE) UCL	13915						
490												
491	Nonparametric Distribution Free UCL Statistics											
492	Data appear to follow a Discernible Distribution at 5% Significance Level											
493												
494	Nonparametric Distribution Free UCLs											
495					95% CLT UCL	3511			95% Jackknife UCL			3537
496					95% Standard Bootstrap UCL	3487			95% Bootstrap-t UCL			4684
497					95% Hall's Bootstrap UCL	8073			95% Percentile Bootstrap UCL			3595
498					95% BCA Bootstrap UCL	4141						
499					90% Chebyshev(Mean, Sd) UCL	4506			95% Chebyshev(Mean, Sd) UCL			5504
500					97.5% Chebyshev(Mean, Sd) UCL	6889			99% Chebyshev(Mean, Sd) UCL			9610
501												
502	Suggested UCL to Use											
503					95% Chebyshev (Mean, Sd) UCL	5504						
504												
505	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
506	Recommendations are based upon data size, data distribution, and skewness.											
507	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
508	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
509												

ProUCL Output for ECCL Firing Range
Rifle Range Exposure Unit
Surface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 7:22:42 PM								
5	From File			SOIL17_ECCL_20191016_RRSurf.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	VALUE (antimony)											
11												
12	General Statistics											
13	Total Number of Observations					44	Number of Distinct Observations					34
14	Number of Detects					32	Number of Non-Detects					12
15	Number of Distinct Detects					30	Number of Distinct Non-Detects					6
16	Minimum Detect					0.53	Minimum Non-Detect					1.8
17	Maximum Detect					110	Maximum Non-Detect					2.4
18	Variance Detects					782.9	Percent Non-Detects					27.27%
19	Mean Detects					18.06	SD Detects					27.98
20	Median Detects					2.8	CV Detects					1.55
21	Skewness Detects					1.93	Kurtosis Detects					3.366
22	Mean of Logged Detects					1.485	SD of Logged Detects					1.813
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.688	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.322	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.154	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					13.37	KM Standard Error of Mean					3.783
33	KM SD					24.7	95% KM (BCA) UCL					19.48
34	95% KM (t) UCL					19.73	95% KM (Percentile Bootstrap) UCL					19.49
35	95% KM (z) UCL					19.6	95% KM Bootstrap t UCL					22.27
36	90% KM Chebyshev UCL					24.72	95% KM Chebyshev UCL					29.86
37	97.5% KM Chebyshev UCL					37	99% KM Chebyshev UCL					51.02
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					2.037	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.82	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.258	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.165	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.457	k star (bias corrected MLE)					0.435
48	Theta hat (MLE)					39.48	Theta star (bias corrected MLE)					41.48
49	nu hat (MLE)					29.27	nu star (bias corrected)					27.86
50	Mean (detects)					18.06						
51												
52	Gamma ROS Statistics using Imputed Non-Detects											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											

	A	B	C	D	E	F	G	H	I	J	K	L
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean		13.13
59					Maximum	110				Median		0.99
60					SD	25.11				CV		1.912
61					k hat (MLE)	0.257				k star (bias corrected MLE)		0.255
62					Theta hat (MLE)	51.1				Theta star (bias corrected MLE)		51.58
63					nu hat (MLE)	22.62				nu star (bias corrected)		22.41
64					Adjusted Level of Significance (β)	0.0445						
65					Approximate Chi Square Value (22.41, α)	12.65				Adjusted Chi Square Value (22.41, β)		12.4
66					95% Gamma Approximate UCL (use when n>=50)	23.27				95% Gamma Adjusted UCL (use when n<50)		23.74
67												
68	Estimates of Gamma Parameters using KM Estimates											
69					Mean (KM)	13.37				SD (KM)		24.7
70					Variance (KM)	610				SE of Mean (KM)		3.783
71					k hat (KM)	0.293				k star (KM)		0.288
72					nu hat (KM)	25.8				nu star (KM)		25.37
73					theta hat (KM)	45.61				theta star (KM)		46.38
74					80% gamma percentile (KM)	20.3				90% gamma percentile (KM)		39.62
75					95% gamma percentile (KM)	61.96				99% gamma percentile (KM)		120.3
76												
77	Gamma Kaplan-Meier (KM) Statistics											
78					Approximate Chi Square Value (25.37, α)	14.9				Adjusted Chi Square Value (25.37, β)		14.63
79					95% Gamma Approximate KM-UCL (use when n>=50)	22.78				95% Gamma Adjusted KM-UCL (use when n<50)		23.2
80												
81	Lognormal GOF Test on Detected Observations Only											
82					Shapiro Wilk Test Statistic	0.866				Shapiro Wilk GOF Test		
83					5% Shapiro Wilk Critical Value	0.93				Detected Data Not Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.17				Lilliefors GOF Test		
85					5% Lilliefors Critical Value	0.154				Detected Data Not Lognormal at 5% Significance Level		
86	Detected Data Not Lognormal at 5% Significance Level											
87												
88	Lognormal ROS Statistics Using Imputed Non-Detects											
89					Mean in Original Scale	13.46				Mean in Log Scale		1.087
90					SD in Original Scale	24.94				SD in Log Scale		1.7
91					95% t UCL (assumes normality of ROS data)	19.78				95% Percentile Bootstrap UCL		19.8
92					95% BCA Bootstrap UCL	21.47				95% Bootstrap t UCL		22.59
93					95% H-UCL (Log ROS)	29.25						
94												
95	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
96					KM Mean (logged)	1.03				KM Geo Mean		2.8
97					KM SD (logged)	1.704				95% Critical H Value (KM-Log)		3.258
98					KM Standard Error of Mean (logged)	0.264				95% H-UCL (KM -Log)		27.87
99					KM SD (logged)	1.704				95% Critical H Value (KM-Log)		3.258
100					KM Standard Error of Mean (logged)	0.264						
101												
102	DL/2 Statistics											
103					DL/2 Normal					DL/2 Log-Transformed		
104					Mean in Original Scale	13.42				Mean in Log Scale		1.098
105					SD in Original Scale	24.96				SD in Log Scale		1.668
106					95% t UCL (Assumes normality)	19.75				95% H-Stat UCL		27.22

	A	B	C	D	E	F	G	H	I	J	K	L
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Data do not follow a Discernible Distribution at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	95% KM (Chebyshev) UCL					29.86						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												
120	VALUE (benz(a)anthracene)											
121												
122	General Statistics											
123	Total Number of Observations					49	Number of Distinct Observations					33
124	Number of Detects					27	Number of Non-Detects					22
125	Number of Distinct Detects					23	Number of Distinct Non-Detects					12
126	Minimum Detect					0.006	Minimum Non-Detect					0.0073
127	Maximum Detect					4.5	Maximum Non-Detect					0.078
128	Variance Detects					0.736	Percent Non-Detects					44.9%
129	Mean Detects					0.24	SD Detects					0.858
130	Median Detects					0.031	CV Detects					3.572
131	Skewness Detects					5.077	Kurtosis Detects					26.11
132	Mean of Logged Detects					-3.101	SD of Logged Detects					1.496
133												
134	Normal GOF Test on Detects Only											
135	Shapiro Wilk Test Statistic					0.275	Shapiro Wilk GOF Test					
136	5% Shapiro Wilk Critical Value					0.923	Detected Data Not Normal at 5% Significance Level					
137	Lilliefors Test Statistic					0.408	Lilliefors GOF Test					
138	5% Lilliefors Critical Value					0.167	Detected Data Not Normal at 5% Significance Level					
139	Detected Data Not Normal at 5% Significance Level											
140												
141	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
142	KM Mean					0.137	KM Standard Error of Mean					0.0925
143	KM SD					0.635	95% KM (BCA) UCL					0.324
144	95% KM (t) UCL					0.292	95% KM (Percentile Bootstrap) UCL					0.312
145	95% KM (z) UCL					0.289	95% KM Bootstrap t UCL					1.442
146	90% KM Chebyshev UCL					0.414	95% KM Chebyshev UCL					0.54
147	97.5% KM Chebyshev UCL					0.714	99% KM Chebyshev UCL					1.057
148												
149	Gamma GOF Tests on Detected Observations Only											
150	A-D Test Statistic					3.05	Anderson-Darling GOF Test					
151	5% A-D Critical Value					0.832	Detected Data Not Gamma Distributed at 5% Significance Level					
152	K-S Test Statistic					0.274	Kolmogorov-Smirnov GOF					
153	5% K-S Critical Value					0.18	Detected Data Not Gamma Distributed at 5% Significance Level					
154	Detected Data Not Gamma Distributed at 5% Significance Level											
155												
156	Gamma Statistics on Detected Data Only											
157	k hat (MLE)					0.394	k star (bias corrected MLE)					0.375
158	Theta hat (MLE)					0.61	Theta star (bias corrected MLE)					0.641
159	nu hat (MLE)					21.27	nu star (bias corrected)					20.24

	A	B	C	D	E	F	G	H	I	J	K	L
160					Mean (detects)	0.24						
161												
162					Gamma ROS Statistics using Imputed Non-Detects							
163					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
164					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
165					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
166					This is especially true when the sample size is small.							
167					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
168					Minimum	0.006				Mean		0.137
169					Maximum	4.5				Median		0.01
170					SD	0.642				CV		4.691
171					k hat (MLE)	0.372				k star (bias corrected MLE)		0.363
172					Theta hat (MLE)	0.367				Theta star (bias corrected MLE)		0.377
173					nu hat (MLE)	36.5				nu star (bias corrected)		35.6
174					Adjusted Level of Significance (β)	0.0451						
175					Approximate Chi Square Value (35.60, α)	22.95				Adjusted Chi Square Value (35.60, β)		22.64
176					95% Gamma Approximate UCL (use when n>=50)	0.212				95% Gamma Adjusted UCL (use when n<50)		0.215
177												
178					Estimates of Gamma Parameters using KM Estimates							
179					Mean (KM)	0.137				SD (KM)		0.635
180					Variance (KM)	0.404				SE of Mean (KM)		0.0925
181					k hat (KM)	0.0462				k star (KM)		0.057
182					nu hat (KM)	4.531				nu star (KM)		5.587
183					theta hat (KM)	2.954				theta star (KM)		2.396
184					80% gamma percentile (KM)	0.0284				90% gamma percentile (KM)		0.244
185					95% gamma percentile (KM)	0.756				99% gamma percentile (KM)		2.816
186												
187					Gamma Kaplan-Meier (KM) Statistics							
188					Approximate Chi Square Value (5.59, α)	1.432				Adjusted Chi Square Value (5.59, β)		1.37
189					95% Gamma Approximate KM-UCL (use when n>=50)	0.533				95% Gamma Adjusted KM-UCL (use when n<50)		0.557
190					95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)							
191												
192					Lognormal GOF Test on Detected Observations Only							
193					Shapiro Wilk Test Statistic	0.926				Shapiro Wilk GOF Test		
194					5% Shapiro Wilk Critical Value	0.923				Detected Data appear Lognormal at 5% Significance Level		
195					Lilliefors Test Statistic	0.117				Lilliefors GOF Test		
196					5% Lilliefors Critical Value	0.167				Detected Data appear Lognormal at 5% Significance Level		
197					Detected Data appear Lognormal at 5% Significance Level							
198												
199					Lognormal ROS Statistics Using Imputed Non-Detects							
200					Mean in Original Scale	0.136				Mean in Log Scale		-3.989
201					SD in Original Scale	0.642				SD in Log Scale		1.548
202					95% t UCL (assumes normality of ROS data)	0.29				95% Percentile Bootstrap UCL		0.315
203					95% BCA Bootstrap UCL	0.429				95% Bootstrap t UCL		1.41
204					95% H-UCL (Log ROS)	0.12						
205												
206					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
207					KM Mean (logged)	-3.846				KM Geo Mean		0.0214
208					KM SD (logged)	1.394				95% Critical H Value (KM-Log)		2.799
209					KM Standard Error of Mean (logged)	0.21				95% H-UCL (KM -Log)		0.0992
210					KM SD (logged)	1.394				95% Critical H Value (KM-Log)		2.799
211					KM Standard Error of Mean (logged)	0.21						
212												

	A	B	C	D	E	F	G	H	I	J	K	L
213	DL/2 Statistics											
214	DL/2 Normal						DL/2 Log-Transformed					
215					Mean in Original Scale	0.138				Mean in Log Scale		-3.768
216					SD in Original Scale	0.642				SD in Log Scale		1.379
217					95% t UCL (Assumes normality)	0.291				95% H-Stat UCL		0.104
218	DL/2 is not a recommended method, provided for comparisons and historical reasons											
219												
220	Nonparametric Distribution Free UCL Statistics											
221	Detected Data appear Lognormal Distributed at 5% Significance Level											
222												
223	Suggested UCL to Use											
224					KM H-UCL	0.0992						
225												
226	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
227	Recommendations are based upon data size, data distribution, and skewness.											
228	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
229	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
230												
231	VALUE (benzo(a)pyrene)											
232												
233	General Statistics											
234					Total Number of Observations	49				Number of Distinct Observations		34
235					Number of Detects	27				Number of Non-Detects		22
236					Number of Distinct Detects	24				Number of Distinct Non-Detects		12
237					Minimum Detect	0.0076				Minimum Non-Detect		0.0073
238					Maximum Detect	4.9				Maximum Non-Detect		0.078
239					Variance Detects	0.871				Percent Non-Detects		44.9%
240					Mean Detects	0.262				SD Detects		0.933
241					Median Detects	0.038				CV Detects		3.562
242					Skewness Detects	5.089				Kurtosis Detects		26.21
243					Mean of Logged Detects	-2.972				SD of Logged Detects		1.465
244												
245	Normal GOF Test on Detects Only											
246					Shapiro Wilk Test Statistic	0.273	Shapiro Wilk GOF Test					
247					5% Shapiro Wilk Critical Value	0.923	Detected Data Not Normal at 5% Significance Level					
248					Lilliefors Test Statistic	0.415	Lilliefors GOF Test					
249					5% Lilliefors Critical Value	0.167	Detected Data Not Normal at 5% Significance Level					
250	Detected Data Not Normal at 5% Significance Level											
251												
252	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
253					KM Mean	0.149				KM Standard Error of Mean		0.101
254					KM SD	0.691				95% KM (BCA) UCL		0.352
255					95% KM (t) UCL	0.318				95% KM (Percentile Bootstrap) UCL		0.342
256					95% KM (z) UCL	0.315				95% KM Bootstrap t UCL		1.542
257					90% KM Chebyshev UCL	0.451				95% KM Chebyshev UCL		0.588
258					97.5% KM Chebyshev UCL	0.778				99% KM Chebyshev UCL		1.15
259												
260	Gamma GOF Tests on Detected Observations Only											
261					A-D Test Statistic	3.059	Anderson-Darling GOF Test					
262					5% A-D Critical Value	0.83	Detected Data Not Gamma Distributed at 5% Significance Level					
263					K-S Test Statistic	0.245	Kolmogorov-Smirnov GOF					
264					5% K-S Critical Value	0.18	Detected Data Not Gamma Distributed at 5% Significance Level					
265	Detected Data Not Gamma Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
266												
267					Gamma Statistics on Detected Data Only							
268					k hat (MLE)	0.403			k star (bias corrected MLE)			0.383
269					Theta hat (MLE)	0.651			Theta star (bias corrected MLE)			0.685
270					nu hat (MLE)	21.74			nu star (bias corrected)			20.66
271					Mean (detects)	0.262						
272												
273					Gamma ROS Statistics using Imputed Non-Detects							
274					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
275					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
276					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
277					This is especially true when the sample size is small.							
278					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
279					Minimum	0.0076			Mean			0.149
280					Maximum	4.9			Median			0.011
281					SD	0.698			CV			4.692
282					k hat (MLE)	0.37			k star (bias corrected MLE)			0.361
283					Theta hat (MLE)	0.402			Theta star (bias corrected MLE)			0.412
284					nu hat (MLE)	36.27			nu star (bias corrected)			35.38
285					Adjusted Level of Significance (β)	0.0451						
286					Approximate Chi Square Value (35.38, α)	22.77			Adjusted Chi Square Value (35.38, β)			22.47
287					95% Gamma Approximate UCL (use when n>=50)	0.231			95% Gamma Adjusted UCL (use when n<50)			0.234
288												
289					Estimates of Gamma Parameters using KM Estimates							
290					Mean (KM)	0.149			SD (KM)			0.691
291					Variance (KM)	0.478			SE of Mean (KM)			0.101
292					k hat (KM)	0.0467			k star (KM)			0.0574
293					nu hat (KM)	4.573			nu star (KM)			5.626
294					theta hat (KM)	3.199			theta star (KM)			2.6
295					80% gamma percentile (KM)	0.0317			90% gamma percentile (KM)			0.268
296					95% gamma percentile (KM)	0.828			99% gamma percentile (KM)			3.069
297												
298					Gamma Kaplan-Meier (KM) Statistics							
299					Approximate Chi Square Value (5.63, α)	1.452			Adjusted Chi Square Value (5.63, β)			1.389
300					95% Gamma Approximate KM-UCL (use when n>=50)	0.578			95% Gamma Adjusted KM-UCL (use when n<50)			0.605
301					95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)							
302												
303					Lognormal GOF Test on Detected Observations Only							
304					Shapiro Wilk Test Statistic	0.92			Shapiro Wilk GOF Test			
305					5% Shapiro Wilk Critical Value	0.923			Detected Data Not Lognormal at 5% Significance Level			
306					Lilliefors Test Statistic	0.0993			Lilliefors GOF Test			
307					5% Lilliefors Critical Value	0.167			Detected Data appear Lognormal at 5% Significance Level			
308					Detected Data appear Approximate Lognormal at 5% Significance Level							
309												
310					Lognormal ROS Statistics Using Imputed Non-Detects							
311					Mean in Original Scale	0.148			Mean in Log Scale			-3.952
312					SD in Original Scale	0.699			SD in Log Scale			1.622
313					95% t UCL (assumes normality of ROS data)	0.315			95% Percentile Bootstrap UCL			0.342
314					95% BCA Bootstrap UCL	0.448			95% Bootstrap t UCL			1.526
315					95% H-UCL (Log ROS)	0.148						
316												
317					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
318					KM Mean (logged)	-3.7			KM Geo Mean			0.0247

	A	B	C	D	E	F	G	H	I	J	K	L
319					KM SD (logged)	1.36				95% Critical H Value (KM-Log)		2.757
320					KM Standard Error of Mean (logged)	0.204				95% H-UCL (KM -Log)		0.107
321					KM SD (logged)	1.36				95% Critical H Value (KM-Log)		2.757
322					KM Standard Error of Mean (logged)	0.204						
323												
324					DL/2 Statistics							
325				DL/2 Normal					DL/2 Log-Transformed			
326					Mean in Original Scale	0.15				Mean in Log Scale		-3.687
327					SD in Original Scale	0.698				SD in Log Scale		1.392
328					95% t UCL (Assumes normality)	0.317				95% H-Stat UCL		0.116
329					DL/2 is not a recommended method, provided for comparisons and historical reasons							
330												
331					Nonparametric Distribution Free UCL Statistics							
332					Detected Data appear Approximate Lognormal Distributed at 5% Significance Level							
333												
334					Suggested UCL to Use							
335					KM H-UCL	0.107						
336												
337					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
338					Recommendations are based upon data size, data distribution, and skewness.							
339					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
340					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
341												
342	VALUE (benzo(b)fluoranthene)											
343												
344					General Statistics							
345					Total Number of Observations	49				Number of Distinct Observations		36
346					Number of Detects	32				Number of Non-Detects		17
347					Number of Distinct Detects	29				Number of Distinct Non-Detects		9
348					Minimum Detect	0.012				Minimum Non-Detect		0.0073
349					Maximum Detect	2.8				Maximum Non-Detect		0.078
350					Variance Detects	0.262				Percent Non-Detects		34.69%
351					Mean Detects	0.207				SD Detects		0.512
352					Median Detects	0.0415				CV Detects		2.478
353					Skewness Detects	4.564				Kurtosis Detects		22.72
354					Mean of Logged Detects	-2.774				SD of Logged Detects		1.369
355												
356					Normal GOF Test on Detects Only							
357					Shapiro Wilk Test Statistic	0.407				Shapiro Wilk GOF Test		
358					5% Shapiro Wilk Critical Value	0.93				Detected Data Not Normal at 5% Significance Level		
359					Lilliefors Test Statistic	0.352				Lilliefors GOF Test		
360					5% Lilliefors Critical Value	0.154				Detected Data Not Normal at 5% Significance Level		
361					Detected Data Not Normal at 5% Significance Level							
362												
363					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
364					KM Mean	0.14				KM Standard Error of Mean		0.0605
365					KM SD	0.417				95% KM (BCA) UCL		0.252
366					95% KM (t) UCL	0.241				95% KM (Percentile Bootstrap) UCL		0.249
367					95% KM (z) UCL	0.239				95% KM Bootstrap t UCL		0.464
368					90% KM Chebyshev UCL	0.321				95% KM Chebyshev UCL		0.404
369					97.5% KM Chebyshev UCL	0.518				99% KM Chebyshev UCL		0.742
370												
371					Gamma GOF Tests on Detected Observations Only							

	A	B	C	D	E	F	G	H	I	J	K	L
372					A-D Test Statistic	2.644	Anderson-Darling GOF Test					
373					5% A-D Critical Value	0.808	Detected Data Not Gamma Distributed at 5% Significance Level					
374					K-S Test Statistic	0.242	Kolmogorov-Smirnov GOF					
375					5% K-S Critical Value	0.164	Detected Data Not Gamma Distributed at 5% Significance Level					
376	Detected Data Not Gamma Distributed at 5% Significance Level											
377												
378	Gamma Statistics on Detected Data Only											
379					k hat (MLE)	0.527			k star (bias corrected MLE)			0.498
380					Theta hat (MLE)	0.392			Theta star (bias corrected MLE)			0.415
381					nu hat (MLE)	33.71			nu star (bias corrected)			31.88
382					Mean (detects)	0.207						
383												
384	Gamma ROS Statistics using Imputed Non-Detects											
385	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
386	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
387	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
388	This is especially true when the sample size is small.											
389	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
390					Minimum	0.01			Mean			0.138
391					Maximum	2.8			Median			0.022
392					SD	0.422			CV			3.05
393					k hat (MLE)	0.451			k star (bias corrected MLE)			0.437
394					Theta hat (MLE)	0.307			Theta star (bias corrected MLE)			0.317
395					nu hat (MLE)	44.2			nu star (bias corrected)			42.83
396					Adjusted Level of Significance (β)	0.0451						
397					Approximate Chi Square Value (42.83, α)	28.83			Adjusted Chi Square Value (42.83, β)			28.48
398					95% Gamma Approximate UCL (use when n>=50)	0.206			95% Gamma Adjusted UCL (use when n<50)			0.208
399												
400	Estimates of Gamma Parameters using KM Estimates											
401					Mean (KM)	0.14			SD (KM)			0.417
402					Variance (KM)	0.174			SE of Mean (KM)			0.0605
403					k hat (KM)	0.112			k star (KM)			0.119
404					nu hat (KM)	11			nu star (KM)			11.66
405					theta hat (KM)	1.245			theta star (KM)			1.175
406					80% gamma percentile (KM)	0.121			90% gamma percentile (KM)			0.395
407					95% gamma percentile (KM)	0.798			99% gamma percentile (KM)			2.032
408												
409	Gamma Kaplan-Meier (KM) Statistics											
410					Approximate Chi Square Value (11.66, α)	5.004			Adjusted Chi Square Value (11.66, β)			4.871
411					95% Gamma Approximate KM-UCL (use when n>=50)	0.326			95% Gamma Adjusted KM-UCL (use when n<50)			0.334
412												
413	Lognormal GOF Test on Detected Observations Only											
414					Shapiro Wilk Test Statistic	0.91	Shapiro Wilk GOF Test					
415					5% Shapiro Wilk Critical Value	0.93	Detected Data Not Lognormal at 5% Significance Level					
416					Lilliefors Test Statistic	0.179	Lilliefors GOF Test					
417					5% Lilliefors Critical Value	0.154	Detected Data Not Lognormal at 5% Significance Level					
418	Detected Data Not Lognormal at 5% Significance Level											
419												
420	Lognormal ROS Statistics Using Imputed Non-Detects											
421					Mean in Original Scale	0.138			Mean in Log Scale			-3.502
422					SD in Original Scale	0.422			SD in Log Scale			1.551
423					95% t UCL (assumes normality of ROS data)	0.239			95% Percentile Bootstrap UCL			0.245
424					95% BCA Bootstrap UCL	0.322			95% Bootstrap t UCL			0.469

425				95% H-UCL (Log ROS)	0.196						
426											
427	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution										
428				KM Mean (logged)	-3.319				KM Geo Mean	0.0362	
429				KM SD (logged)	1.34				95% Critical H Value (KM-Log)	2.733	
430				KM Standard Error of Mean (logged)	0.199				95% H-UCL (KM -Log)	0.151	
431				KM SD (logged)	1.34				95% Critical H Value (KM-Log)	2.733	
432				KM Standard Error of Mean (logged)	0.199						
433											
434	DL/2 Statistics										
435			DL/2 Normal						DL/2 Log-Transformed		
436				Mean in Original Scale	0.14				Mean in Log Scale	-3.362	
437				SD in Original Scale	0.422				SD in Log Scale	1.409	
438				95% t UCL (Assumes normality)	0.241				95% H-Stat UCL	0.166	
439	DL/2 is not a recommended method, provided for comparisons and historical reasons										
440											
441	Nonparametric Distribution Free UCL Statistics										
442	Data do not follow a Discernible Distribution at 5% Significance Level										
443											
444	Suggested UCL to Use										
445				95% KM (Chebyshev) UCL	0.404						
446											
447	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
448	Recommendations are based upon data size, data distribution, and skewness.										
449	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
450	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
451											
452	VALUE (dibenz(a,h)anthracene)										
453											
454	General Statistics										
455				Total Number of Observations	49				Number of Distinct Observations	26	
456				Number of Detects	4				Number of Non-Detects	45	
457				Number of Distinct Detects	4				Number of Distinct Non-Detects	22	
458				Minimum Detect	0.034				Minimum Non-Detect	0.007	
459				Maximum Detect	0.71				Maximum Non-Detect	0.078	
460				Variance Detects	0.11				Percent Non-Detects	91.84%	
461				Mean Detects	0.212				SD Detects	0.332	
462				Median Detects	0.052				CV Detects	1.567	
463				Skewness Detects	1.995				Kurtosis Detects	3.983	
464				Mean of Logged Detects	-2.413				SD of Logged Detects	1.397	
465											
466	Normal GOF Test on Detects Only										
467				Shapiro Wilk Test Statistic	0.658				Shapiro Wilk GOF Test		
468				5% Shapiro Wilk Critical Value	0.748				Detected Data Not Normal at 5% Significance Level		
469				Lilliefors Test Statistic	0.429				Lilliefors GOF Test		
470				5% Lilliefors Critical Value	0.375				Detected Data Not Normal at 5% Significance Level		
471	Detected Data Not Normal at 5% Significance Level										
472											
473	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs										
474				KM Mean	0.0239				KM Standard Error of Mean	0.0164	
475				KM SD	0.0995				95% KM (BCA) UCL	N/A	
476				95% KM (t) UCL	0.0514				95% KM (Percentile Bootstrap) UCL	N/A	
477				95% KM (z) UCL	0.0509				95% KM Bootstrap t UCL	N/A	

	A	B	C	D	E	F	G	H	I	J	K	L
478					90% KM Chebyshev UCL	0.0731				95% KM Chebyshev UCL		0.0954
479					97.5% KM Chebyshev UCL	0.126				99% KM Chebyshev UCL		0.187
480												
481					Gamma GOF Tests on Detected Observations Only							
482					A-D Test Statistic	0.737			Anderson-Darling GOF Test			
483					5% A-D Critical Value	0.672			Detected Data Not Gamma Distributed at 5% Significance Level			
484					K-S Test Statistic	0.43			Kolmogorov-Smirnov GOF			
485					5% K-S Critical Value	0.406			Detected Data Not Gamma Distributed at 5% Significance Level			
486					Detected Data Not Gamma Distributed at 5% Significance Level							
487												
488					Gamma Statistics on Detected Data Only							
489					k hat (MLE)	0.701			k star (bias corrected MLE)			0.342
490					Theta hat (MLE)	0.302			Theta star (bias corrected MLE)			0.62
491					nu hat (MLE)	5.611			nu star (bias corrected)			2.736
492					Mean (detects)	0.212						
493												
494					Gamma ROS Statistics using Imputed Non-Detects							
495					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
496					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
497					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
498					This is especially true when the sample size is small.							
499					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
500					Minimum	0.01			Mean			0.0265
501					Maximum	0.71			Median			0.01
502					SD	0.1			CV			3.778
503					k hat (MLE)	0.752			k star (bias corrected MLE)			0.72
504					Theta hat (MLE)	0.0352			Theta star (bias corrected MLE)			0.0368
505					nu hat (MLE)	73.74			nu star (bias corrected)			70.56
506					Adjusted Level of Significance (β)	0.0451						
507					Approximate Chi Square Value (70.56, α)	52.22			Adjusted Chi Square Value (70.56, β)			51.74
508					95% Gamma Approximate UCL (use when n>=50)	0.0358			95% Gamma Adjusted UCL (use when n<50)			N/A
509												
510					Estimates of Gamma Parameters using KM Estimates							
511					Mean (KM)	0.0239			SD (KM)			0.0995
512					Variance (KM)	0.00991			SE of Mean (KM)			0.0164
513					k hat (KM)	0.0574			k star (KM)			0.0675
514					nu hat (KM)	5.628			nu star (KM)			6.617
515					theta hat (KM)	0.415			theta star (KM)			0.353
516					80% gamma percentile (KM)	0.00784			90% gamma percentile (KM)			0.05
517					95% gamma percentile (KM)	0.137			99% gamma percentile (KM)			0.457
518												
519					Gamma Kaplan-Meier (KM) Statistics							
520					Approximate Chi Square Value (6.62, α)	1.963			Adjusted Chi Square Value (6.62, β)			1.887
521					95% Gamma Approximate KM-UCL (use when n>=50)	0.0804			95% Gamma Adjusted KM-UCL (use when n<50)			0.0836
522					95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)							
523												
524					Lognormal GOF Test on Detected Observations Only							
525					Shapiro Wilk Test Statistic	0.773			Shapiro Wilk GOF Test			
526					5% Shapiro Wilk Critical Value	0.748			Detected Data appear Lognormal at 5% Significance Level			
527					Lilliefors Test Statistic	0.372			Lilliefors GOF Test			
528					5% Lilliefors Critical Value	0.375			Detected Data appear Lognormal at 5% Significance Level			
529					Detected Data appear Lognormal at 5% Significance Level							
530												

	A	B	C	D	E	F	G	H	I	J	K	L
531					Lognormal ROS Statistics Using Imputed Non-Detects							
532					Mean in Original Scale	0.0176				Mean in Log Scale		-8.843
533					SD in Original Scale	0.102				SD in Log Scale		2.607
534					95% t UCL (assumes normality of ROS data)	0.0419				95% Percentile Bootstrap UCL		0.0461
535					95% BCA Bootstrap UCL	0.0629				95% Bootstrap t UCL		0.258
536					95% H-UCL (Log ROS)	0.0233						
537												
538					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
539					KM Mean (logged)	-4.748				KM Geo Mean		0.00867
540					KM SD (logged)	0.784				95% Critical H Value (KM-Log)		2.118
541					KM Standard Error of Mean (logged)	0.13				95% H-UCL (KM -Log)		0.015
542					KM SD (logged)	0.784				95% Critical H Value (KM-Log)		2.118
543					KM Standard Error of Mean (logged)	0.13						
544												
545					DL/2 Statistics							
546					DL/2 Normal					DL/2 Log-Transformed		
547					Mean in Original Scale	0.0261				Mean in Log Scale		-4.629
548					SD in Original Scale	0.1				SD in Log Scale		0.933
549					95% t UCL (Assumes normality)	0.0502				95% H-Stat UCL		0.0205
550					DL/2 is not a recommended method, provided for comparisons and historical reasons							
551												
552					Nonparametric Distribution Free UCL Statistics							
553					Detected Data appear Lognormal Distributed at 5% Significance Level							
554												
555					Suggested UCL to Use							
556					KM H-UCL	0.015						
557												
558					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
559					Recommendations are based upon data size, data distribution, and skewness.							
560					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
561					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
562												
563												
564	VALUE (lead)											
565												
566					General Statistics							
567					Total Number of Observations	50				Number of Distinct Observations		42
568										Number of Missing Observations		0
569					Minimum	23				Mean		2301
570					Maximum	28000				Median		205
571					SD	5199				Std. Error of Mean		735.3
572					Coefficient of Variation	2.259				Skewness		3.376
573												
574					Normal GOF Test							
575					Shapiro Wilk Test Statistic	0.514				Shapiro Wilk GOF Test		
576					5% Shapiro Wilk Critical Value	0.947				Data Not Normal at 5% Significance Level		
577					Lilliefors Test Statistic	0.382				Lilliefors GOF Test		
578					5% Lilliefors Critical Value	0.125				Data Not Normal at 5% Significance Level		
579					Data Not Normal at 5% Significance Level							
580												
581					Assuming Normal Distribution							
582					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
583					95% Student's-t UCL	3534				95% Adjusted-CLT UCL (Chen-1995)		3886

584							95% Modified-t UCL (Johnson-1978)					3593
585												
586					Gamma GOF Test							
587				A-D Test Statistic		3.978	Anderson-Darling Gamma GOF Test					
588				5% A-D Critical Value		0.856	Data Not Gamma Distributed at 5% Significance Level					
589				K-S Test Statistic		0.253	Kolmogorov-Smirnov Gamma GOF Test					
590				5% K-S Critical Value		0.136	Data Not Gamma Distributed at 5% Significance Level					
591					Data Not Gamma Distributed at 5% Significance Level							
592												
593					Gamma Statistics							
594				k hat (MLE)		0.328	k star (bias corrected MLE)					0.322
595				Theta hat (MLE)		7013	Theta star (bias corrected MLE)					7152
596				nu hat (MLE)		32.82	nu star (bias corrected)					32.18
597				MLE Mean (bias corrected)		2301	MLE Sd (bias corrected)					4057
598							Approximate Chi Square Value (0.05)					20.22
599				Adjusted Level of Significance		0.0452	Adjusted Chi Square Value					19.93
600												
601					Assuming Gamma Distribution							
602				95% Approximate Gamma UCL (use when n>=50))		3664	95% Adjusted Gamma UCL (use when n<50)					3716
603												
604					Lognormal GOF Test							
605				Shapiro Wilk Test Statistic		0.886	Shapiro Wilk Lognormal GOF Test					
606				5% Shapiro Wilk Critical Value		0.947	Data Not Lognormal at 5% Significance Level					
607				Lilliefors Test Statistic		0.133	Lilliefors Lognormal GOF Test					
608				5% Lilliefors Critical Value		0.125	Data Not Lognormal at 5% Significance Level					
609					Data Not Lognormal at 5% Significance Level							
610												
611					Lognormal Statistics							
612				Minimum of Logged Data		3.135	Mean of logged Data					5.671
613				Maximum of Logged Data		10.24	SD of logged Data					2.065
614												
615					Assuming Lognormal Distribution							
616				95% H-UCL		7316	90% Chebyshev (MVUE) UCL					4972
617				95% Chebyshev (MVUE) UCL		6242	97.5% Chebyshev (MVUE) UCL					8004
618				99% Chebyshev (MVUE) UCL		11466						
619												
620					Nonparametric Distribution Free UCL Statistics							
621					Data do not follow a Discernible Distribution (0.05)							
622												
623					Nonparametric Distribution Free UCLs							
624				95% CLT UCL		3511	95% Jackknife UCL					3534
625				95% Standard Bootstrap UCL		3502	95% Bootstrap-t UCL					4407
626				95% Hall's Bootstrap UCL		4615	95% Percentile Bootstrap UCL					3561
627				95% BCA Bootstrap UCL		4135						
628				90% Chebyshev(Mean, Sd) UCL		4507	95% Chebyshev(Mean, Sd) UCL					5507
629				97.5% Chebyshev(Mean, Sd) UCL		6893	99% Chebyshev(Mean, Sd) UCL					9618
630												
631					Suggested UCL to Use							
632				95% Chebyshev (Mean, Sd) UCL		5507						
633												
634					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
635					Recommendations are based upon data size, data distribution, and skewness.							
636					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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ProUCL Output for ECCL Firing Range
Rifle Range Exposure Unit
Subsurface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 7:31:39 PM								
5	From File			SOIL17_ECCL_20191016_RRSub.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	VALUE (lead)											
12												
13	General Statistics											
14	Total Number of Observations					6	Number of Distinct Observations					6
15							Number of Missing Observations					0
16	Minimum					29	Mean					476.3
17	Maximum					1900	Median					175
18	SD					720.5	Std. Error of Mean					294.1
19	Coefficient of Variation					1.513	Skewness					2.136
20												
21	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
22	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
23	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
24	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
25												
26	Normal GOF Test											
27	Shapiro Wilk Test Statistic					0.695	Shapiro Wilk GOF Test					
28	5% Shapiro Wilk Critical Value					0.788	Data Not Normal at 5% Significance Level					
29	Lilliefors Test Statistic					0.316	Lilliefors GOF Test					
30	5% Lilliefors Critical Value					0.325	Data appear Normal at 5% Significance Level					
31	Data appear Approximate Normal at 5% Significance Level											
32												
33	Assuming Normal Distribution											
34	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
35	95% Student's-t UCL					1069	95% Adjusted-CLT UCL (Chen-1995)					1234
36							95% Modified-t UCL (Johnson-1978)					1112
37												
38	Gamma GOF Test											
39	A-D Test Statistic					0.337	Anderson-Darling Gamma GOF Test					
40	5% A-D Critical Value					0.727	Detected data appear Gamma Distributed at 5% Significance Level					
41	K-S Test Statistic					0.237	Kolmogorov-Smirnov Gamma GOF Test					
42	5% K-S Critical Value					0.345	Detected data appear Gamma Distributed at 5% Significance Level					
43	Detected data appear Gamma Distributed at 5% Significance Level											
44												
45	Gamma Statistics											
46	k hat (MLE)					0.653	k star (bias corrected MLE)					0.438
47	Theta hat (MLE)					729.3	Theta star (bias corrected MLE)					1088
48	nu hat (MLE)					7.838	nu star (bias corrected)					5.252
49	MLE Mean (bias corrected)					476.3	MLE Sd (bias corrected)					720
50							Approximate Chi Square Value (0.05)					1.271
51	Adjusted Level of Significance					0.0122	Adjusted Chi Square Value					0.697
52												
53	Assuming Gamma Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L
54					95% Approximate Gamma UCL (use when n>=50))	1969				95% Adjusted Gamma UCL (use when n<50)		3588
55												
56					Lognormal GOF Test							
57					Shapiro Wilk Test Statistic	0.971			Shapiro Wilk Lognormal GOF Test			
58					5% Shapiro Wilk Critical Value	0.788			Data appear Lognormal at 5% Significance Level			
59					Lilliefors Test Statistic	0.149			Lilliefors Lognormal GOF Test			
60					5% Lilliefors Critical Value	0.325			Data appear Lognormal at 5% Significance Level			
61					Data appear Lognormal at 5% Significance Level							
62												
63					Lognormal Statistics							
64					Minimum of Logged Data	3.367			Mean of logged Data			5.232
65					Maximum of Logged Data	7.55			SD of logged Data			1.535
66												
67					Assuming Lognormal Distribution							
68					95% H-UCL	37528			90% Chebyshev (MVUE) UCL			1239
69					95% Chebyshev (MVUE) UCL	1596			97.5% Chebyshev (MVUE) UCL			2093
70					99% Chebyshev (MVUE) UCL	3069						
71												
72					Nonparametric Distribution Free UCL Statistics							
73					Data appear to follow a Discernible Distribution at 5% Significance Level							
74												
75					Nonparametric Distribution Free UCLs							
76					95% CLT UCL	960.1			95% Jackknife UCL			1069
77					95% Standard Bootstrap UCL	922			95% Bootstrap-t UCL			4072
78					95% Hall's Bootstrap UCL	3390			95% Percentile Bootstrap UCL			1005
79					95% BCA Bootstrap UCL	1097						
80					90% Chebyshev(Mean, Sd) UCL	1359			95% Chebyshev(Mean, Sd) UCL			1758
81					97.5% Chebyshev(Mean, Sd) UCL	2313			99% Chebyshev(Mean, Sd) UCL			3403
82												
83					Suggested UCL to Use							
84					95% Student's-t UCL	1069						
85												
86					When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test							
87					When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL							
88												
89					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
90					Recommendations are based upon data size, data distribution, and skewness.							
91					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
92					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
93												

ProUCL Output for ECCL Firing Range Trap and Skeet Ranges Exposure Unit Surface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 7:36:03 PM								
5	From File			SOIL17_ECCL_20191016_TSRSurf.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	VALUE (antimony)											
11												
12	General Statistics											
13	Total Number of Observations					91	Number of Distinct Observations					64
14	Number of Detects					82	Number of Non-Detects					9
15	Number of Distinct Detects					62	Number of Distinct Non-Detects					6
16	Minimum Detect					0.54	Minimum Non-Detect					2.1
17	Maximum Detect					10000	Maximum Non-Detect					6.6
18	Variance Detects					2061838	Percent Non-Detects					9.89%
19	Mean Detects					399.9	SD Detects					1436
20	Median Detects					4.2	CV Detects					3.591
21	Skewness Detects					4.829	Kurtosis Detects					26.71
22	Mean of Logged Detects					2.163	SD of Logged Detects					2.341
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.334	Normal GOF Test on Detected Observations Only					
26	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.466	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.098	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					360.5	KM Standard Error of Mean					143.4
33	KM SD					1360	95% KM (BCA) UCL					642.7
34	95% KM (t) UCL					598.9	95% KM (Percentile Bootstrap) UCL					618
35	95% KM (z) UCL					596.4	95% KM Bootstrap t UCL					813.7
36	90% KM Chebyshev UCL					790.8	95% KM Chebyshev UCL					985.7
37	97.5% KM Chebyshev UCL					1256	99% KM Chebyshev UCL					1788
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					15.03	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.922	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.366	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.11	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.193	k star (bias corrected MLE)					0.194
48	Theta hat (MLE)					2069	Theta star (bias corrected MLE)					2058
49	nu hat (MLE)					31.69	nu star (bias corrected)					31.87
50	Mean (detects)					399.9						
51												
52	Gamma ROS Statistics using Imputed Non-Detects											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											

	A	B	C	D	E	F	G	H	I	J	K	L
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean		360.4
59					Maximum	10000				Median		3.6
60					SD	1368				CV		3.795
61					k hat (MLE)	0.171				k star (bias corrected MLE)		0.173
62					Theta hat (MLE)	2101				Theta star (bias corrected MLE)		2081
63					nu hat (MLE)	31.21				nu star (bias corrected)		31.52
64					Adjusted Level of Significance (β)	0.0474						
65					Approximate Chi Square Value (31.52, α)	19.69				Adjusted Chi Square Value (31.52, β)		19.54
66					95% Gamma Approximate UCL (use when n>=50)	576.8				95% Gamma Adjusted UCL (use when n<50)		581.3
67												
68	Estimates of Gamma Parameters using KM Estimates											
69					Mean (KM)	360.5				SD (KM)		1360
70					Variance (KM)	1849401				SE of Mean (KM)		143.4
71					k hat (KM)	0.0703				k star (KM)		0.0753
72					nu hat (KM)	12.79				nu star (KM)		13.7
73					theta hat (KM)	5130				theta star (KM)		4789
74					80% gamma percentile (KM)	151.7				90% gamma percentile (KM)		821.1
75					95% gamma percentile (KM)	2089				99% gamma percentile (KM)		6570
76												
77	Gamma Kaplan-Meier (KM) Statistics											
78					Approximate Chi Square Value (13.70, α)	6.368				Adjusted Chi Square Value (13.70, β)		6.287
79					95% Gamma Approximate KM-UCL (use when n>=50)	775.7				95% Gamma Adjusted KM-UCL (use when n<50)		785.7
80												
81	Lognormal GOF Test on Detected Observations Only											
82					Shapiro Wilk Approximate Test Statistic	0.801				Shapiro Wilk GOF Test		
83					5% Shapiro Wilk P Value	7.772E-16				Detected Data Not Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.177				Lilliefors GOF Test		
85					5% Lilliefors Critical Value	0.098				Detected Data Not Lognormal at 5% Significance Level		
86	Detected Data Not Lognormal at 5% Significance Level											
87												
88	Lognormal ROS Statistics Using Imputed Non-Detects											
89					Mean in Original Scale	360.5				Mean in Log Scale		1.963
90					SD in Original Scale	1367				SD in Log Scale		2.312
91					95% t UCL (assumes normality of ROS data)	598.7				95% Percentile Bootstrap UCL		609.6
92					95% BCA Bootstrap UCL	756.1				95% Bootstrap t UCL		785
93					95% H-UCL (Log ROS)	260.1						
94												
95	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
96					KM Mean (logged)	1.983				KM Geo Mean		7.264
97					KM SD (logged)	2.28				95% Critical H Value (KM-Log)		3.752
98					KM Standard Error of Mean (logged)	0.241				95% H-UCL (KM -Log)		240.6
99					KM SD (logged)	2.28				95% Critical H Value (KM-Log)		3.752
100					KM Standard Error of Mean (logged)	0.241						
101												
102	DL/2 Statistics											
103					DL/2 Normal					DL/2 Log-Transformed		
104					Mean in Original Scale	360.5				Mean in Log Scale		1.989
105					SD in Original Scale	1367				SD in Log Scale		2.287
106					95% t UCL (Assumes normality)	598.8				95% H-Stat UCL		247.3

107	DL/2 is not a recommended method, provided for comparisons and historical reasons			
108				
109	Nonparametric Distribution Free UCL Statistics			
110	Data do not follow a Discernible Distribution at 5% Significance Level			
111				
112	Suggested UCL to Use			
113	95% KM (Chebyshev) UCL	985.7		
114				
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
116	Recommendations are based upon data size, data distribution, and skewness.			
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
119				
120				
121	VALUE (arsenic)			
122				
123	General Statistics			
124	Total Number of Observations	91	Number of Distinct Observations	57
125			Number of Missing Observations	0
126	Minimum	3.7	Mean	106.6
127	Maximum	2200	Median	14
128	SD	338.1	Std. Error of Mean	35.45
129	Coefficient of Variation	3.172	Skewness	4.507
130				
131	Normal GOF Test			
132	Shapiro Wilk Test Statistic	0.342	Shapiro Wilk GOF Test	
133	5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
134	Lilliefors Test Statistic	0.456	Lilliefors GOF Test	
135	5% Lilliefors Critical Value	0.0931	Data Not Normal at 5% Significance Level	
136	Data Not Normal at 5% Significance Level			
137				
138	Assuming Normal Distribution			
139	95% Normal UCL		95% UCLs (Adjusted for Skewness)	
140	95% Student's-t UCL	165.5	95% Adjusted-CLT UCL (Chen-1995)	182.8
141			95% Modified-t UCL (Johnson-1978)	168.3
142				
143	Gamma GOF Test			
144	A-D Test Statistic	17.41	Anderson-Darling Gamma GOF Test	
145	5% A-D Critical Value	0.846	Data Not Gamma Distributed at 5% Significance Level	
146	K-S Test Statistic	0.378	Kolmogorov-Smirnov Gamma GOF Test	
147	5% K-S Critical Value	0.101	Data Not Gamma Distributed at 5% Significance Level	
148	Data Not Gamma Distributed at 5% Significance Level			
149				
150	Gamma Statistics			
151	k hat (MLE)	0.389	k star (bias corrected MLE)	0.383
152	Theta hat (MLE)	274.3	Theta star (bias corrected MLE)	278.2
153	nu hat (MLE)	70.73	nu star (bias corrected)	69.73
154	MLE Mean (bias corrected)	106.6	MLE Sd (bias corrected)	172.2
155			Approximate Chi Square Value (0.05)	51.51
156	Adjusted Level of Significance	0.0474	Adjusted Chi Square Value	51.26
157				
158	Assuming Gamma Distribution			
159	95% Approximate Gamma UCL (use when n>=50))	144.3	95% Adjusted Gamma UCL (use when n<50)	145

160				
161	Lognormal GOF Test			
162	Shapiro Wilk Test Statistic	0.752	Shapiro Wilk Lognormal GOF Test	
163	5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
164	Lilliefors Test Statistic	0.222	Lilliefors Lognormal GOF Test	
165	5% Lilliefors Critical Value	0.0931	Data Not Lognormal at 5% Significance Level	
166	Data Not Lognormal at 5% Significance Level			
167				
168	Lognormal Statistics			
169	Minimum of Logged Data	1.308	Mean of logged Data	2.968
170	Maximum of Logged Data	7.696	SD of logged Data	1.362
171				
172	Assuming Lognormal Distribution			
173	95% H-UCL	71.7	90% Chebyshev (MVUE) UCL	75.72
174	95% Chebyshev (MVUE) UCL	88.16	97.5% Chebyshev (MVUE) UCL	105.4
175	99% Chebyshev (MVUE) UCL	139.3		
176				
177	Nonparametric Distribution Free UCL Statistics			
178	Data do not follow a Discernible Distribution (0.05)			
179				
180	Nonparametric Distribution Free UCLs			
181	95% CLT UCL	164.9	95% Jackknife UCL	165.5
182	95% Standard Bootstrap UCL	164.5	95% Bootstrap-t UCL	203.4
183	95% Hall's Bootstrap UCL	179.5	95% Percentile Bootstrap UCL	166.9
184	95% BCA Bootstrap UCL	180.6		
185	90% Chebyshev(Mean, Sd) UCL	212.9	95% Chebyshev(Mean, Sd) UCL	261.1
186	97.5% Chebyshev(Mean, Sd) UCL	327.9	99% Chebyshev(Mean, Sd) UCL	459.3
187				
188	Suggested UCL to Use			
189	95% Chebyshev (Mean, Sd) UCL	261.1		
190				
191	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
192	Recommendations are based upon data size, data distribution, and skewness.			
193	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
194	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
195				
196	VALUE (benz(a)anthracene)			
197				
198	General Statistics			
199	Total Number of Observations	112	Number of Distinct Observations	79
200	Number of Detects	100	Number of Non-Detects	12
201	Number of Distinct Detects	74	Number of Distinct Non-Detects	9
202	Minimum Detect	0.0043	Minimum Non-Detect	0.0081
203	Maximum Detect	200	Maximum Non-Detect	0.02
204	Variance Detects	1401	Percent Non-Detects	10.71%
205	Mean Detects	12.99	SD Detects	37.43
206	Median Detects	0.024	CV Detects	2.882
207	Skewness Detects	3.596	Kurtosis Detects	13.01
208	Mean of Logged Detects	-2.06	SD of Logged Detects	3.345
209				
210	Normal GOF Test on Detects Only			
211	Shapiro Wilk Test Statistic	0.41	Normal GOF Test on Detected Observations Only	
212	5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	

Lilliefors Test Statistic	0.401	Lilliefors GOF Test		
5% Lilliefors Critical Value	0.0889	Detected Data Not Normal at 5% Significance Level		
Detected Data Not Normal at 5% Significance Level				
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs				
KM Mean	11.6	KM Standard Error of Mean	3.363	
KM SD	35.42	95% KM (BCA) UCL	17.57	
95% KM (t) UCL	17.18	95% KM (Percentile Bootstrap) UCL	17.65	
95% KM (z) UCL	17.13	95% KM Bootstrap t UCL	19.99	
90% KM Chebyshev UCL	21.69	95% KM Chebyshev UCL	26.26	
97.5% KM Chebyshev UCL	32.6	99% KM Chebyshev UCL	45.06	
Gamma GOF Tests on Detected Observations Only				
A-D Test Statistic	11.97	Anderson-Darling GOF Test		
5% A-D Critical Value	0.953	Detected Data Not Gamma Distributed at 5% Significance Level		
K-S Test Statistic	0.287	Kolmogorov-Smirnov GOF		
5% K-S Critical Value	0.101	Detected Data Not Gamma Distributed at 5% Significance Level		
Detected Data Not Gamma Distributed at 5% Significance Level				
Gamma Statistics on Detected Data Only				
k hat (MLE)	0.164	k star (bias corrected MLE)	0.166	
Theta hat (MLE)	79.16	Theta star (bias corrected MLE)	78.33	
nu hat (MLE)	32.81	nu star (bias corrected)	33.16	
Mean (detects)	12.99			
Gamma ROS Statistics using Imputed Non-Detects				
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs				
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)				
For such situations, GROS method may yield incorrect values of UCLs and BTVs				
This is especially true when the sample size is small.				
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates				
Minimum	0.0043	Mean	11.6	
Maximum	200	Median	0.0175	
SD	35.58	CV	3.068	
k hat (MLE)	0.159	k star (bias corrected MLE)	0.161	
Theta hat (MLE)	72.81	Theta star (bias corrected MLE)	72.04	
nu hat (MLE)	35.68	nu star (bias corrected)	36.05	
Adjusted Level of Significance (β)	0.0479			
Approximate Chi Square Value (36.05, α)	23.31	Adjusted Chi Square Value (36.05, β)	23.18	
95% Gamma Approximate UCL (use when n>=50)	17.93	95% Gamma Adjusted UCL (use when n<50)	18.04	
Estimates of Gamma Parameters using KM Estimates				
Mean (KM)	11.6	SD (KM)	35.42	
Variance (KM)	1254	SE of Mean (KM)	3.363	
k hat (KM)	0.107	k star (KM)	0.11	
nu hat (KM)	24.01	nu star (KM)	24.7	
theta hat (KM)	108.2	theta star (KM)	105.2	
80% gamma percentile (KM)	9.191	90% gamma percentile (KM)	32.02	
95% gamma percentile (KM)	66.8	99% gamma percentile (KM)	175.3	
Gamma Kaplan-Meier (KM) Statistics				
Approximate Chi Square Value (24.70, α)	14.38	Adjusted Chi Square Value (24.70, β)	14.28	
95% Gamma Approximate KM-UCL (use when n>=50)	19.91	95% Gamma Adjusted KM-UCL (use when n<50)	20.06	

	Lognormal GOF Test on Detected Observations Only			
	Shapiro Wilk Approximate Test Statistic	0.805	Shapiro Wilk GOF Test	
	5% Shapiro Wilk P Value	0	Detected Data Not Lognormal at 5% Significance Level	
	Lilliefors Test Statistic	0.24	Lilliefors GOF Test	
	5% Lilliefors Critical Value	0.0889	Detected Data Not Lognormal at 5% Significance Level	
	Detected Data Not Lognormal at 5% Significance Level			
	Lognormal ROS Statistics Using Imputed Non-Detects			
	Mean in Original Scale	11.6	Mean in Log Scale	-2.348
	SD in Original Scale	35.58	SD in Log Scale	3.278
	95% t UCL (assumes normality of ROS data)	17.17	95% Percentile Bootstrap UCL	17.41
	95% BCA Bootstrap UCL	18.56	95% Bootstrap t UCL	19.23
	95% H-UCL (Log ROS)	96.83		
	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
	KM Mean (logged)	-2.354	KM Geo Mean	0.0949
	KM SD (logged)	3.259	95% Critical H Value (KM-Log)	4.955
	KM Standard Error of Mean (logged)	0.31	95% H-UCL (KM -Log)	89.17
	KM SD (logged)	3.259	95% Critical H Value (KM-Log)	4.955
	KM Standard Error of Mean (logged)	0.31		
	DL/2 Statistics			
	DL/2 Normal		DL/2 Log-Transformed	
	Mean in Original Scale	11.6	Mean in Log Scale	-2.357
	SD in Original Scale	35.58	SD in Log Scale	3.275
	95% t UCL (Assumes normality)	17.17	95% H-Stat UCL	94.91
	DL/2 is not a recommended method, provided for comparisons and historical reasons			
	Nonparametric Distribution Free UCL Statistics			
	Data do not follow a Discernible Distribution at 5% Significance Level			
	Suggested UCL to Use			
	95% KM (Chebyshev) UCL	26.26		
	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
	Recommendations are based upon data size, data distribution, and skewness.			
	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
VALUE (benzo(a)pyrene)				
	General Statistics			
	Total Number of Observations	112	Number of Distinct Observations	84
	Number of Detects	102	Number of Non-Detects	10
	Number of Distinct Detects	82	Number of Distinct Non-Detects	7
	Minimum Detect	0.0051	Minimum Non-Detect	0.016
	Maximum Detect	220	Maximum Non-Detect	0.02
	Variance Detects	2011	Percent Non-Detects	8.929%
	Mean Detects	15.46	SD Detects	44.85
	Median Detects	0.029	CV Detects	2.901
	Skewness Detects	3.514	Kurtosis Detects	12.07
	Mean of Logged Detects	-1.888	SD of Logged Detects	3.309

319				
320	Normal GOF Test on Detects Only			
321	Shapiro Wilk Test Statistic	0.401	Normal GOF Test on Detected Observations Only	
322	5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
323	Lilliefors Test Statistic	0.411	Lilliefors GOF Test	
324	5% Lilliefors Critical Value	0.088	Detected Data Not Normal at 5% Significance Level	
325	Detected Data Not Normal at 5% Significance Level			
326				
327	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
328	KM Mean	14.08	KM Standard Error of Mean	4.066
329	KM SD	42.81	95% KM (BCA) UCL	20.7
330	95% KM (t) UCL	20.82	95% KM (Percentile Bootstrap) UCL	21.39
331	95% KM (z) UCL	20.77	95% KM Bootstrap t UCL	23.54
332	90% KM Chebyshev UCL	26.28	95% KM Chebyshev UCL	31.8
333	97.5% KM Chebyshev UCL	39.47	99% KM Chebyshev UCL	54.53
334				
335	Gamma GOF Tests on Detected Observations Only			
336	A-D Test Statistic	12.47	Anderson-Darling GOF Test	
337	5% A-D Critical Value	0.953	Detected Data Not Gamma Distributed at 5% Significance Level	
338	K-S Test Statistic	0.287	Kolmogorov-Smirnov GOF	
339	5% K-S Critical Value	0.1	Detected Data Not Gamma Distributed at 5% Significance Level	
340	Detected Data Not Gamma Distributed at 5% Significance Level			
341				
342	Gamma Statistics on Detected Data Only			
343	k hat (MLE)	0.164	k star (bias corrected MLE)	0.166
344	Theta hat (MLE)	94.27	Theta star (bias corrected MLE)	93.3
345	nu hat (MLE)	33.45	nu star (bias corrected)	33.8
346	Mean (detects)	15.46		
347				
348	Gamma ROS Statistics using Imputed Non-Detects			
349	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
350	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
351	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
352	This is especially true when the sample size is small.			
353	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
354	Minimum	0.0051	Mean	14.08
355	Maximum	220	Median	0.0218
356	SD	43.01	CV	3.055
357	k hat (MLE)	0.16	k star (bias corrected MLE)	0.161
358	Theta hat (MLE)	88.27	Theta star (bias corrected MLE)	87.35
359	nu hat (MLE)	35.73	nu star (bias corrected)	36.11
360	Adjusted Level of Significance (β)	0.0479		
361	Approximate Chi Square Value (36.11, α)	23.35	Adjusted Chi Square Value (36.11, β)	23.22
362	95% Gamma Approximate UCL (use when n>=50)	21.77	95% Gamma Adjusted UCL (use when n<50)	21.89
363				
364	Estimates of Gamma Parameters using KM Estimates			
365	Mean (KM)	14.08	SD (KM)	42.81
366	Variance (KM)	1833	SE of Mean (KM)	4.066
367	k hat (KM)	0.108	k star (KM)	0.111
368	nu hat (KM)	24.22	nu star (KM)	24.91
369	theta hat (KM)	130.2	theta star (KM)	126.6
370	80% gamma percentile (KM)	11.28	90% gamma percentile (KM)	38.98
371	95% gamma percentile (KM)	81.04	99% gamma percentile (KM)	212

	A	B	C	D	E	F	G	H	I	J	K	L
372												
373						Gamma Kaplan-Meier (KM) Statistics						
374					Approximate Chi Square Value (24.91, α)	14.54			Adjusted Chi Square Value (24.91, β)			14.44
375					95% Gamma Approximate KM-UCL (use when n>=50)	24.12			95% Gamma Adjusted KM-UCL (use when n<50)			24.29
376												
377						Lognormal GOF Test on Detected Observations Only						
378					Shapiro Wilk Approximate Test Statistic	0.807			Shapiro Wilk GOF Test			
379					5% Shapiro Wilk P Value	0			Detected Data Not Lognormal at 5% Significance Level			
380					Lilliefors Test Statistic	0.222			Lilliefors GOF Test			
381					5% Lilliefors Critical Value	0.088			Detected Data Not Lognormal at 5% Significance Level			
382						Detected Data Not Lognormal at 5% Significance Level						
383												
384						Lognormal ROS Statistics Using Imputed Non-Detects						
385					Mean in Original Scale	14.08			Mean in Log Scale			-2.132
386					SD in Original Scale	43.01			SD in Log Scale			3.258
387					95% t UCL (assumes normality of ROS data)	20.82			95% Percentile Bootstrap UCL			21.1
388					95% BCA Bootstrap UCL	22.43			95% Bootstrap t UCL			23.39
389					95% H-UCL (Log ROS)	110.6						
390												
391						Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution						
392					KM Mean (logged)	-2.132			KM Geo Mean			0.119
393					KM SD (logged)	3.239			95% Critical H Value (KM-Log)			4.928
394					KM Standard Error of Mean (logged)	0.308			95% H-UCL (KM -Log)			102.3
395					KM SD (logged)	3.239			95% Critical H Value (KM-Log)			4.928
396					KM Standard Error of Mean (logged)	0.308						
397												
398						DL/2 Statistics						
399					DL/2 Normal				DL/2 Log-Transformed			
400					Mean in Original Scale	14.08			Mean in Log Scale			-2.14
401					SD in Original Scale	43.01			SD in Log Scale			3.259
402					95% t UCL (Assumes normality)	20.82			95% H-Stat UCL			110.1
403						DL/2 is not a recommended method, provided for comparisons and historical reasons						
404												
405						Nonparametric Distribution Free UCL Statistics						
406						Data do not follow a Discernible Distribution at 5% Significance Level						
407												
408						Suggested UCL to Use						
409					95% KM (Chebyshev) UCL	31.8						
410												
411						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
412						Recommendations are based upon data size, data distribution, and skewness.						
413						These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).						
414						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
415												
416	VALUE (benzo(b)fluoranthene)											
417												
418						General Statistics						
419					Total Number of Observations	112			Number of Distinct Observations			70
420					Number of Detects	104			Number of Non-Detects			8
421					Number of Distinct Detects	67			Number of Distinct Non-Detects			7
422					Minimum Detect	0.0075			Minimum Non-Detect			0.0081
423					Maximum Detect	200			Maximum Non-Detect			0.019
424					Variance Detects	1554			Percent Non-Detects			7.143%

	A	B	C	D	E	F	G	H	I	J	K	L
425					Mean Detects	13.01					SD Detects	39.42
426					Median Detects	0.036					CV Detects	3.031
427					Skewness Detects	3.679					Kurtosis Detects	13.28
428					Mean of Logged Detects	-1.76					SD of Logged Detects	2.983
429												
430					Normal GOF Test on Detects Only							
431					Shapiro Wilk Test Statistic	0.382	Normal GOF Test on Detected Observations Only					
432					5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level					
433					Lilliefors Test Statistic	0.418	Lilliefors GOF Test					
434					5% Lilliefors Critical Value	0.0872	Detected Data Not Normal at 5% Significance Level					
435					Detected Data Not Normal at 5% Significance Level							
436												
437					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
438					KM Mean	12.08					KM Standard Error of Mean	3.604
439					KM SD	37.95					95% KM (BCA) UCL	18.54
440					95% KM (t) UCL	18.06					95% KM (Percentile Bootstrap) UCL	18.65
441					95% KM (z) UCL	18.01					95% KM Bootstrap t UCL	20.36
442					90% KM Chebyshev UCL	22.89					95% KM Chebyshev UCL	27.79
443					97.5% KM Chebyshev UCL	34.58					99% KM Chebyshev UCL	47.93
444												
445					Gamma GOF Tests on Detected Observations Only							
446					A-D Test Statistic	14.72	Anderson-Darling GOF Test					
447					5% A-D Critical Value	0.943	Detected Data Not Gamma Distributed at 5% Significance Level					
448					K-S Test Statistic	0.293	Kolmogorov-Smirnov GOF					
449					5% K-S Critical Value	0.0991	Detected Data Not Gamma Distributed at 5% Significance Level					
450					Detected Data Not Gamma Distributed at 5% Significance Level							
451												
452					Gamma Statistics on Detected Data Only							
453					k hat (MLE)	0.174					k star (bias corrected MLE)	0.175
454					Theta hat (MLE)	74.82					Theta star (bias corrected MLE)	74.22
455					nu hat (MLE)	36.16					nu star (bias corrected)	36.45
456					Mean (detects)	13.01						
457												
458					Gamma ROS Statistics using Imputed Non-Detects							
459					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
460					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
461					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
462					This is especially true when the sample size is small.							
463					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
464					Minimum	0.0075					Mean	12.08
465					Maximum	200					Median	0.033
466					SD	38.12					CV	3.157
467					k hat (MLE)	0.169					k star (bias corrected MLE)	0.171
468					Theta hat (MLE)	71.28					Theta star (bias corrected MLE)	70.69
469					nu hat (MLE)	37.96					nu star (bias corrected)	38.27
470					Adjusted Level of Significance (β)	0.0479						
471					Approximate Chi Square Value (38.27, α)	25.1					Adjusted Chi Square Value (38.27, β)	24.97
472					95% Gamma Approximate UCL (use when n>=50)	18.41					95% Gamma Adjusted UCL (use when n<50)	18.51
473												
474					Estimates of Gamma Parameters using KM Estimates							
475					Mean (KM)	12.08					SD (KM)	37.95
476					Variance (KM)	1441					SE of Mean (KM)	3.604
477					k hat (KM)	0.101					k star (KM)	0.105

	A	B	C	D	E	F	G	H	I	J	K	L
478					nu hat (KM)	22.68					nu star (KM)	23.41
479					theta hat (KM)	119.3					theta star (KM)	115.6
480				80% gamma percentile (KM)		8.917				90% gamma percentile (KM)		32.71
481				95% gamma percentile (KM)		69.9				99% gamma percentile (KM)		187.6
482												
483					Gamma Kaplan-Meier (KM) Statistics							
484				Approximate Chi Square Value (23.41, α)		13.4				Adjusted Chi Square Value (23.41, β)		13.3
485				95% Gamma Approximate KM-UCL (use when n>=50)		21.1				95% Gamma Adjusted KM-UCL (use when n<50)		21.26
486												
487					Lognormal GOF Test on Detected Observations Only							
488				Shapiro Wilk Approximate Test Statistic		0.785				Shapiro Wilk GOF Test		
489				5% Shapiro Wilk P Value		0				Detected Data Not Lognormal at 5% Significance Level		
490				Lilliefors Test Statistic		0.253				Lilliefors GOF Test		
491				5% Lilliefors Critical Value		0.0872				Detected Data Not Lognormal at 5% Significance Level		
492					Detected Data Not Lognormal at 5% Significance Level							
493												
494					Lognormal ROS Statistics Using Imputed Non-Detects							
495				Mean in Original Scale		12.08				Mean in Log Scale		-2.081
496				SD in Original Scale		38.12				SD in Log Scale		3.118
497				95% t UCL (assumes normality of ROS data)		18.05				95% Percentile Bootstrap UCL		18.58
498				95% BCA Bootstrap UCL		20.14				95% Bootstrap t UCL		20.72
499				95% H-UCL (Log ROS)		66.18						
500												
501					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
502				KM Mean (logged)		-1.955				KM Geo Mean		0.142
503				KM SD (logged)		2.946				95% Critical H Value (KM-Log)		4.537
504				KM Standard Error of Mean (logged)		0.28				95% H-UCL (KM -Log)		38.64
505				KM SD (logged)		2.946				95% Critical H Value (KM-Log)		4.537
506				KM Standard Error of Mean (logged)		0.28						
507												
508					DL/2 Statistics							
509				DL/2 Normal						DL/2 Log-Transformed		
510				Mean in Original Scale		12.08				Mean in Log Scale		-1.986
511				SD in Original Scale		38.12				SD in Log Scale		2.988
512				95% t UCL (Assumes normality)		18.05				95% H-Stat UCL		43.91
513					DL/2 is not a recommended method, provided for comparisons and historical reasons							
514												
515					Nonparametric Distribution Free UCL Statistics							
516					Data do not follow a Discernible Distribution at 5% Significance Level							
517												
518					Suggested UCL to Use							
519				95% KM (Chebyshev) UCL		27.79						
520												
521					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
522					Recommendations are based upon data size, data distribution, and skewness.							
523					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
524					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
525												
526	VALUE (benzo(k)fluoranthene)											
527												
528					General Statistics							
529				Total Number of Observations		112				Number of Distinct Observations		81
530				Number of Detects		87				Number of Non-Detects		25

	A	B	C	D	E	F	G	H	I	J	K	L
531					Number of Distinct Detects	71				Number of Distinct Non-Detects		16
532					Minimum Detect	0.004				Minimum Non-Detect		0.0075
533					Maximum Detect	65				Maximum Non-Detect		0.57
534					Variance Detects	171				Percent Non-Detects		22.32%
535					Mean Detects	4.673				SD Detects		13.08
536					Median Detects	0.019				CV Detects		2.798
537					Skewness Detects	3.343				Kurtosis Detects		10.88
538					Mean of Logged Detects	-2.508				SD of Logged Detects		2.934
539												
540					Normal GOF Test on Detects Only							
541					Shapiro Wilk Test Statistic	0.419			Normal GOF Test on Detected Observations Only			
542					5% Shapiro Wilk P Value	0			Detected Data Not Normal at 5% Significance Level			
543					Lilliefors Test Statistic	0.43			Lilliefors GOF Test			
544					5% Lilliefors Critical Value	0.0951			Detected Data Not Normal at 5% Significance Level			
545					Detected Data Not Normal at 5% Significance Level							
546												
547					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
548					KM Mean	3.632				KM Standard Error of Mean		1.104
549					KM SD	11.62				95% KM (BCA) UCL		5.713
550					95% KM (t) UCL	5.464				95% KM (Percentile Bootstrap) UCL		5.488
551					95% KM (z) UCL	5.448				95% KM Bootstrap t UCL		6.118
552					90% KM Chebyshev UCL	6.945				95% KM Chebyshev UCL		8.446
553					97.5% KM Chebyshev UCL	10.53				99% KM Chebyshev UCL		14.62
554												
555					Gamma GOF Tests on Detected Observations Only							
556					A-D Test Statistic	11.07			Anderson-Darling GOF Test			
557					5% A-D Critical Value	0.931			Detected Data Not Gamma Distributed at 5% Significance Level			
558					K-S Test Statistic	0.269			Kolmogorov-Smirnov GOF			
559					5% K-S Critical Value	0.107			Detected Data Not Gamma Distributed at 5% Significance Level			
560					Detected Data Not Gamma Distributed at 5% Significance Level							
561												
562					Gamma Statistics on Detected Data Only							
563					k hat (MLE)	0.184				k star (bias corrected MLE)		0.185
564					Theta hat (MLE)	25.39				Theta star (bias corrected MLE)		25.2
565					nu hat (MLE)	32.03				nu star (bias corrected)		32.26
566					Mean (detects)	4.673						
567												
568					Gamma ROS Statistics using Imputed Non-Detects							
569					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
570					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
571					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
572					This is especially true when the sample size is small.							
573					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
574					Minimum	0.004				Mean		3.632
575					Maximum	65				Median		0.012
576					SD	11.67				CV		3.214
577					k hat (MLE)	0.176				k star (bias corrected MLE)		0.177
578					Theta hat (MLE)	20.64				Theta star (bias corrected MLE)		20.5
579					nu hat (MLE)	39.41				nu star (bias corrected)		39.69
580					Adjusted Level of Significance (β)	0.0479						
581					Approximate Chi Square Value (39.69, α)	26.26				Adjusted Chi Square Value (39.69, β)		26.12
582					95% Gamma Approximate UCL (use when n>=50)	5.49				95% Gamma Adjusted UCL (use when n<50)		5.52
583												

	A	B	C	D	E	F	G	H	I	J	K	L
584	Estimates of Gamma Parameters using KM Estimates											
585					Mean (KM)	3.632				SD (KM)		11.62
586					Variance (KM)	135				SE of Mean (KM)		1.104
587					k hat (KM)	0.0977				k star (KM)		0.101
588					nu hat (KM)	21.88				nu star (KM)		22.62
589					theta hat (KM)	37.19				theta star (KM)		35.96
590					80% gamma percentile (KM)	2.556				90% gamma percentile (KM)		9.706
591					95% gamma percentile (KM)	21.07				99% gamma percentile (KM)		57.4
592												
593	Gamma Kaplan-Meier (KM) Statistics											
594					Approximate Chi Square Value (22.62, α)	12.81				Adjusted Chi Square Value (22.62, β)		12.71
595					95% Gamma Approximate KM-UCL (use when n>=50)	6.415				95% Gamma Adjusted KM-UCL (use when n<50)		6.464
596												
597	Lognormal GOF Test on Detected Observations Only											
598					Shapiro Wilk Approximate Test Statistic	0.817				Shapiro Wilk GOF Test		
599					5% Shapiro Wilk P Value	1.221E-15				Detected Data Not Lognormal at 5% Significance Level		
600					Lilliefors Test Statistic	0.202				Lilliefors GOF Test		
601					5% Lilliefors Critical Value	0.0951				Detected Data Not Lognormal at 5% Significance Level		
602	Detected Data Not Lognormal at 5% Significance Level											
603												
604	Lognormal ROS Statistics Using Imputed Non-Detects											
605					Mean in Original Scale	3.632				Mean in Log Scale		-3.09
606					SD in Original Scale	11.67				SD in Log Scale		2.843
607					95% t UCL (assumes normality of ROS data)	5.461				95% Percentile Bootstrap UCL		5.596
608					95% BCA Bootstrap UCL	5.782				95% Bootstrap t UCL		6.019
609					95% H-UCL (Log ROS)	8.47						
610												
611	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
612					KM Mean (logged)	-3.051				KM Geo Mean		0.0473
613					KM SD (logged)	2.772				95% Critical H Value (KM-Log)		4.307
614					KM Standard Error of Mean (logged)	0.264				95% H-UCL (KM -Log)		6.853
615					KM SD (logged)	2.772				95% Critical H Value (KM-Log)		4.307
616					KM Standard Error of Mean (logged)	0.264						
617												
618	DL/2 Statistics											
619				DL/2 Normal						DL/2 Log-Transformed		
620					Mean in Original Scale	3.634				Mean in Log Scale		-3.033
621					SD in Original Scale	11.67				SD in Log Scale		2.791
622					95% t UCL (Assumes normality)	5.463				95% H-Stat UCL		7.453
623	DL/2 is not a recommended method, provided for comparisons and historical reasons											
624												
625	Nonparametric Distribution Free UCL Statistics											
626	Data do not follow a Discernible Distribution at 5% Significance Level											
627												
628	Suggested UCL to Use											
629					95% KM (Chebyshev) UCL	8.446						
630												
631	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
632	Recommendations are based upon data size, data distribution, and skewness.											
633	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
634	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
635												
636	VALUE (carbazole)											

	A	B	C	D	E	F	G	H	I	J	K	L
637												
638						General Statistics						
639					Total Number of Observations	89			Number of Distinct Observations			38
640					Number of Detects	10			Number of Non-Detects			79
641					Number of Distinct Detects	10			Number of Distinct Non-Detects			28
642					Minimum Detect	0.035			Minimum Non-Detect			0.055
643					Maximum Detect	10			Maximum Non-Detect			15
644					Variance Detects	15.16			Percent Non-Detects			88.76%
645					Mean Detects	3.239			SD Detects			3.894
646					Median Detects	1.475			CV Detects			1.202
647					Skewness Detects	0.965			Kurtosis Detects			-0.891
648					Mean of Logged Detects	-0.026			SD of Logged Detects			2.012
649												
650						Normal GOF Test on Detects Only						
651					Shapiro Wilk Test Statistic	0.792			Shapiro Wilk GOF Test			
652					5% Shapiro Wilk Critical Value	0.842			Detected Data Not Normal at 5% Significance Level			
653					Lilliefors Test Statistic	0.255			Lilliefors GOF Test			
654					5% Lilliefors Critical Value	0.262			Detected Data appear Normal at 5% Significance Level			
655						Detected Data appear Approximate Normal at 5% Significance Level						
656												
657						Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
658					KM Mean	0.414			KM Standard Error of Mean			0.185
659					KM SD	1.627			95% KM (BCA) UCL			0.782
660					95% KM (t) UCL	0.722			95% KM (Percentile Bootstrap) UCL			0.726
661					95% KM (z) UCL	0.719			95% KM Bootstrap t UCL			0.873
662					90% KM Chebyshev UCL	0.97			95% KM Chebyshev UCL			1.222
663					97.5% KM Chebyshev UCL	1.572			99% KM Chebyshev UCL			2.258
664												
665						Gamma GOF Tests on Detected Observations Only						
666					A-D Test Statistic	0.302			Anderson-Darling GOF Test			
667					5% A-D Critical Value	0.775			Detected data appear Gamma Distributed at 5% Significance Level			
668					K-S Test Statistic	0.168			Kolmogorov-Smirnov GOF			
669					5% K-S Critical Value	0.28			Detected data appear Gamma Distributed at 5% Significance Level			
670						Detected data appear Gamma Distributed at 5% Significance Level						
671												
672						Gamma Statistics on Detected Data Only						
673					k hat (MLE)	0.525			k star (bias corrected MLE)			0.434
674					Theta hat (MLE)	6.171			Theta star (bias corrected MLE)			7.462
675					nu hat (MLE)	10.5			nu star (bias corrected)			8.681
676					Mean (detects)	3.239						
677												
678						Gamma ROS Statistics using Imputed Non-Detects						
679						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
680						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)						
681						For such situations, GROS method may yield incorrect values of UCLs and BTVs						
682						This is especially true when the sample size is small.						
683						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						
684					Minimum	0.01			Mean			0.373
685					Maximum	10			Median			0.01
686					SD	1.613			CV			4.327
687					k hat (MLE)	0.232			k star (bias corrected MLE)			0.231
688					Theta hat (MLE)	1.609			Theta star (bias corrected MLE)			1.612
689					nu hat (MLE)	41.23			nu star (bias corrected)			41.18

	A	B	C	D	E	F	G	H	I	J	K	L
690					Adjusted Level of Significance (β)	0.0473						
691					Approximate Chi Square Value (41.18, α)	27.47				Adjusted Chi Square Value (41.18, β)		27.29
692					95% Gamma Approximate UCL (use when n>=50)	0.559				95% Gamma Adjusted UCL (use when n<50)		0.563
693												
694					Estimates of Gamma Parameters using KM Estimates							
695					Mean (KM)	0.414				SD (KM)		1.627
696					Variance (KM)	2.648				SE of Mean (KM)		0.185
697					k hat (KM)	0.0647				k star (KM)		0.07
698					nu hat (KM)	11.51				nu star (KM)		12.45
699					theta hat (KM)	6.4				theta star (KM)		5.914
700					80% gamma percentile (KM)	0.148				90% gamma percentile (KM)		0.893
701					95% gamma percentile (KM)	2.38				99% gamma percentile (KM)		7.799
702												
703					Gamma Kaplan-Meier (KM) Statistics							
704					Approximate Chi Square Value (12.45, α)	5.528				Adjusted Chi Square Value (12.45, β)		5.452
705					95% Gamma Approximate KM-UCL (use when n>=50)	0.932				95% Gamma Adjusted KM-UCL (use when n<50)		0.945
706												
707					Lognormal GOF Test on Detected Observations Only							
708					Shapiro Wilk Test Statistic	0.93				Shapiro Wilk GOF Test		
709					5% Shapiro Wilk Critical Value	0.842				Detected Data appear Lognormal at 5% Significance Level		
710					Lilliefors Test Statistic	0.142				Lilliefors GOF Test		
711					5% Lilliefors Critical Value	0.262				Detected Data appear Lognormal at 5% Significance Level		
712					Detected Data appear Lognormal at 5% Significance Level							
713												
714					Lognormal ROS Statistics Using Imputed Non-Detects							
715					Mean in Original Scale	0.389				Mean in Log Scale		-3.897
716					SD in Original Scale	1.61				SD in Log Scale		2.031
717					95% t UCL (assumes normality of ROS data)	0.673				95% Percentile Bootstrap UCL		0.692
718					95% BCA Bootstrap UCL	0.77				95% Bootstrap t UCL		1.046
719					95% H-UCL (Log ROS)	0.335						
720												
721					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
722					KM Mean (logged)	-2.946				KM Geo Mean		0.0526
723					KM SD (logged)	1.267				95% Critical H Value (KM-Log)		2.516
724					KM Standard Error of Mean (logged)	0.147				95% H-UCL (KM -Log)		0.165
725					KM SD (logged)	1.267				95% Critical H Value (KM-Log)		2.516
726					KM Standard Error of Mean (logged)	0.147						
727												
728					DL/2 Statistics							
729					DL/2 Normal					DL/2 Log-Transformed		
730					Mean in Original Scale	0.78				Mean in Log Scale		-2.505
731					SD in Original Scale	2.045				SD in Log Scale		1.81
732					95% t UCL (Assumes normality)	1.14				95% H-Stat UCL		0.772
733					DL/2 is not a recommended method, provided for comparisons and historical reasons							
734												
735					Nonparametric Distribution Free UCL Statistics							
736					Detected Data appear Approximate Normal Distributed at 5% Significance Level							
737												
738					Suggested UCL to Use							
739					95% KM (t) UCL	0.722						
740												
741					When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test							
742					When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL							

	A	B	C	D	E	F	G	H	I	J	K	L
743												
744	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
745	Recommendations are based upon data size, data distribution, and skewness.											
746	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
747	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
748												
749	VALUE (chrysene)											
750												
751	General Statistics											
752	Total Number of Observations					112	Number of Distinct Observations					81
753	Number of Detects					101	Number of Non-Detects					11
754	Number of Distinct Detects					78	Number of Distinct Non-Detects					9
755	Minimum Detect					0.0068	Minimum Non-Detect					0.0081
756	Maximum Detect					370	Maximum Non-Detect					0.02
757	Variance Detects					3962	Percent Non-Detects					9.821%
758	Mean Detects					21.92	SD Detects					62.94
759	Median Detects					0.039	CV Detects					2.871
760	Skewness Detects					3.656	Kurtosis Detects					13.94
761	Mean of Logged Detects					-1.609	SD of Logged Detects					3.397
762												
763	Normal GOF Test on Detects Only											
764	Shapiro Wilk Test Statistic					0.417	Normal GOF Test on Detected Observations Only					
765	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
766	Lilliefors Test Statistic					0.401	Lilliefors GOF Test					
767	5% Lilliefors Critical Value					0.0884	Detected Data Not Normal at 5% Significance Level					
768	Detected Data Not Normal at 5% Significance Level											
769												
770	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
771	KM Mean					19.77	KM Standard Error of Mean					5.682
772	KM SD					59.83	95% KM (BCA) UCL					29.57
773	95% KM (t) UCL					29.19	95% KM (Percentile Bootstrap) UCL					30.19
774	95% KM (z) UCL					29.11	95% KM Bootstrap t UCL					33.53
775	90% KM Chebyshev UCL					36.81	95% KM Chebyshev UCL					44.53
776	97.5% KM Chebyshev UCL					55.25	99% KM Chebyshev UCL					76.3
777												
778	Gamma GOF Tests on Detected Observations Only											
779	A-D Test Statistic					12.02	Anderson-Darling GOF Test					
780	5% A-D Critical Value					0.955	Detected Data Not Gamma Distributed at 5% Significance Level					
781	K-S Test Statistic					0.281	Kolmogorov-Smirnov GOF					
782	5% K-S Critical Value					0.1	Detected Data Not Gamma Distributed at 5% Significance Level					
783	Detected Data Not Gamma Distributed at 5% Significance Level											
784												
785	Gamma Statistics on Detected Data Only											
786	k hat (MLE)					0.162	k star (bias corrected MLE)					0.164
787	Theta hat (MLE)					135.4	Theta star (bias corrected MLE)					134
788	nu hat (MLE)					32.69	nu star (bias corrected)					33.05
789	Mean (detects)					21.92						
790												
791	Gamma ROS Statistics using Imputed Non-Detects											
792	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
793	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
794	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
795	This is especially true when the sample size is small.											

	A	B	C	D	E	F	G	H	I	J	K	L
796	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
797					Minimum	0.0068					Mean	19.77
798					Maximum	370					Median	0.0245
799					SD	60.1					CV	3.04
800					k hat (MLE)	0.156					k star (bias corrected MLE)	0.158
801					Theta hat (MLE)	126.5					Theta star (bias corrected MLE)	125.1
802					nu hat (MLE)	35.01					nu star (bias corrected)	35.41
803					Adjusted Level of Significance (β)	0.0479						
804					Approximate Chi Square Value (35.41, α)	22.79					Adjusted Chi Square Value (35.41, β)	22.66
805					95% Gamma Approximate UCL (use when n>=50)	30.71					95% Gamma Adjusted UCL (use when n<50)	30.89
806												
807	Estimates of Gamma Parameters using KM Estimates											
808					Mean (KM)	19.77					SD (KM)	59.83
809					Variance (KM)	3580					SE of Mean (KM)	5.682
810					k hat (KM)	0.109					k star (KM)	0.112
811					nu hat (KM)	24.46					nu star (KM)	25.13
812					theta hat (KM)	181.1					theta star (KM)	176.2
813					80% gamma percentile (KM)	16.01					90% gamma percentile (KM)	54.9
814					95% gamma percentile (KM)	113.7					99% gamma percentile (KM)	296.2
815												
816	Gamma Kaplan-Meier (KM) Statistics											
817					Approximate Chi Square Value (25.13, α)	14.71					Adjusted Chi Square Value (25.13, β)	14.61
818					95% Gamma Approximate KM-UCL (use when n>=50)	33.77					95% Gamma Adjusted KM-UCL (use when n<50)	34.01
819												
820	Lognormal GOF Test on Detected Observations Only											
821					Shapiro Wilk Approximate Test Statistic	0.806					Shapiro Wilk GOF Test	
822					5% Shapiro Wilk P Value	0					Detected Data Not Lognormal at 5% Significance Level	
823					Lilliefors Test Statistic	0.223					Lilliefors GOF Test	
824					5% Lilliefors Critical Value	0.0884					Detected Data Not Lognormal at 5% Significance Level	
825	Detected Data Not Lognormal at 5% Significance Level											
826												
827	Lognormal ROS Statistics Using Imputed Non-Detects											
828					Mean in Original Scale	19.77					Mean in Log Scale	-1.971
829					SD in Original Scale	60.1					SD in Log Scale	3.427
830					95% t UCL (assumes normality of ROS data)	29.19					95% Percentile Bootstrap UCL	29.73
831					95% BCA Bootstrap UCL	31.2					95% Bootstrap t UCL	33.03
832					95% H-UCL (Log ROS)	267.3						
833												
834	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
835					KM Mean (logged)	-1.902					KM Geo Mean	0.149
836					KM SD (logged)	3.331					95% Critical H Value (KM-Log)	5.052
837					KM Standard Error of Mean (logged)	0.316					95% H-UCL (KM -Log)	189.6
838					KM SD (logged)	3.331					95% Critical H Value (KM-Log)	5.052
839					KM Standard Error of Mean (logged)	0.316						
840												
841	DL/2 Statistics											
842					DL/2 Normal						DL/2 Log-Transformed	
843					Mean in Original Scale	19.77					Mean in Log Scale	-1.925
844					SD in Original Scale	60.1					SD in Log Scale	3.366
845					95% t UCL (Assumes normality)	29.19					95% H-Stat UCL	214.6
846	DL/2 is not a recommended method, provided for comparisons and historical reasons											
847												
848	Nonparametric Distribution Free UCL Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
849	Data do not follow a Discernible Distribution at 5% Significance Level											
850												
851	Suggested UCL to Use											
852					95% KM (Chebyshev) UCL	44.53						
853												
854	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
855	Recommendations are based upon data size, data distribution, and skewness.											
856	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
857	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
858												
859	VALUE (dibenz(a,h)anthracene)											
860												
861	General Statistics											
862					Total Number of Observations	112			Number of Distinct Observations		65	
863					Number of Detects	40			Number of Non-Detects		72	
864					Number of Distinct Detects	39			Number of Distinct Non-Detects		26	
865					Minimum Detect	0.0094			Minimum Non-Detect		0.0074	
866					Maximum Detect	42			Maximum Non-Detect		0.02	
867					Variance Detects	125.1			Percent Non-Detects		64.29%	
868					Mean Detects	6.658			SD Detects		11.19	
869					Median Detects	0.758			CV Detects		1.68	
870					Skewness Detects	2.052			Kurtosis Detects		3.575	
871					Mean of Logged Detects	-0.0531			SD of Logged Detects		2.409	
872												
873	Normal GOF Test on Detects Only											
874					Shapiro Wilk Test Statistic	0.65			Shapiro Wilk GOF Test			
875					5% Shapiro Wilk Critical Value	0.94			Detected Data Not Normal at 5% Significance Level			
876					Lilliefors Test Statistic	0.291			Lilliefors GOF Test			
877					5% Lilliefors Critical Value	0.139			Detected Data Not Normal at 5% Significance Level			
878	Detected Data Not Normal at 5% Significance Level											
879												
880	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
881					KM Mean	2.383			KM Standard Error of Mean		0.701	
882					KM SD	7.33			95% KM (BCA) UCL		3.696	
883					95% KM (t) UCL	3.546			95% KM (Percentile Bootstrap) UCL		3.614	
884					95% KM (z) UCL	3.536			95% KM Bootstrap t UCL		4.038	
885					90% KM Chebyshev UCL	4.487			95% KM Chebyshev UCL		5.44	
886					97.5% KM Chebyshev UCL	6.763			99% KM Chebyshev UCL		9.362	
887												
888	Gamma GOF Tests on Detected Observations Only											
889					A-D Test Statistic	1.055			Anderson-Darling GOF Test			
890					5% A-D Critical Value	0.847			Detected Data Not Gamma Distributed at 5% Significance Level			
891					K-S Test Statistic	0.152			Kolmogorov-Smirnov GOF			
892					5% K-S Critical Value	0.151			Detected Data Not Gamma Distributed at 5% Significance Level			
893	Detected Data Not Gamma Distributed at 5% Significance Level											
894												
895	Gamma Statistics on Detected Data Only											
896					k hat (MLE)	0.346			k star (bias corrected MLE)		0.336	
897					Theta hat (MLE)	19.26			Theta star (bias corrected MLE)		19.79	
898					nu hat (MLE)	27.66			nu star (bias corrected)		26.92	
899					Mean (detects)	6.658						
900												
901	Gamma ROS Statistics using Imputed Non-Detects											

	A	B	C	D	E	F	G	H	I	J	K	L
902	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
903	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
904	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
905	This is especially true when the sample size is small.											
906	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
907					Minimum	0.0094				Mean		2.384
908					Maximum	42				Median		0.01
909					SD	7.363				CV		3.088
910					k hat (MLE)	0.192				k star (bias corrected MLE)		0.193
911					Theta hat (MLE)	12.39				Theta star (bias corrected MLE)		12.34
912					nu hat (MLE)	43.1				nu star (bias corrected)		43.27
913					Adjusted Level of Significance (β)	0.0479						
914					Approximate Chi Square Value (43.27, α)	29.19				Adjusted Chi Square Value (43.27, β)		29.04
915					95% Gamma Approximate UCL (use when n>=50)	3.534				95% Gamma Adjusted UCL (use when n<50)		3.553
916												
917	Estimates of Gamma Parameters using KM Estimates											
918					Mean (KM)	2.383				SD (KM)		7.33
919					Variance (KM)	53.73				SE of Mean (KM)		0.701
920					k hat (KM)	0.106				k star (KM)		0.109
921					nu hat (KM)	23.66				nu star (KM)		24.36
922					theta hat (KM)	22.55				theta star (KM)		21.91
923					80% gamma percentile (KM)	1.855				90% gamma percentile (KM)		6.547
924					95% gamma percentile (KM)	13.74				99% gamma percentile (KM)		36.27
925												
926	Gamma Kaplan-Meier (KM) Statistics											
927					Approximate Chi Square Value (24.36, α)	14.13				Adjusted Chi Square Value (24.36, β)		14.02
928					95% Gamma Approximate KM-UCL (use when n>=50)	4.109				95% Gamma Adjusted KM-UCL (use when n<50)		4.139
929												
930	Lognormal GOF Test on Detected Observations Only											
931					Shapiro Wilk Test Statistic	0.948				Shapiro Wilk GOF Test		
932					5% Shapiro Wilk Critical Value	0.94				Detected Data appear Lognormal at 5% Significance Level		
933					Lilliefors Test Statistic	0.118				Lilliefors GOF Test		
934					5% Lilliefors Critical Value	0.139				Detected Data appear Lognormal at 5% Significance Level		
935	Detected Data appear Lognormal at 5% Significance Level											
936												
937	Lognormal ROS Statistics Using Imputed Non-Detects											
938					Mean in Original Scale	2.38				Mean in Log Scale		-4.548
939					SD in Original Scale	7.364				SD in Log Scale		3.948
940					95% t UCL (assumes normality of ROS data)	3.534				95% Percentile Bootstrap UCL		3.64
941					95% BCA Bootstrap UCL	3.802				95% Bootstrap t UCL		4.048
942					95% H-UCL (Log ROS)	233.2						
943												
944	Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution											
945					KM Mean (logged)	-3.171				KM Geo Mean		0.042
946					KM SD (logged)	2.724				95% Critical H Value (KM-Log)		4.244
947					KM Standard Error of Mean (logged)	0.261				95% H-UCL (KM -Log)		5.144
948					KM SD (logged)	2.724				95% Critical H Value (KM-Log)		4.244
949					KM Standard Error of Mean (logged)	0.261						
950												
951	DL/2 Statistics											
952					DL/2 Normal					DL/2 Log-Transformed		
953					Mean in Original Scale	2.381				Mean in Log Scale		-3.441
954					SD in Original Scale	7.364				SD in Log Scale		2.924

955	95% t UCL (Assumes normality)	3.535	95% H-Stat UCL	8.029
956	DL/2 is not a recommended method, provided for comparisons and historical reasons			
957				
958	Nonparametric Distribution Free UCL Statistics			
959	Detected Data appear Lognormal Distributed at 5% Significance Level			
960				
961	Suggested UCL to Use			
962	KM H-UCL	5.144		
963				
964	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
965	Recommendations are based upon data size, data distribution, and skewness.			
966	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
967	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
968				
969	VALUE (indeno(1,2,3-cd)pyrene)			
970				
971	General Statistics			
972	Total Number of Observations	112	Number of Distinct Observations	75
973	Number of Detects	71	Number of Non-Detects	41
974	Number of Distinct Detects	60	Number of Distinct Non-Detects	21
975	Minimum Detect	0.0043	Minimum Non-Detect	0.0074
976	Maximum Detect	88	Maximum Non-Detect	0.02
977	Variance Detects	284.9	Percent Non-Detects	36.61%
978	Mean Detects	6.715	SD Detects	16.88
979	Median Detects	0.079	CV Detects	2.514
980	Skewness Detects	3.181	Kurtosis Detects	10.51
981	Mean of Logged Detects	-1.753	SD of Logged Detects	3.028
982				
983	Normal GOF Test on Detects Only			
984	Shapiro Wilk Test Statistic	0.475	Normal GOF Test on Detected Observations Only	
985	5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
986	Lilliefors Test Statistic	0.415	Lilliefors GOF Test	
987	5% Lilliefors Critical Value	0.105	Detected Data Not Normal at 5% Significance Level	
988	Detected Data Not Normal at 5% Significance Level			
989				
990	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
991	KM Mean	4.259	KM Standard Error of Mean	1.307
992	KM SD	13.73	95% KM (BCA) UCL	6.476
993	95% KM (t) UCL	6.426	95% KM (Percentile Bootstrap) UCL	6.532
994	95% KM (z) UCL	6.408	95% KM Bootstrap t UCL	7.454
995	90% KM Chebyshev UCL	8.179	95% KM Chebyshev UCL	9.954
996	97.5% KM Chebyshev UCL	12.42	99% KM Chebyshev UCL	17.26
997				
998	Gamma GOF Tests on Detected Observations Only			
999	A-D Test Statistic	6.145	Anderson-Darling GOF Test	
1000	5% A-D Critical Value	0.914	Detected Data Not Gamma Distributed at 5% Significance Level	
1001	K-S Test Statistic	0.213	Kolmogorov-Smirnov GOF	
1002	5% K-S Critical Value	0.117	Detected Data Not Gamma Distributed at 5% Significance Level	
1003	Detected Data Not Gamma Distributed at 5% Significance Level			
1004				
1005	Gamma Statistics on Detected Data Only			
1006	k hat (MLE)	0.201	k star (bias corrected MLE)	0.202
1007	Theta hat (MLE)	33.4	Theta star (bias corrected MLE)	33.25

1008					nu hat (MLE)	28.55				nu star (bias corrected)	28.68
1009					Mean (detects)	6.715					
1010											
1011					Gamma ROS Statistics using Imputed Non-Detects						
1012					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
1013					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)						
1014					For such situations, GROS method may yield incorrect values of UCLs and BTVs						
1015					This is especially true when the sample size is small.						
1016					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						
1017					Minimum	0.0043				Mean	4.26
1018					Maximum	88				Median	0.0115
1019					SD	13.79				CV	3.237
1020					k hat (MLE)	0.177				k star (bias corrected MLE)	0.178
1021					Theta hat (MLE)	24.12				Theta star (bias corrected MLE)	23.95
1022					nu hat (MLE)	39.57				nu star (bias corrected)	39.84
1023					Adjusted Level of Significance (β)	0.0479					
1024					Approximate Chi Square Value (39.84, α)	26.38				Adjusted Chi Square Value (39.84, β)	26.24
1025					95% Gamma Approximate UCL (use when n>=50)	6.434				95% Gamma Adjusted UCL (use when n<50)	6.469
1026											
1027					Estimates of Gamma Parameters using KM Estimates						
1028					Mean (KM)	4.259				SD (KM)	13.73
1029					Variance (KM)	188.5				SE of Mean (KM)	1.307
1030					k hat (KM)	0.0962				k star (KM)	0.0996
1031					nu hat (KM)	21.55				nu star (KM)	22.31
1032					theta hat (KM)	44.27				theta star (KM)	42.77
1033					80% gamma percentile (KM)	2.937				90% gamma percentile (KM)	11.32
1034					95% gamma percentile (KM)	24.73				99% gamma percentile (KM)	67.79
1035											
1036					Gamma Kaplan-Meier (KM) Statistics						
1037					Approximate Chi Square Value (22.31, α)	12.57				Adjusted Chi Square Value (22.31, β)	12.47
1038					95% Gamma Approximate KM-UCL (use when n>=50)	7.559				95% Gamma Adjusted KM-UCL (use when n<50)	7.616
1039											
1040					Lognormal GOF Test on Detected Observations Only						
1041					Shapiro Wilk Approximate Test Statistic	0.874				Shapiro Wilk GOF Test	
1042					5% Shapiro Wilk P Value	5.5117E-8				Detected Data Not Lognormal at 5% Significance Level	
1043					Lilliefors Test Statistic	0.162				Lilliefors GOF Test	
1044					5% Lilliefors Critical Value	0.105				Detected Data Not Lognormal at 5% Significance Level	
1045					Detected Data Not Lognormal at 5% Significance Level						
1046											
1047					Lognormal ROS Statistics Using Imputed Non-Detects						
1048					Mean in Original Scale	4.258				Mean in Log Scale	-3.553
1049					SD in Original Scale	13.79				SD in Log Scale	3.458
1050					95% t UCL (assumes normality of ROS data)	6.419				95% Percentile Bootstrap UCL	6.427
1051					95% BCA Bootstrap UCL	6.912				95% Bootstrap t UCL	7.464
1052					95% H-UCL (Log ROS)	62.71					
1053											
1054					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution						
1055					KM Mean (logged)	-3.014				KM Geo Mean	0.0491
1056					KM SD (logged)	2.918				95% Critical H Value (KM-Log)	4.499
1057					KM Standard Error of Mean (logged)	0.278				95% H-UCL (KM -Log)	12.05
1058					KM SD (logged)	2.918				95% Critical H Value (KM-Log)	4.499
1059					KM Standard Error of Mean (logged)	0.278					
1060											

	A	B	C	D	E	F	G	H	I	J	K	L
1061					DL/2 Statistics							
1062			DL/2 Normal						DL/2 Log-Transformed			
1063					Mean in Original Scale	4.259				Mean in Log Scale		-3.044
1064					SD in Original Scale	13.79				SD in Log Scale		2.957
1065					95% t UCL (Assumes normality)	6.42				95% H-Stat UCL		13.54
1066					DL/2 is not a recommended method, provided for comparisons and historical reasons							
1067												
1068					Nonparametric Distribution Free UCL Statistics							
1069					Data do not follow a Discernible Distribution at 5% Significance Level							
1070												
1071					Suggested UCL to Use							
1072					95% KM (Chebyshev) UCL	9.954						
1073												
1074					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
1075					Recommendations are based upon data size, data distribution, and skewness.							
1076					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
1077					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
1078												
1079												
1080	VALUE (lead)											
1081												
1082					General Statistics							
1083					Total Number of Observations	131				Number of Distinct Observations		99
1084										Number of Missing Observations		0
1085					Minimum	6.5				Mean		6170
1086					Maximum	100000				Median		440
1087					SD	19293				Std. Error of Mean		1686
1088					Coefficient of Variation	3.127				Skewness		3.667
1089												
1090					Normal GOF Test							
1091					Shapiro Wilk Test Statistic	0.351				Shapiro Wilk GOF Test		
1092					5% Shapiro Wilk P Value	0				Data Not Normal at 5% Significance Level		
1093					Lilliefors Test Statistic	0.461				Lilliefors GOF Test		
1094					5% Lilliefors Critical Value	0.0778				Data Not Normal at 5% Significance Level		
1095					Data Not Normal at 5% Significance Level							
1096												
1097					Assuming Normal Distribution							
1098					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
1099					95% Student's-t UCL	8962				95% Adjusted-CLT UCL (Chen-1995)		9520
1100										95% Modified-t UCL (Johnson-1978)		9052
1101												
1102					Gamma GOF Test							
1103					A-D Test Statistic	16.74				Anderson-Darling Gamma GOF Test		
1104					5% A-D Critical Value	0.874				Data Not Gamma Distributed at 5% Significance Level		
1105					K-S Test Statistic	0.273				Kolmogorov-Smirnov Gamma GOF Test		
1106					5% K-S Critical Value	0.0887				Data Not Gamma Distributed at 5% Significance Level		
1107					Data Not Gamma Distributed at 5% Significance Level							
1108												
1109					Gamma Statistics							
1110					k hat (MLE)	0.288				k star (bias corrected MLE)		0.287
1111					Theta hat (MLE)	21413				Theta star (bias corrected MLE)		21525
1112					nu hat (MLE)	75.49				nu star (bias corrected)		75.1
1113					MLE Mean (bias corrected)	6170				MLE Sd (bias corrected)		11524

1114									Approximate Chi Square Value (0.05)		56.14
1115					Adjusted Level of Significance	0.0482			Adjusted Chi Square Value		55.96
1116											
1117					Assuming Gamma Distribution						
1118				95% Approximate Gamma UCL (use when n>=50))		8254			95% Adjusted Gamma UCL (use when n<50)		8280
1119											
1120					Lognormal GOF Test						
1121					Shapiro Wilk Test Statistic	0.926			Shapiro Wilk Lognormal GOF Test		
1122					5% Shapiro Wilk P Value	5.1137E-8			Data Not Lognormal at 5% Significance Level		
1123					Lilliefors Test Statistic	0.104			Lilliefors Lognormal GOF Test		
1124					5% Lilliefors Critical Value	0.0778			Data Not Lognormal at 5% Significance Level		
1125					Data Not Lognormal at 5% Significance Level						
1126											
1127					Lognormal Statistics						
1128					Minimum of Logged Data	1.872			Mean of logged Data		6.319
1129					Maximum of Logged Data	11.51			SD of logged Data		1.925
1130											
1131					Assuming Lognormal Distribution						
1132					95% H-UCL	6055			90% Chebyshev (MVUE) UCL		6120
1133					95% Chebyshev (MVUE) UCL	7349			97.5% Chebyshev (MVUE) UCL		9055
1134					99% Chebyshev (MVUE) UCL	12406					
1135											
1136					Nonparametric Distribution Free UCL Statistics						
1137					Data do not follow a Discernible Distribution (0.05)						
1138											
1139					Nonparametric Distribution Free UCLs						
1140					95% CLT UCL	8943			95% Jackknife UCL		8962
1141					95% Standard Bootstrap UCL	8920			95% Bootstrap-t UCL		9908
1142					95% Hall's Bootstrap UCL	9467			95% Percentile Bootstrap UCL		9114
1143					95% BCA Bootstrap UCL	9773					
1144					90% Chebyshev(Mean, Sd) UCL	11227			95% Chebyshev(Mean, Sd) UCL		13517
1145					97.5% Chebyshev(Mean, Sd) UCL	16697			99% Chebyshev(Mean, Sd) UCL		22941
1146											
1147					Suggested UCL to Use						
1148					95% Chebyshev (Mean, Sd) UCL	13517					
1149											
1150	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
1151	Recommendations are based upon data size, data distribution, and skewness.										
1152	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
1153	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
1154											

ProUCL Output for ECCL Firing Range Trap and Skeet Ranges Exposure Unit Subsurface Soils

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	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.110/18/2019 7:51:04 PM								
5	From File			SOIL17_ECCL_20191016_TSRSub.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	VALUE (benzo(a)pyrene)											
11												
12	General Statistics											
13	Total Number of Observations					8	Number of Distinct Observations					8
14	Number of Detects					7	Number of Non-Detects					1
15	Number of Distinct Detects					7	Number of Distinct Non-Detects					1
16	Minimum Detect					0.13	Minimum Non-Detect					0.019
17	Maximum Detect					0.91	Maximum Non-Detect					0.019
18	Variance Detects					0.0897	Percent Non-Detects					12.5%
19	Mean Detects					0.36	SD Detects					0.299
20	Median Detects					0.26	CV Detects					0.832
21	Skewness Detects					1.315	Kurtosis Detects					0.667
22	Mean of Logged Detects					-1.294	SD of Logged Detects					0.778
23												
24	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
25	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
26	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
27	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
28												
29	Normal GOF Test on Detects Only											
30	Shapiro Wilk Test Statistic					0.811	Shapiro Wilk GOF Test					
31	5% Shapiro Wilk Critical Value					0.803	Detected Data appear Normal at 5% Significance Level					
32	Lilliefors Test Statistic					0.28	Lilliefors GOF Test					
33	5% Lilliefors Critical Value					0.304	Detected Data appear Normal at 5% Significance Level					
34	Detected Data appear Normal at 5% Significance Level											
35												
36	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
37	KM Mean					0.317	KM Standard Error of Mean					0.108
38	KM SD					0.283	95% KM (BCA) UCL					0.484
39	95% KM (t) UCL					0.522	95% KM (Percentile Bootstrap) UCL					0.491
40	95% KM (z) UCL					0.495	95% KM Bootstrap t UCL					0.801
41	90% KM Chebyshev UCL					0.641	95% KM Chebyshev UCL					0.788
42	97.5% KM Chebyshev UCL					0.992	99% KM Chebyshev UCL					1.392
43												
44	Gamma GOF Tests on Detected Observations Only											
45	A-D Test Statistic					0.477	Anderson-Darling GOF Test					
46	5% A-D Critical Value					0.715	Detected data appear Gamma Distributed at 5% Significance Level					
47	K-S Test Statistic					0.224	Kolmogorov-Smirnov GOF					
48	5% K-S Critical Value					0.315	Detected data appear Gamma Distributed at 5% Significance Level					
49	Detected data appear Gamma Distributed at 5% Significance Level											
50												
51	Gamma Statistics on Detected Data Only											
52	k hat (MLE)					1.99	k star (bias corrected MLE)					1.232
53	Theta hat (MLE)					0.181	Theta star (bias corrected MLE)					0.292

	A	B	C	D	E	F	G	H	I	J	K	L
54					nu hat (MLE)	27.86				nu star (bias corrected)		17.25
55					Mean (detects)	0.36						
56												
57					Gamma ROS Statistics using Imputed Non-Detects							
58					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
59					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)							
60					For such situations, GROS method may yield incorrect values of UCLs and BTVs							
61					This is especially true when the sample size is small.							
62					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
63					Minimum	0.01				Mean		0.316
64					Maximum	0.91				Median		0.205
65					SD	0.304				CV		0.96
66					k hat (MLE)	1.034				k star (bias corrected MLE)		0.729
67					Theta hat (MLE)	0.306				Theta star (bias corrected MLE)		0.433
68					nu hat (MLE)	16.54				nu star (bias corrected)		11.67
69					Adjusted Level of Significance (β)	0.0195						
70					Approximate Chi Square Value (11.67, α)	5.011				Adjusted Chi Square Value (11.67, β)		3.965
71					95% Gamma Approximate UCL (use when n>=50)	0.736				95% Gamma Adjusted UCL (use when n<50)		0.931
72												
73					Estimates of Gamma Parameters using KM Estimates							
74					Mean (KM)	0.317				SD (KM)		0.283
75					Variance (KM)	0.08				SE of Mean (KM)		0.108
76					k hat (KM)	1.259				k star (KM)		0.87
77					nu hat (KM)	20.15				nu star (KM)		13.92
78					theta hat (KM)	0.252				theta star (KM)		0.365
79					80% gamma percentile (KM)	0.516				90% gamma percentile (KM)		0.756
80					95% gamma percentile (KM)	0.999				99% gamma percentile (KM)		1.568
81												
82					Gamma Kaplan-Meier (KM) Statistics							
83					Approximate Chi Square Value (13.92, α)	6.52				Adjusted Chi Square Value (13.92, β)		5.293
84					95% Gamma Approximate KM-UCL (use when n>=50)	0.678				95% Gamma Adjusted KM-UCL (use when n<50)		0.835
85												
86					Lognormal GOF Test on Detected Observations Only							
87					Shapiro Wilk Test Statistic	0.887				Shapiro Wilk GOF Test		
88					5% Shapiro Wilk Critical Value	0.803				Detected Data appear Lognormal at 5% Significance Level		
89					Lilliefors Test Statistic	0.21				Lilliefors GOF Test		
90					5% Lilliefors Critical Value	0.304				Detected Data appear Lognormal at 5% Significance Level		
91					Detected Data appear Lognormal at 5% Significance Level							
92												
93					Lognormal ROS Statistics Using Imputed Non-Detects							
94					Mean in Original Scale	0.32				Mean in Log Scale		-1.534
95					SD in Original Scale	0.299				SD in Log Scale		0.99
96					95% t UCL (assumes normality of ROS data)	0.521				95% Percentile Bootstrap UCL		0.484
97					95% BCA Bootstrap UCL	0.535				95% Bootstrap t UCL		0.779
98					95% H-UCL (Log ROS)	1.258						
99												
100					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
101					KM Mean (logged)	-1.627				KM Geo Mean		0.196
102					KM SD (logged)	1.111				95% Critical H Value (KM-Log)		3.704
103					KM Standard Error of Mean (logged)	0.424				95% H-UCL (KM -Log)		1.723
104					KM SD (logged)	1.111				95% Critical H Value (KM-Log)		3.704
105					KM Standard Error of Mean (logged)	0.424						
106												

	A	B	C	D	E	F	G	H	I	J	K	L
107					DL/2 Statistics							
108				DL/2 Normal					DL/2 Log-Transformed			
109					Mean in Original Scale	0.316				Mean in Log Scale		-1.714
110					SD in Original Scale	0.304				SD in Log Scale		1.39
111					95% t UCL (Assumes normality)	0.52				95% H-Stat UCL		4.883
112					DL/2 is not a recommended method, provided for comparisons and historical reasons							
113												
114					Nonparametric Distribution Free UCL Statistics							
115					Detected Data appear Normal Distributed at 5% Significance Level							
116												
117					Suggested UCL to Use							
118					95% KM (t) UCL	0.522						
119												
120					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
121					Recommendations are based upon data size, data distribution, and skewness.							
122					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
123					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
124												
125	VALUE (dibenz(a,h)anthracene)											
126												
127					General Statistics							
128					Total Number of Observations	8				Number of Distinct Observations		8
129					Number of Detects	7				Number of Non-Detects		1
130					Number of Distinct Detects	7				Number of Distinct Non-Detects		1
131					Minimum Detect	0.026				Minimum Non-Detect		0.019
132					Maximum Detect	0.15				Maximum Non-Detect		0.019
133					Variance Detects	0.0023				Percent Non-Detects		12.5%
134					Mean Detects	0.0692				SD Detects		0.0479
135					Median Detects	0.056				CV Detects		0.692
136					Skewness Detects	1.016				Kurtosis Detects		-0.411
137					Mean of Logged Detects	-2.87				SD of Logged Detects		0.677
138												
139					Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use							
140					guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.							
141					For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).							
142					Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1							
143												
144					Normal GOF Test on Detects Only							
145					Shapiro Wilk Test Statistic	0.859				Shapiro Wilk GOF Test		
146					5% Shapiro Wilk Critical Value	0.803				Detected Data appear Normal at 5% Significance Level		
147					Lilliefors Test Statistic	0.241				Lilliefors GOF Test		
148					5% Lilliefors Critical Value	0.304				Detected Data appear Normal at 5% Significance Level		
149					Detected Data appear Normal at 5% Significance Level							
150												
151					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
152					KM Mean	0.0629				KM Standard Error of Mean		0.0171
153					KM SD	0.0447				95% KM (BCA) UCL		0.0914
154					95% KM (t) UCL	0.0953				95% KM (Percentile Bootstrap) UCL		0.0898
155					95% KM (z) UCL	0.091				95% KM Bootstrap t UCL		0.131
156					90% KM Chebyshev UCL	0.114				95% KM Chebyshev UCL		0.137
157					97.5% KM Chebyshev UCL	0.17				99% KM Chebyshev UCL		0.233
158												
159					Gamma GOF Tests on Detected Observations Only							

160				A-D Test Statistic	0.349	Anderson-Darling GOF Test					
161				5% A-D Critical Value	0.713	Detected data appear Gamma Distributed at 5% Significance Level					
162				K-S Test Statistic	0.19	Kolmogorov-Smirnov GOF					
163				5% K-S Critical Value	0.314	Detected data appear Gamma Distributed at 5% Significance Level					
164	Detected data appear Gamma Distributed at 5% Significance Level										
165											
166	Gamma Statistics on Detected Data Only										
167				k hat (MLE)	2.666	k star (bias corrected MLE)					1.619
168				Theta hat (MLE)	0.026	Theta star (bias corrected MLE)					0.0428
169				nu hat (MLE)	37.32	nu star (bias corrected)					22.66
170				Mean (detects)	0.0692						
171											
172	Gamma ROS Statistics using Imputed Non-Detects										
173	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
174	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)										
175	For such situations, GROS method may yield incorrect values of UCLs and BTVs										
176	This is especially true when the sample size is small.										
177	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
178				Minimum	0.01	Mean					0.0618
179				Maximum	0.15	Median					0.0465
180				SD	0.049	CV					0.794
181				k hat (MLE)	1.799	k star (bias corrected MLE)					1.208
182				Theta hat (MLE)	0.0344	Theta star (bias corrected MLE)					0.0512
183				nu hat (MLE)	28.79	nu star (bias corrected)					19.32
184				Adjusted Level of Significance (β)	0.0195						
185				Approximate Chi Square Value (19.32, α)	10.35	Adjusted Chi Square Value (19.32, β)					8.743
186				95% Gamma Approximate UCL (use when n>=50)	0.115	95% Gamma Adjusted UCL (use when n<50)					0.137
187											
188	Estimates of Gamma Parameters using KM Estimates										
189				Mean (KM)	0.0629	SD (KM)					0.0447
190				Variance (KM)	0.002	SE of Mean (KM)					0.0171
191				k hat (KM)	1.983	k star (KM)					1.323
192				nu hat (KM)	31.73	nu star (KM)					21.16
193				theta hat (KM)	0.0317	theta star (KM)					0.0476
194				80% gamma percentile (KM)	0.0987	90% gamma percentile (KM)					0.135
195				95% gamma percentile (KM)	0.171	99% gamma percentile (KM)					0.253
196											
197	Gamma Kaplan-Meier (KM) Statistics										
198				Approximate Chi Square Value (21.16, α)	11.71	Adjusted Chi Square Value (21.16, β)					9.984
199				95% Gamma Approximate KM-UCL (use when n>=50)	0.114	95% Gamma Adjusted KM-UCL (use when n<50)					0.133
200											
201	Lognormal GOF Test on Detected Observations Only										
202				Shapiro Wilk Test Statistic	0.93	Shapiro Wilk GOF Test					
203				5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level					
204				Lilliefors Test Statistic	0.165	Lilliefors GOF Test					
205				5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level					
206	Detected Data appear Lognormal at 5% Significance Level										
207											
208	Lognormal ROS Statistics Using Imputed Non-Detects										
209				Mean in Original Scale	0.0619	Mean in Log Scale					-3.082
210				SD in Original Scale	0.049	SD in Log Scale					0.868
211				95% t UCL (assumes normality of ROS data)	0.0947	95% Percentile Bootstrap UCL					0.0909
212				95% BCA Bootstrap UCL	0.0956	95% Bootstrap t UCL					0.123

	A	B	C	D	E	F	G	H	I	J	K	L
213					95% H-UCL (Log ROS)	0.185						
214												
215					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution							
216					KM Mean (logged)	-3.006				KM Geo Mean		0.0495
217					KM SD (logged)	0.689				95% Critical H Value (KM-Log)		2.711
218					KM Standard Error of Mean (logged)	0.263				95% H-UCL (KM -Log)		0.127
219					KM SD (logged)	0.689				95% Critical H Value (KM-Log)		2.711
220					KM Standard Error of Mean (logged)	0.263						
221												
222					DL/2 Statistics							
223					DL/2 Normal					DL/2 Log-Transformed		
224					Mean in Original Scale	0.0618				Mean in Log Scale		-3.093
225					SD in Original Scale	0.0491				SD in Log Scale		0.89
226					95% t UCL (Assumes normality)	0.0947				95% H-Stat UCL		0.195
227					DL/2 is not a recommended method, provided for comparisons and historical reasons							
228												
229					Nonparametric Distribution Free UCL Statistics							
230					Detected Data appear Normal Distributed at 5% Significance Level							
231												
232					Suggested UCL to Use							
233					95% KM (t) UCL	0.0953						
234												
235					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
236					Recommendations are based upon data size, data distribution, and skewness.							
237					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
238					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
239												

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Appendix H

Removal Action Calculations and Budgetary Estimates

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NASA Plum Brook Station
Removal Site Evaluation - ECCL Firing Range
Key Parameters and Assumptions

Item	Unit	Value	Notes
Capital Cost			
Removal Action Work Plan/Design			
Removal Action Work Plan	hrs	380	Leidos proposal estimate
Technical Labor	$/hr	90	Leidos proposal estimate for project engineer
Removal Action Activities - Phase 1			
Mobilization	LS	$14,650	Based on Arrowhead proposal estimate.
Site Preparation - Site Survey, Vegetation Removal around Berms and Trap/Skeet Range; Transport logs to firewood staging area. Set-up Temporary Erosion Controls.	LS	$75,350	Based on Arrowhead proposal estimate to perform site preparation and clearing using large tracked excavator with clearing attachment.
Vegetation Clearing and temporary erosion controls	weeks	4	Based on Arrowhead estimate from historical clearing operations and field sitewalks. Clearing via excavator with mulcher attachment and skidsteer with brushcutter. Includes cutting logs with chainsaw and transport to firewood staging area. Includes
Temporary Erosion Controls	days	2	Based on Arrowhead estimate from historical site preparation.
Pre-Removal Action Sampling			
Waste Characterization Sampling - Concrete block wall	$/ea	652	Concrete retaining blocks will need to be sampled per Erie County Landfill reuse requirements. Assume one 5-part composite sample will be collected. - Sample analysis: TCLP VOCs, TCLP SVOCs, TCLP Metals, TCLP Pesticides, TCLP Herbicides, RCI. Based on Laboratory MSA pricing for COMETS Contract.
Waste Characterization Sampling - Soil	$/ea	652	Waste characterization samples will include 5-part composite sample contingent on Erie County Landfill requirements. Assume up to 10 samples may be requested in supplement to existing waste analytical data. - Sample analysis: TCLP VOCs, TCLP SVOCs, TCLP Metals, TCLP Pesticides, TCLP Herbicides, RCI. Based on Laboratory MSA pricing for COMETS Contract.
Backfill Sampling	$/ea	541	Assume 1 composite sample of each backfill and topsoil source at frequency of 1 sample per material (NASA GRC Specification 31 23 01.98). Estimated backfill 14000 CY and topsoil 14000 CY. Anticipate 2 samples. Based on Laboratory MSA pricing for COMETS Contract.
Sampling Labor	$/hr	90	- Assume 1 hour per sample. Based on Leidos proposal estimate for engineer/sampler.
Removal Action Support Activities (Phase 2)			
Mobilization	LS	$46,856	Leidos proposal estimate, including equipment rentals, supplies, and travel costs. Assume CONUS per diem rates for Erie County.
Confirmation Soil Sample Analysis	$/ea	45	- Assume up to 115 treated stockpile confirmation samples for TCLP Lead, at a frequency of 1 sample per 300 CY (Erie County Landfill requirement). - Sample analysis: TCLP Lead ($10/sample), TCLP non-volatile extract ($35/sample); Optional: TCLP 2-3 metals ($30/sample), TCLP metals ($38/sample) Expedited Turn-Around Time 3 days: 60% surcharge (added to unit rate) Based on Laboratory MSA pricing for COMETS Contract.
Verification Soil Sample Analysis	$/ea	$46 to 149	- Assume up to 250 discrete Verification samples collected remaining portion of berms, target areas, trap and skeet range and hot spot excavations for applicable COCs. Includes QC samples. - Sample analysis: Lead ($10/sample), 2-3 Metals ($22-29/sample), Firing Range Metals ($34/sample); PAHs ($93/sample). Expedited Turn-Around Time 3 days: 60% surcharge (added to unit rate) Based on Laboratory MSA pricing for COMETS Contract.
Sampling and QC Oversight Labor	$/hr	90	- Assume 1 hour per lab sample, XRF screening, and sample management. Based on Leidos proposal estimate for engineer/sampler.
Sampling and QC Oversight Support	hrs	1,540	Based on Leidos proposal estimate for engineer/sampler.
Berm Reuse Sampling	$/ea	541	Assume one 10-part composite sample of remaining berm soils at frequency of 1 sample per segment of berm. Anticipate up to 8 samples. Based on Laboratory MSA pricing for COMETS Contract.
Excavation Water Characterization Sample Analysis	$/ea	554	Assume one sample per frac tank, up to 3 samples. Sample analysis: VOCs, SVOCs, RCRA Metals, PCBs, Pesticides, Herbicides, RCI. Based on Laboratory MSA pricing for COMETS Contract.
XRF analyzer for Field Screening	$/month	4,500	Vendor rental quote for July 2019 RSE sample screening (Pine Environmental). Realtime lead measurements to guide excavation.
Removal Action Activities - Phase 2			
Mobilization	LS	$168,000	Based on Arrowhead proposal estimate to perform excavation and debris removal using large tracked excavators and managing soils. Haul treated soils to stockpile area with offroad haul truck. Includes field trailer and heavy equipment rentals. Assume NASA will be responsible for electrical power hookup and service. Assume CONUS per diem rates for Erie County.
Remove/Tear Down Concrete Block Retaining Wall and old fence/gate; load debris into dump trucks	days	3	Based on Arrowhead estimate for similar projects.
Remove/Tear Down existing gate and fence; load debris into dump truck/rolloff	day	1	Based on Arrowhead estimate for similar projects.
Excavation (soil and debris removal)	$/ton	13	Based on Arrowhead proposal estimate to perform excavation and debris removal using large tracked excavators and managing soils. Haul treated soils to stockpile area with offroad haul truck.

NASA Plum Brook Station
Removal Site Evaluation - ECCL Firing Range
Key Parameters and Assumptions

Item	Unit	Value	Notes
On-Site treatment of excavated soils	$/ton	48	Based on Arrowhead proposal estimate to treat and manage excavated soils onsite. Includes construction of bermed/lined treated stockpile area.
Remove soil from berms, target areas, trap & skeet fields, and isolated hot spots; load into dump trucks (LS)	weeks	21	Based on Arrowhead estimate for 300 CY per day production rate for similar projects.
Remove and treat sediment from Pond A West; treat sediment; load into dump trucks; setup temporary cofferdam/aqua barrier between ponds; dewater to adjacent pond (LS)	weeks	2	Based on Arrowhead estimate for similar projects.
Waste Management			
Construction and Demolition Debris Disposal			
Non-Hazardous Waste Disposal	$/ton	$44.50-71.00	Based on quotes and published pricing for Erie County Landfill, includes transportation and disposal costs. Concrete blocks will be sampled for potential reuse by Erie County Landfill, to support NASA's sustainability goal for 50% waste diversion from landfills. Scrap metal will be recycled where applicable.
Total Waste Quantity	tons	108	Assumed non-hazardous disposal of the concrete retaining blocks (65) and scrap wood and metal. Materials will be diverted for reuse/recycling where applicable.
Soil Disposal Option 1			***includes soil and sediment***
Amendment to stabilize lead contamination in soil	$/ton	207	Based on literature research and vendor quote for Mintek Resources' Calciment in 1-ton supersacks; bulk shipment available too. (alternative amendment is Premier Magnesia's Enviroblend with similar bench test results). Based on bench test study results, assume up to 6% amendment rate will treat soils to nonhazardous level (TCLP lead <5 mg/L) (Appendix F).
Transportation of Amendment	$/ton	52	Based on vendor quote for Mintek Resources' Calciment amendment. Maximum 22.5 tons per load.
Non-Hazardous Waste Disposal (following amendment addition)	$/ton	36	Based on quotes and published pricing for Erie County Landfill, including amendment cost, includes only landfill tipping fee. Arrowhead assumes that the Erie County Landfill will accept the amended material at the production rates established in the Arrowhead cost estimate (up to 800 CY per day). Daily landfill maximum is 1200 CY from all sources. Conversations with Erie County Landfill have presented a variation of acceptable flow through rates at the facility based on timing of the ECCL project. Therefore, Erie County was not able to definitively agree to the Arrowhead production rate. Erie County indicated that an amendment to the current permit for alternative daily cover granted by Ohio EPA is an option. This option would may require NASA, Ohio EPA, and Erie County officials to meet and deliberate a final solution.
Transportation	$/ton	5	Based on Arrowhead proposal estimate.
Total Waste Quantity	tons	48,520	Assume 6% amendment addition included in waste quantity, based on treatability study results (Appendix F).
No. of Haul Trips	trips	3,032	Assume 16-ton load per haul to Erie County Landfill (~ 5 miles away).
No. of Days	days	152	Assume 4 load and haul trips per day (with 5 dump trucks in operation per day). Engineer Estimate. Approximately 7.5 months if landfill accepts at least 320 CY per day.
Excavation Water Management	gallons	60,000	Assume as stormwater in direct contact with open excavations and treated soil stockpiles. Engineer Estimate.
Excavation Water Offsite Disposal	$/gal	1.25	Based on Erie County Department of Environmental Services disposal rate for Huron Township WWTP. Assume characterization data will be acceptable for disposal. Also includes hauling services and 20,000-gallon frac tank monthly rental based on vendor quotes.
Soil Disposal Option 2			***includes soil and sediment***
Hazardous Waste Disposal	$/ton	264	Based on quotes for hazardous waste, includes transportation and disposal costs to Envirosafe Services of Ohio facility (RCRA Subtitle C Landfill) (~ 60 miles away).
Total Waste Quantity	tons	40,456	includes lead-impacted soil and sediment
No. of Haul Trips	trips	2,528	Assume 16-ton load per haul to Envirosafe Services of Ohio facility (RCRA Subtitle C Landfill) (~ 60 miles away).
No. of Days	days	253	Assume 10 load and haul trips per day (with 5 dump trucks in operation per day)
Site Restoration Activities			
Seed backfilled area; remove erosion and sediment controls once grass reestabilished; post-construction inspections, demobilization	days	10	Based on Arrowhead Estimate for similar projects.
Backfill (approved offsite source)	tons	41,336	Based on estimate for total backfill and topsoil required, excluding backstop berms.
Backfill (approved offsite source)	$/ton	23	Based on vendor quotes for acceptable common fill and topsoil obtained by Arrowhead. Source will be sampled to ensure clean soil meets NASA GRC Soil Policy (Ohio VAP generic numeric direct contact (-residential land use) soil standards).
Reporting			
Removal Action Completion Report	hrs	392	Leidos proposal estimate
Technical Labor	$/hr	90	Leidos proposal estimate
Operation & Maintenance (O&M) Cost			
none			

NASA Plum Brook Station
Removal Site Evaluation - ECCL Firing Range
Budgetary Cost Estimate

Capital Cost (No Action)	**$0**
Capital Cost (Soil Disposal Option 1)	**$8,380,099**
Capital Cost (Soil Disposal Option 2)	**$18,335,261**

Activity (unit)	Quantity	Unit	Unit Cost	Total
Capital Cost				
Removal Action Activities - Phase 1				
Mobilization	1	LS	$14,650	$14,650
Site Preparation - Site Survey, Vegetation Removal (tree felling and brushclearing) around Berms and Trap/Skeet Range; Transport logs to firewood staging area. Set-up Temporary Erosion Controls.	1	LS	$75,350	$75,350
Removal Action Activities - Phase 2				
Mobilization	1	LS	$168,000	$168,000
Set-up Erosion Controls and Dust Control Barrier on Fence. Site survey. Stabilize construction entrances and truck loading areas.	1	LS	$30,000	$30,000
Additional Clearing and Grubbing; Stump Removal and Management	1	LS	$145,200	$145,200
Water Management	1	LS	$136,000	$136,000
Excavation (soil and debris removal)	46,197	tons	$13	$600,563
On-Site treatment of excavated soils	40,456	tons	$48	$1,941,876
Transportation (Erie County Landfill)	48,520	tons	$5	$242,598
XRF Analyzer for Field Screening	8	months	$4,500	$36,000
Removal Action Support Activities (under Phase 1 and 2)				
Mobilization including travel/sampling equipment	1	LS	$46,856	$46,856
Field QC Oversight and Sampling Support	1,540	hrs	$90	$138,600
Removal Action Work Plan	380	$/hr	$90	$34,200
Waste Characterization sampling (concrete)	1	$/ea	$652	$652
Waste Characterization Sampling (soil)	10	$/ea	$652	$6,520
Backfill Sampling Analysis	2	$/ea	$541	$1,082
Berm Reuse Sample Analysis	8	$/ea	$541	$4,328
Confirmation Sample Analysis (Rush turnaround)	115	$/ea	$72	$8,280
Verification Sample Analysis (Rush turnaround)	250	$/ea	$46 to 149	$18,586
Excavation Water Sample Analysis	3	$/ea	$554	$1,662
Waste Management				
Construction and Demolition Debris Disposal				
Non-Hazardous Waste Disposal	108	tons	$71	$7,637
Soil Disposal Option 1				
Amendment to stabilize lead contamination in soil	2,430	tons	$207	$501,795
Transportation of Amendment	2,430	tons	$52	$125,145
Non-Hazardous Waste Disposal (treated soil plus amendment)	42,886	tons	$36	$1,543,887
Non-hazardous waste disposal (for PAH contaminated soil - no treatment)	5,634	tons	$36	$202,819
Excavation Water Offsite Disposal				
Non-hazardous waste Disposal (WWTP)	60,000	gallons	$1.25	$75,000
Soil Disposal Option 2				
Hazardous Waste Disposal	40,456	tons	$264	$10,680,316
Non-hazardous waste disposal (for PAH contaminated soil - no treatment)	5,634	tons	$36	$202,819.08

NASA Plum Brook Station
Removal Site Evaluation - ECCL Firing Range
Budgetary Cost Estimate

Site Restoration Activities				
Backfill (approved offsite source)	41,336	tons	$23	$950,737
Seed backfilled area; remove erosion and sediment controls; post-construction inspection, demobilization (LS)	1	LS	$69,400	$69,400
Reporting				
Removal Action Completion Report	1	LS	$35,732	$35,732
Subtotal (Soil Disposal Option 1)				$7,163,154
Contingency (including constructability/overexcavation quantity/disposal delay due to landfill restrictions)			10%	$716,315
Office Overhead (G&A)			0.89%	$63,752
Subtotal				$7,943,222
Profit			5.5%	$436,877
Total (Soil Disposal Option 1)				**$8,380,099**
Subtotal (Soil Disposal Option 2)				$15,672,643
Contingency (including constructability/overexcavation quantity/disposal delay due to landfill restrictions)			10%	$1,567,264
Office Overhead (G&A)			0.89%	$139,487
Subtotal				$17,379,394
Profit			5.5%	$955,867
Total (Soil Disposal Option 2)				**$18,335,261**
Total (No Action)				**$0**
Operation & Maintenance (O&M) Cost				
None				**$0**

Note: Detailed costs were estimated for comparison purposes only and are believed to be accurate within a range of -10% to +20% (Class 3 Cost Estimate as defined by ASTM E2516-11, Standard Classification for Cost Estimate Classification System).

NASA Plum Brook Station
Removal Site Evaluation - ECCL Firing Range
Volume Estimates

Construction & Demolition Debris Removal	Depth bgs (ft)	Width (ft)	Length (ft)	Area (ft^2)	Volume (CF)	Volume (CY)	Tons *	Notes
Concrete Retaining Wall	2.5	3	3	585	1,463	54	**103**	Visual survey (Leidos, 2019), 65 blocks (3'x3'x2.5' each) on rear of berm
Trap & Skeet Range traphouse burned wood and metal debris	1	28	32	642	642	24	**5**	Burned wood and metal debris near SL-002. No asbestos detected.

Rifle Range Removal	Depth bgs (ft)	Width (ft)	Length (ft)	Area (ft^2)	Volume (CF)	Volume (CY)	Tons *	Notes
Earthen Backstop Berm	6	53	98	5,042	27,975	1,035	1,553	Earthen backstop dimensions based on land survey and ArcGIS mapping for RSE; Based on lead exceedances in top 6 ft of berm.
Target Area	1.5	40	83	3,325	4,988	185	277	Based on lead exceedances at SL-088, SL-089, SL-090, SL-216 and expansion for XRF exceedances.
						Subtotal	**1,829**	
Pistol Range (West) Removal	**Depth bgs (ft)**	**Width (ft)**	**Length (ft)**	**Area (ft^2)**	**Volume (CF)**	**Volume (CY)**	**Tons ***	**Notes**
Earthen Backstop Berm	3.5	67	154	8,807	29,698	1,099	1,648	Earthen backstop dimensions based on land survey and ArcGIS mapping for RSE; Based on lead exceedances in top 3.5 ft of berm
Target Area	1	41	103	3,218	3,218	119	179	Based on lead exceedances at SL-118, 120, 119, 230, 231, 265, 266
Soil hotspot excavation at Discharge Area (SL-115 and SL-117)	1	20	70	1,414	1,414	52	78	Hot spot for copper exceedances at SL-115 and SL-117. Also spent casings mixed in gravel
						Subtotal	**1,905**	
Pistol Range (East) Removal	**Depth bgs (ft)**	**Width (ft)**	**Length (ft)**	**Area (ft^2)**	**Volume (CF)**	**Volume (CY)**	**Tons ***	**Notes**
Earthen Backstop Berm	6	57	116	6,070	27,971	1035	1,552	Earthen backstop dimensions based on land survey and ArcGIS mapping for RSE; Based on lead exceedances in top 6 ft of berm.
Target Area	1	14	22	312	312	12	17	based on lead exceedances at SL-145 and SL-245
Soil hotspot excavation behind berm (SL-157 and SL-252)	1	23	29	646	646	24	36	Hot spot excavations based on lead exceedances at specific depths and locations SL-157 and SL-252
Discharge Area	1	19	57	1,071	1,071	40	59	spent casings mixed in gravel
						Subtotal	**1,665**	
Trap and Skeet Range Removal	**Depth bgs (ft)**	**Width (ft)**	**Length (ft)**	**Area (SF)**	**Volume (CF)**	**Volume (CY)**	**Tons ***	
Lead fallout zone excavation (1 ft)	1	436	1195	381,650	381,650	14,121	21,182	Based on lead exceedances up to 1 ft
Lead fallout zone excavation (1.5 ft)	1.5	227	380	86,814	130,220	4,818	7,227	Based on lead exceedances up to 1.5 ft
Lead and PAHs fallout zone excavation	1.5	123	715	72,352	108,528	4,016	6,023	Based on lead exceedances up to 1 ft and PAHs exceedances up to 1.5 ft. Surficial skeet debris areas
PAHs discharge area excavation	1.5	116	620	66,076	99,114	3,667	5,501	Based on PAH exceedances in both discharge areas and surficial skeet debris areas. Excludes SL-176 hot spot excavation
PAH hotspot excavation (SL176)	2	33	37	1,199	2,397	89	133	Hot spot excavation based on PAH exceedances at specific depth and location. Surficial skeet debris area.
						Subtotal	**40,066**	
Pond A Sediment Removal	**Depth bgs (ft)**	**Width (ft)**	**Length (ft)**	**Area (SF)**	**Volume (CF)**	**Volume (CY)**	**Tons ***	**Notes**
Sediment in south pond	1	124	100	11,240	11,240	416	624	Depth based on refusal. Based on lead and copper exceedances.
						Subtotal	**624**	
						Total Soil (tons)	**45,466**	
						Total Soil/Sediment (tons)	**46,090**	

*Assume density of soil at 1.5 tons/CY (bench test average), wood debris at 0.2 tons/CY and density of concrete rubble at 1.9 tons/CY

ACRONYMS AND ABBREVIATIONS

ACI	Arrowhead Contracting Inc
bgs	Below Ground Surface
CF	Cubic Feet
CY	Cubic Yard
ECCL	Erie County Conservation League
Envirosafe	Enviroservices of Ohio, Inc.
ft	Feet
ft^2	Square Feet
G&A	General and Administrative
LS	Lump Sum
MSA	Master Service Agreement
NASA	National Aeronautics and Space Administration
Ohio EPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
QC	Quality Control
RCI	Reactivity, Corrosivity, and Ignitability
RCRA	Resource Conservation and Recovery Act
RSE	Removal Site Evaluation
SVOC	Semivolatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
VAP	Voluntary Action Program
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant
XRF	X-Ray Fluorescence

REFERENCES

Envirosafe Services of Ohio hazardous disposal quote
Erie County Department of Environmental Services, Resolutions No.14-617, Landfill Rates via quote/website
Erie County Department of Environmental Services, Wastewater Disposal (offsite treatment) Rates via quote
Firelake-Arrowhead NASA Services E109 Proposal, Revision 2, 9/19/2018 (Includes Arrowhead and Leidos cost estimates)
Leidos Master Service Agreement with TestAmerica Laboratories under COMETS Contract
Mintek Resources (Calciment) Vendor quotes for amendment
NASA GRC Facilities Division Specifications (including 31 23 01.98)
Pine Environmental XRF quote (July 2019)
Premier Magnesia's Enviroblend Vendor quotes for amendment
USEPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.* EPA/540/G. October.

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