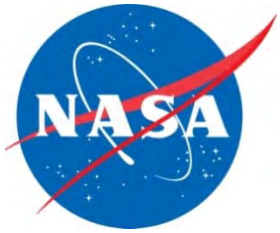
FINAL

ERIE COUNTY CONSERVATION LEAGUE (ECCL)
FIRING RANGE SITE INVESTIGATION
REPORT

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
PLUM BROOK STATION
SANDUSKY, OHIO



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March 29, 2018

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ACRONYMS

ACM	Asbestos-Containing Material
AMSL	Above Mean Sea Level
BGS	Below Ground Surface
CB&I	CB&I Federal Services, LLC
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
CRQL	Contract-Required Quantitation Limit
DA2A	Disposal Area 2A
DA2B	Disposal Area 2B
DL	Detection Limit
DNAP	Division of Natural Areas and Preserves
DNT	Dinitrotoluene
ECCL	Erie County Conservation League
EcoSSL	Ecological Soil Screening Level
EMS	Environmental Management Systems
ESL	Ecological Screening Level
ESV	Ecological Screening Value
FR3	Firing Range 3
FR4	Firing Range 4
FRBG	Fox Road Burning Ground
FY	Fiscal Year
gpm	Gallons per Minute
GPS	Global Positioning System
GRC	John H. Glenn Research Center
HQ	Hazard Quotient
IDW	Investigation-Derived Waste
IRA	Interim Removal Action
L/min	Liters per Minute
LOQ	Level of Quantitation
MCL	Maximum Contaminant Level
MDC	Maximum Detected Concentration
MK	Morrison Knudsen Corporation
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NASA	National Aeronautics and Space Administration
NESHAP	Natural Emission Standards for Hazardous Air Pollutants
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
ORAM	Ohio Rapid Assessment Method
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station
PBT	Persistent, Bioaccumulative, and Toxic
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
PPE	Personal Protective Equipment
PRG	Preliminary Remediation Goal

ACRONYMS (CONTINUED)

QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RL	Reporting Limit
RSL	Regional Screening Level
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SI	Site Investigation
SIR	Site Investigation Report
SMP	Species Management Plan
SOR	Sum of Ratios
SRBG	Snake Road Burning Ground
SRC	Site-Related Chemical
SRV	Sediment Reference Value
SVOC	Semivolatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TRBG	Taylor Road Burning Ground
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VAP	Voluntary Action Program
VOC	Volatile Organic Compound
WM	Waste Management
WQC	Water Quality Criteria
WWTP2	Wastewater Treatment Plant #2
XRF	X-Ray Fluorescence

EXECUTIVE SUMMARY

This Site Investigation Report presents the results and recommendations from the Site Investigation (SI) activities conducted in June 2016 at the Erie County Conservation League (ECCL) Firing Range located at the National Aeronautics and Space Administration (NASA) Plum Brook Station (PBS) in Sandusky, Ohio. The objective of the SI as presented in the October 2011 *Multi-Site Site Characterization Sampling and Analysis Plan* (SAP) [SAIC 2011] was to determine the presence or absence of contamination and provide one of the following recommendations:

- No further action for a given media at the site;
- Conduct further evaluation (i.e., a remedial investigation [RI] or removal site evaluation) for a given media at the site; and
- Conduct interim removal action (IRA).

Surface soil, sediment, and surface water samples were collected from the site and analyzed for semivolatile organic compounds (SVOCs) and firing range metals in accordance with the SAP. Analytical data were screened based upon the following criteria:

- United States Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals;
- Ohio Environmental Protection Agency (Ohio EPA) Sediment Reference Values;
- Ohio EPA Ecological Screening Levels;
- Ohio EPA Regional Screening Levels (RSLs);
- Persistent, Bioaccumulative, and Toxic 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.

ES.1 RESULTS AND CONCLUSIONS

SI activities at ECCL Firing Range included collecting 168 surface soil samples, 9 dry sediment samples, and 9 collocated sediment/surface water samples. Samples were analyzed for firing range metals and SVOCs. Multiple compounds were detected in each medium sampled. In addition, each medium contained multiple compounds at concentrations greater than relevant screening criteria. Sample results indicate the site has been impacted by historical site use.

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.

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.

ES.2 RECOMMENDATIONS

Results of the SI activities indicate that the surface soil, sediment, and surface water at ECCL Firing Range have been impacted by previous site activities. Further evaluation is 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 are recommended to further delineate the vertical and horizontal extent of contamination at the ranges, ditches, and ponds. In addition, an IRA is recommended for the Trap and Skeet Range and the Rifle/Pistol Firing Range Impact Berms with surface soil lead concentrations above the RSL. The IRA may include additional pre-delineation sampling, treatability study, excavation of surface soil (Trap and Skeet Range, 0 to 1 foot below ground surface), 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 IRA will also 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 survey) within the Trap and Skeet Range.

The primary objective of the SI was to document a site characterization data collection program consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as presented in the approved SAP (SAIC 2011). However, recent communication with Ohio EPA, including review of the Director's Findings and Orders, has allowed NASA to consider evaluating former Firing Ranges under a different program than CERCLA. Although the scope of this investigation and the presentation of results and recommendations are consistent with *Guidance for Performing Site Inspections Under CERCLA* (USEPA 1992), additional recommendations are included for NASA to consider when deciding future activities at the former firing range.

If NASA does not follow the CERLCA process, future investigations and remedial actions could be completed under Ohio's Voluntary Action Plan (VAP). Under this program, a Phase II Preliminary Assessment would be completed under the guidance of a Certified VAP Professional. The VAP may be done following specific standards developed by Ohio EPA. When cleanup requirements are met under VAP, the director of Ohio EPA issues a covenant not to sue. This covenant would protect NASA and future owners from being legally responsible to the State of Ohio for further investigation and cleanup.

Regardless of the regulatory program that NASA and Ohio EPA decide to follow for future work at ECCL Firing Range, the results of the data collection program were evaluated and have determined that additional characterization and/or remedial action is necessary.

1.0 INTRODUCTION

Leidos has prepared this Site Investigation Report (SIR) on behalf of the National Aeronautics and Space Administration (NASA) as part of a Site Investigation (SI) at Erie County Conservation League (ECCL) Firing Range within the Plum Brook Station (PBS) in Sandusky, Ohio (**Figure 1**). This report summarizes SI activities conducted at one of the seven sites identified in the 2011 *Multi-Site Site Characterization Sampling and Analysis Plan* (SAP) [SAIC 2011].

Six additional sites—Disposal Area 2A (DA2A), Disposal Area 2B (DA2B), Firing Range 3 and 4 (FR3 and FR4), Fox Road Burning Ground (FRBG), Snake Road Burning Ground (SRBG), and Taylor Road Burning Ground (TRBG)—were discussed in the SAP; however, SI activities for these sites were documented under separate cover and are, therefore, not included in this SIR.

- Remedial activities were completed by others on behalf of the United States Army Corps of Engineers (USACE) at DA2B concurrent with the 2015 Multi-site SI activities. Details pertaining to the remedial activities at DA2B are presented in *Plan of Operations: Acid Area 2 Remedial Action – Remediation of Contaminated Soil Plum Brook Ordnance Works Sandusky, Ohio* (Oneida Total Integrated Enterprises, LLC 2015).

- 2015 SI activities at FR3 and FR4 were reported in the December 2015 *NASA Plum Brook Station Firing Range Site Investigation Report* (Leidos 2015).

- 2015 SI activities at DA2A, FRBG, SRBG, and TRBG were reported in the April 2016 *NASA Plum Brook Station Multi-site Site Investigation Report* (Leidos 2016).

- Lastly, the SAP included SI activities for the Wastewater Treatment Plant #2 (WWTP2) portion of DA2A; however, these were also presented under separate cover in the Remedial Investigation (RI) Report (CB&I 2015) prepared by CB&I Federal Services, LLC (CB&I) for USACE.

SI field activities at ECCL Firing Range were conducted from June 6 through 16, 2016. This SIR describes SI field activities, presents analytical results of environmental sampling, and provides recommendations specific to the site. SI activities were conducted in accordance with United States Environmental Protection Agency (USEPA), Ohio Environmental Protection Agency (Ohio EPA), and NASA guidance. USEPA guidance documents relevant to this project include *Guidance for Conducting Preliminary Assessments Under CERCLA* (USEPA 1991), *Guidance for Performing Site Inspections under CERCLA* (USEPA 1992), Interstate Technology and Regulatory Council (ITRC) *Characterization and Remediation of Soils and Closed Small Arms Firing Ranges* (ITRC 2003), and *Federal Facilities Remedial Preliminary Assessment Summary Guide* (USEPA 2005). Ohio EPA follows the USEPA Region 9 guidance with regard to screening criteria (i.e., Regional Screening Levels [RSLs] and maximum contaminant levels [MCLs]).

1.1 PROJECT OBJECTIVES AND SCOPE

The objective of the SI was to determine the presence, or absence, of contamination and provide one of the following recommendations:

- No further action for a given media at the site;

- Conduct further evaluation (i.e., an RI or removal site evaluation) for a given media at the site; and

- Conduct interim removal action (IRA).

1.2 REPORT ORGANIZATION

This SIR was developed in accordance with the *Guidance for Performing Site Inspections Under CERCLA* (USEPA 1992) and documents the following key components of the SI program for the subject sites:

- Background Information (location, physical setting, and site history);
- Previous Investigations (potential source areas, characterization data);
- Site Characterization Data Collection Program (data quality objectives, environmental sampling);
- Sampling Results;
- Environmental Hazard Assessments; and
- Conclusions and Recommendations.

2.0 BACKGROUND INFORMATION

The following sections provide background information for PBS and the project site, including location, site history, physical setting, land use, and related information. Additional background details are available in the SAP.

2.1 LOCATION

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) in Cleveland, Ohio (**Figure 1**). The PBS facility encompasses approximately 6,400 acres and is depicted in two adjacent United States 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. **Figure 2** shows the location of NASA PBS on the USGS topographic maps (both quadrangles combined). The location of the site discussed in this SIR is depicted in **Figure 3** with reference to an aerial photograph.

2.2 SITE 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 United States Army established the Plum Brook Ordnance Works (PBOW) for the manufacture of munitions and related materials, including trinitrotoluene (TNT), dinitrotoluene (DNT), and phonolite. The PBOW facility consisted of 9,009 acres inland, 1.35 acres for 2 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, NASA obtained 500 acres in the northern portion of the site for construction of a nuclear test reactor. 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 and Pape 2008). In 1963, NASA acquired an additional 6,000 acres and took control over what is now referred to as PBS. 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 PBOW as excess. This excess included approximately 1,500 acres outside the fence and was sold as farmland (NASA 2013). The 46 acres outside of the fence in the northeastern corner of the PBOW facility near the guard house was conveyed to the Perkins Township Board of Education for use as a bus transportation area. In addition, the 2,152 acres of PBOW declared as excess included a 604-acre parcel in the western part of the fenced area known as "Parcel 59." This area, although previously declared excess, was not transferred and remains under NASA control. According to a NASA newsletter, NASA presently controls approximately 6,432 acres (NASA 2013); this includes approximately 5,500 acres within the fence line and 900 acres outside of the fence, which have been leased for agriculture (NASA 2012a).

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 United States Department of Agriculture (USDA), United States 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* (Tech Law 1998).

2.2.1 ECCL Operational History

The ECCL was founded in 1948 with the purpose of conserving wildlife and improving hunting, fishing, and other outdoor activities in Erie County. In the late 1950s or early 1960s, NASA acquired the ECCL property through eminent domain to act as a security buffer and leased the property back to ECCL (SAIC 2010).

The ECCL facility originally consisted of a single trap range, skeet range, and rifle range, respectively. In the early 1960s, the 50-yard pistol and rifle range was added. In the early to mid-1960s, the additional trap and skeet ranges were added to the facility and the 25-yard pistol range was built in the mid-1980s. The ECCL operated under a Range Safety Plan that provides general rules and operational guidelines. The ECCL facility formerly employed two personnel. In addition, the facility had an annual membership of approximately 700 to 1,000 people. The facility was thought to have closed on or about August 18, 2007 (SAIC 2010).

2.3 SITE SETTING

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 current PBS main gate 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 east along U.S. Highway 250 and its intersections with Bogart Road and State Highway 2 in Sandusky. A United States Army Reserve Center is situated adjacent to the southeast corner, just off Mason Road (SAIC 2013).

An 8-foot security fence surrounds approximately 5,000 acres of PBS. Most of the land at PBS consists of forestland and old fields. An estimated 75 percent 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 gained through the security guard house located on Scheid Road. The guard house is staffed by armed guards 24 hours per day. 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.

2.3.1 ECCL Firing Range

ECCL leased approximately 57 acres of land from NASA on the east 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-foot security fence and public access is not restricted (only NASA property signage present along

Fox Road). 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 is 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 feet deep and approximately 10,000 square feet) is south-southwest of the trap and skeet ranges, approximately 275 feet west of the former ECCL club house (SAIC 2010).

The pistol/rifle ranges consisted of a firing stand, 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 north and west 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 (< 50 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 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.

A car dealership was under construction in June 2016 on the two adjacent parcels between the ECCL site and U.S. Highway 250.

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).

2.4 PHYSICAL SETTING

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

2.4.1 Climate

At PBS, the climate is continental in character and influenced by proximity to Lake Erie, which is approximately 6 km (4 miles) to the north. Summers are moderately warm and humid with temperatures occasionally exceeding 32°C (90°F). Winters are cold and cloudy with temperatures falling below 18°C (0°F) 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 percent) 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 cm (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. **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 percent. Topographic relief across NASA PBS is approximately 50 feet, with higher elevations (±675 feet above mean sea level [AMSL]) present along the south-southwestern facility boundary and lower elevations (±625 feet AMSL) present along the northern facility boundary. The lowest ground surface elevations at NASA PBS are associated with the two primary surface water drainages features: Plum Brook (north central portion of facility) and Pipe Creek (northwestern portion of facility). The ECCL facility is located on relatively flat terrain characterized by topography that gently slopes northward toward Lake Erie. The general topography of PBS and the surrounding area is shown in **Figure 2**.

2.4.3 Wetlands and Waterways

Erie County drains northward into Lake Erie. There are 17 distinct watershed areas 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 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 4** illustrates the primary surface water drainage features at ECCL. The ECCL Firing Range is not within a 100-year floodplain.

In 2011 and 2012, comprehensive wetlands and waterways delineations were conducted at PBS. The wetland delineations were completed in accordance with methods described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northeast and Northcentral Region* (ERDC 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 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; and 15 ponds totaling 14.908 acres (Enviroscience 2012). As of 2013, the delineated wetland boundaries and ORAM quality scores have not been verified by 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 present within the ECCL Firing Range site. Three are shallow wetlands (approximately 2 to 2.5 feet depth) on the western portion of the site classified as palustrine emergent (nontidal wetlands dominated by erect, rooted, herbaceous vegetation). One deeper pond (currently 2.5 to 5 feet depth and approximately 10,000 square feet) 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.

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 done 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 5**.

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).

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 uncomfortably overlie older sedimentary sequences of Ordovician and Cambrian Age rocks, which in turn uncomfortably 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 feet) with scattered bedrock outcrops.

Four Devonian Age formations comprise the upper bedrock surface across PBS, from youngest to oldest:

- 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 Plum Brook Shale/Prout Limestone formations occur in the eastern portion of PBS and are assumed to be representative of the bedrock formations in the vicinity of the ECCL facility. **Figure 6** presents the bedrock geology at PBS.

Regional groundwater flow is to the north-northwest 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 (L/min) [500 gallons per minute (gpm)] in limestone to 38 L/min (10 gpm) or less in unconsolidated materials.

At PBS, the groundwater has been divided into three zones based on location and yield. Zone 1 occurs in the north and northwestern portion of the station. It has been characterized as yielding from 379 to 1,893 L/min (100 to 500 gpm) from karstic limestone approximately 30 meters (100 feet) below grade. Zone 2 is in the northern portion of PBS and has yields of 57 L/min (15 gpm) or less from limestone approximately 91 meters (300 feet) below grade. Zone 3 is located in the eastern and southern portion 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 L/min (3 gallons per day) [Shaw 2008].

The two main water-bearing zones at PBS are the overburden and the bedrock. Data from recent groundwater investigations conducted by USACE found 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.

2.5 WATER RESOURCES

The Erie County Health Department does not allow the use of surface water as private drinking water. The majority of residents of Erie County receive water from public utilities whose primary sources are surface water. 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 in the vicinity of PBS were determined to be used for private and public consumption; however, none within the facility boundary are used (Shaw 2008). There are six known private wells within 1 mile downgradient from PBS. The nearest known downgradient private well is approximately 256 meters (840 feet) 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 for drinking water. There are no injection wells onsite. Approximately 187 monitoring wells have been installed by NASA and USACE (Humphries 2013). Historical groundwater investigations found localized areas with several contaminants including nitroaromatics, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. The observed contamination has either been remediated or is in the process of remediation.

2.6 BIOTIC RESOURCES

Much of the information in this section was taken from the Protected Species Management Strategy for NASA GRC at Lewis Field and PBS (NASA 2007, ODNR 2002) and the Biological Inventory of PBS (ODNR 1995). The PBS site is part of a regional ecosystem encompassing Sandusky, parts of Lake Erie, and several Lake Erie Islands.

2.6.1 Flora

The 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 the 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. 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.

Plant communities were classified according to the Federal Geographic Data Committee Vegetation Classification Standard (FGDC 1997). The following 15 formations and 14 alliances were identified at PBS during the 2001 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
    - *Fagus grandifolia – Acer saccharum – (Liriodendron tulipifera)* Forest Alliance (FU1)
    - *Quercus alba – (Quercus rubra, Carya spp.)* Forest Alliance (FU2)
    - *Quercus rubra – Acer saccharum – (Quercus alba*) Forest Alliance (FU3)
    - *Quercus veluntina – Quercus alba* Forest Alliance (FU4)
  - Formation: I.B.2.N.d. Temporarily flooded cold-deciduous forest
    - *Fraxinus pennsylvanica – Ulmus americana – Celtis (occidentalis, laevigata)* Temporarily Flooded Forest Alliance (FL1)
    - *Salix nigra* Temporarily Flooded Forest Alliance (FL2)
  - Formation: I.B.2.N.e. Seasonally flooded cold-deciduous forest
    - *Acer rubrum – Fraxinus pennsylvanica* Seasonally Flooded Forest Alliance (FL3)
    - *Quercus palustris – (Quercus bicolor)* Seasonally Flooded Forest Alliance (FL4)

- **Shrubland Formations**
  - Formation: III.B.2.N.a. Temperate cold-deciduous shrubland
  - Formation: III.B.2.N.c. Intermittently flooded cold-deciduous shrubland
  - Formation: III.B.2.N.f. Semi-permanently flooded cold-deciduous shrubland
    - *Cephalanthus occidentalis* Semi-permanently Flooded Shrubland Alliance (SL3)
  - Formation: III.B.2.N.g. Saturated cold-deciduous shrubland
    - *Cornus spp. – Salix spp.* Saturated Shrubland Alliance (SL4)

- **Herbaceous Vegetation Formations**
  - Formation: A.5.C.b. Landscaped urban/suburban/rural (residential yards, nurseries)
  - Formation: V.A.5.N.c. Medium-tall sod temperate or subpolar grassland
  - Formation: V.A.5.N.k. Seasonally flooded temperate or subpolar grassland
    - *Phalaris rundinacea* Seasonally Flooded Herbaceous Alliance (HL2)
    - *Typha spp. – (Scirpus spp. – Juncus spp.)* Seasonally Flooded Herbaceous Alliance (HL3)
    - *Phragmites australis* Seasonally Flooded Herbaceous Alliance (HL4)
  - Formation: V.B.2.N.a. Tall temperate or subpolar perennial forb vegetation
  - Formation: V.B.2.N.c. Intermittently flooded temperate perennial forb vegetation
  - Formation: V.C.2.N.a. Permanently flooded temperate or subpolar hydromorphic rooted vegetation
    - *Potamogeton spp. – Ceratophyllum spp. – Elodea spp.* Permanently Flooded Herbaceous Alliance (HL5).

In 2011–2012, wetlands were formally delineated for all of PBS in accordance with methods described in the *Corps of Engineers Wetlands Delineation Manual* and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northeast and Northcentral Region* (Enviroscience 2012). A

total of 1,050 wetlands totaling 421.958 acres, 373 waterways totaling 308,726 linear feet, and 15 ponds totaling 14.908 acres were delineated. As part of the wetland delineation effort, 10 upland and wetland vegetative communities were identified at PBS.

NASA is currently conducting site-wide species surveys of PBS, with field surveys to be completed in October 2016 (Eppig 2016).

2.6.2 Fauna

Animals inventoried at PBS during the 2001 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).

In 2001, amphibians and/or reptiles were recorded from 116 localities in PBS. There were 15 localities from 1994 where animals were no longer found, 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).

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 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).

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).

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 the ODNR's Ohio's Endangered Wildlife List was recorded (ODNR 2002).

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. There was no evidence of the Indiana bat. Several maternity colonies were located utilized by three different species (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 in relation to the potential wind farm project; 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).

In 2009 and 2010, various bird surveys were conducted onsite by the 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 support of the National Environmental Policy Act planning process for a proposed wind farm at PBS, an eagle point county survey was commissioned by NASA in 2012. Three plots, each not overlapping the other and with an 800-meter radius at ground level, were monitored for eagles over the course of the survey. During the prescribed 4,320 minutes of monitoring, 73 eagle exposure minutes were documented. (Eppig 2016).

In 2012, a survey for a candidate species for the Federal endangered 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 it could not be considered a comprehensive snake or reptile survey. However, though no Eastern Massasaugas were found onsite, three species of snakes were recorded during the survey (Lipps 2012).

NASA is currently conducting site-wide species surveys of PBS, with field surveys to be completed in October 2016 (Eppig 2016).

2.6.3 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, ODNR 2002). Many of these areas contain rare plant species and rare plant communities, including rare prairie species and remnant oak savannas.

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* (SMP) [NASA 2007]. 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 SMP. They can be small and local, or somewhat extensive in area, but in all cases their distinguishing characteristic is that 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. An updated Volume III of the SMP is scheduled for completion in March 2017, following completion of the site-wide species surveys expected in October 2016 (Eppig 2016).

In response to management recommendations, the PBS 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 SMP 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 Systems (EMS) metrics for stewardship for natural resources at PBS (NASA 2012b). As of FY 2015, PBS is in compliance with EMS targets for species management (Eppig 2016).

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

Month	Total Precipitation Normal	Mean Max Temperature Normal	Mean Min Temperature Normal	Mean Avg Temperature Normal	Normal Snowfall
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 12/3/15).

3.0 PREVIOUS INVESTIGATIONS

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) is the only previous documented investigation conducted at the ECCL Firing Range (SAIC 2010). 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, there is no information available 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 includes standard ball shot (< #6) and jacket ammunition (< 50 caliber) [SAIC 2010]. 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.

Probable substances of concern include 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. Additional substances may include arsenic (present in lead shot), antimony (increases shot hardness), and copper and zinc (jacket alloy metal).

Areas of known or suspected contamination include the pistol and rifle range impact berms (deposition of contaminants associated with discharged ammunition), the trap and skeet range field (deposition of lead shot, fragmented clay targets, shell casings), and portions of the pistol and rifle range floor (deposition of bullet jackets). It is 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 current and past activities at the site is 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 is 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 is 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 is expected to be low. No primary targets are 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 does 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. Additionally, there is 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), as well as to the presence of vegetative cover, which inhibits dust emissions (SAIC 2010). Conclusions of the PA indicated that due to site use, potential chemicals, and potential exposure pathways, additional investigation was warranted.

4.0 SITE CHARACTERIZATION FIELD PROGRAM

The site characterization field program included collection of soil, sediment, and surface water samples to assess the presence, nature, and extent of contamination at the site. This section summarizes the SI field activities and presents the analytical results for surface soil, sediment, and surface water sampling. All sampling and analytical activities were conducted in accordance with the procedures specified in the final SAP (SAIC 2011) and in ITRC's *Characterization and Remediation of Soils and Closed Small Arms Firing Ranges* (ITRC 2003).

4.1 GENERAL APPROACH

The following sections describe the methodology utilized for the SI field sampling.

4.1.1 Soil Sampling

Soil sampling was conducted in distinct areas within each sub-site (trap/skeet ranges, rifle/pistol ranges) based on the nature of use at each range including:

- Discharge area - firing positions;
- Standard shot fall zone (defined as less than 375 ft and greater than 600 ft from discharge area [ITRC 2003]) - trap/skeet ranges;
- Maximum shot fall zone (defined as greater than 375 ft and less than 600 ft from discharge area [ITRC 2003]) - trap/skeet ranges;
- Target/short fall zone - rifle/pistol ranges;
- Berm impact zone - rifle/pistol ranges;
- Lateral berm impact zone - rifle/pistol ranges; and
- High-fire zone - rifle/pistol ranges.

Soil sample locations were based on preliminary site reconnaissance and were identified in the field based on proximity to waste materials/debris and small-scale physical site features (e.g., soil piles, berms, stressed vegetated areas) within each applicable area of each range. Field screening for lead was not conducted using a portable X-ray fluorescence (XRF) analyzer during this investigation.

Soil boring activities were conducted using hand augers. NASA and Ohio Utility Protection Service (OUPS) provided utility clearance for the SI site prior to field activities. OUPS only noted that a new natural gas line was installed along U.S. Highway 250, but within the adjacent parcels under current development. Borings were advanced to a maximum of 0.5, 1, or 3 feet below ground surface (BGS) [depending on area of each range] or refusal, whichever was encountered first. Each boring was logged for lithologic description. No field screening with a photoionization detector (PID) or XRF for lead-based paint was performed during this SI. Analytical samples were collected as a composite sample from entire sample intervals: 0 to 0.5, 0 to 1, or 0 to 3 feet BGS. Quality assurance/quality control (QA/QC) sampling included collection of one field blank and one equipment rinsate blank for this field project mobilization. Samples were analyzed for the following:

- SVOCs; and
- Firing Range Metals (As, Cu, Fe, Pb, Sb, Sn, and Zn).

Borings advanced with a hand auger method utilized a stainless steel bucket auger head attached to an extension rod and T-shaped bar. Material collected in the bucket from each interval was transferred with a stainless steel spoon to a stainless steel bowl.

At each borehole, the soil lithology was logged by a Leidos field geologist to identify soil type, texture, lithologic characteristics, saturated zones, and areas of fill and debris. Boreholes were backfilled with bentonite. Location-specific details, including drilling method, total depth, sample interval, and screening results, are recorded on the soil boring logs included as **Appendix A**.

To avoid cross-contamination or outside contamination of the samples, all non-disposable equipment used during the field investigations was decontaminated. Decontamination of soil sampling equipment (stainless steel hand augers, stainless steel bowls, and stainless steel spoons) was performed in accordance with the chemical decontamination method described in the final SAP (SAIC 2011). All liquid decontamination waste was containerized and managed as described in Section 4.1.9.

4.1.2 Surface Water Sampling

Collocated sediment and surface water samples were collected from drainage ditches and ponds to identify potential impacts due to runoff from the ranges. Sample locations were selected based on site conditions and the presence of any discharge/influent pipes or other surface water inflows. For analysis of compounds that required pre-preserved containers, the water sample was collected using a disposable, non-preserved container and transferred to the appropriate preserved container. Field notes were recorded on the sediment boring logs (**Appendix A**). QA/QC sampling included collection of one field blank and one equipment rinsate blank for the field mobilization. Samples were analyzed for the following:

- Firing Range Metals (As, Cu, Fe, Pb, Sb, Sn, and Zn); and
- SVOCs.

4.1.3 Sediment Sampling

Collocated sediment and surface water samples were collected from drainage ditches/ and ponds to identify potential impacts due to runoff from the firing ranges. Sample locations were selected based on site conditions and the presence of any discharge/influent pipes or other surface water inflows. Sediment samples were collected using a hand auger to advance a borehole to approximately 2 feet below grade, as described in Section 6.1 of the SAP (SAIC 2011). Sediment samples were collected as wet sediment where surface water was present and as dry sediment if surface water was not present (e.g., dry seasonal drainages). At locations with surface water (i.e., ponds), sediment samples was collected using a Ponar dredge sampler as described in the SAP. The Ponar sampler is a clamshell-type scoop activated by a counter-level system. The material from each interval (or Ponar) was transferred with a stainless steel spoon to a stainless steel bowl. The soil was then homogenized, as necessary. The soil lithology was logged by the Leidos field geologist and recorded on boring logs (**Appendix A**). QA/QC sampling included collection of one field blank and one equipment rinsate blank for the field mobilization. Samples were analyzed for the following:

- Firing Range Metals (As, Cu, Fe, Pb, Sb, Sn, and Zn); and
- SVOCs.

4.1.4 Location Surveys

Sample locations and notable site features were field surveyed with a handheld Global Positioning System (GPS) unit with horizontal accuracy within +/- 1 meter. GPS data were downloaded and transferred for use in ArcGIS mapping applications during data evaluation and reporting.

4.1.5 Data Screening Criteria

Data screening criteria for the analytical data include:

- 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. These criteria also were used to identify the required laboratory analytical reporting limits (RLs) to ensure the data collected meet the needs of current and potential future risk evaluations.

4.1.6 Data Validation

Analytical data were validated 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 B**.

4.1.6.1 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 detection limit (DL) and the LOQ ensure the presence of the analyte with confidence, but their numeric values are estimates (DoD 2009). Note that the analytical reports from the laboratory (Whitewater and Associates/TestAmerica) provided in **Appendix B** refer to the LOQ as the RL. Non-detects reported by the laboratory are reported at the LOQ, followed by a 'U' flag.

The DL 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 DL indicates that the analyte is present, the absence of a result at or above the DL is inconclusive (i.e., one cannot confidently state whether the analyte is present or absent) because the false negative rate at the DL is 50 percent. Note that the analytical reports from TestAmerica, provided in **Appendix B**, refer to the DL as the method detection limit.

4.1.6.2 Data Validation Qualifiers and Data Usability

Consistent with the data quality requirements presented in the Quality Assurance Project Plan (QAPP), 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 demonstrates a decreased knowledge of its 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, 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, (2) usable with caution as an estimated concentration, or (3) unusable due to non-compliant QC results.

Data for SVOCs were qualified as non-detect (U, UJ) based on blank contamination (method blank results) and as estimated (J, UJ) based on matrix spike/matrix spike duplicate (MS/MSD) results, surrogate results, or calibration standards that exceeded control limits. There was one aqueous MS/MSD result and 41 SVOC results evaluated as part of the soil and sediment MS/MSD analyses that had spiked recovery less than 10 percent and were, therefore, qualified as unusable (R) in one or more parent samples. Thirty eight soil/sediment results were qualified as estimated (J, UJ) due to MS/MSD discrepancies. One hundred and fifty-six results were qualified as non-detect (U) based on blank contamination (method blanks). Sixty-seven results were qualified as estimated (UJ, J) due to surrogate recoveries below the lower control limits (LCL). One hundred and fifteen results were qualified as estimated (J, UJ) due to calibration discrepancies. There were 14,671 discrete SVOC results generated, of which 42 results were qualified unusable (0.29 percent) and an additional 418 discrete data points were qualified as estimated, with 99.7 percent of the SVOC data deemed usable.

Data for metals results were qualified based on blank contamination (instrument and method blank results) MS/MSD results, Contract-Required Quantitation Limit (CRQL) results, or serial dilution results. Seventeen results were qualified as estimated (J) due to serial dilution discrepancies. Two hundred and three results were qualified as non-detect (U) due to blank contamination. Twenty results were qualified as estimated (J) due to MS/MSD discrepancies. Forty-four results were qualified as estimated (J) due to CRQL discrepancies. There were 1,539 discrete metals results generated, of which 280 (18.2 percent) were qualified as estimated, with 100 percent of the metals data deemed usable.

4.1.7 Deviations from the Work Plan

No Field Change Requests were submitted for this project.

4.1.8 Investigation-Derived Waste

Investigation-derived waste (IDW) includes all material generated during the sampling activities that cannot be effectively reused, recycled, or decontaminated in the field. IDW generated during field

activities was managed to prevent the release of contamination. IDW produced during field activities included the following:

- Decontamination liquids;
- Soil and sediment cuttings;
- Contact personal protective equipment (PPE); and
- Sanitary trash.

Two 55-gallon drums containing soil cuttings, one 55-gallon drum of liquid IDW, one 15-gallon drum of nitric acid, and one 30-gallon drum of isopropanol decontamination waste were generated. One composited, solid waste characterization sample was collected from the soil IDW and one liquid waste characterization sample was collected from the liquid IDW. Solid samples were analyzed for toxicity characteristic leaching procedure (TCLP) VOCs (including F-Scan), TCLP metals, TCLP herbicides, TCLP pesticides, TCLP SVOCs, metals, SVOCs, polychlorinated biphenyls (PCBs), cyanide, sulfide, pH, flashpoint, and paint filter test. Liquid IDW sample was analyzed for metals, VOCs (including F-Scan), SVOCs, PCBs, herbicides, pesticides, pH (corrosivity), and flashpoint (ignitability). Nitric acid and isopropanol decontamination wastes were characterized as hazardous waste (corrosive, flammable) by NASA Waste Management (WM); therefore, no characterization samples were collected.

Contact waste, consisting plastic bags and PPE, was managed in one lined, 5-gallon, plastic bucket and contractor garbage bags pending soil IDW characterization. Sanitary trash, including non-contact PPE, was disposed of in an onsite waste receptacle. The soil and liquid IDW was staged temporarily inside a secured storage container at the ECCL Firing Range site and transferred to the environmental hazardous waste storage building (Building 9206) in the custody of NASA WM personnel prior to demobilization.

Laboratory analytical results indicate that solid and liquid wastes generated during the investigation were hazardous. Hazardous liquid and soil IDW, as well as nitric acid and isopropanol wastes generated during SI activities, were removed and properly disposed of offsite by Chemtron Corporation on behalf of NASA WM on July 18, 2016. Contact PPE was added to the soil IDW drums by NASA WM prior to disposal. IDW paperwork is provided in **Appendix C**.

4.2 ECCL FIRING RANGE

The following sections describe the SI field activities and soil, sediment, and surface water sampling results at the ECCL Firing Range. Photographs of SI field activities and site conditions are presented in **Appendix D**.

4.2.1 Field Activities

A total of 168 soil borings were advanced at locations within the ranges including firing positions, impact berms, shot fallout zones, and adjacent to range debris materials potentially impacted by lead or PAHs. Surface soil samples (0 to 0.5, 0 to 1, or 0 to 3 feet BGS) were collected from each soil boring, depending on which portion of the ranges. A total of 168 surface soil samples plus 17 field duplicates were collected and submitted for analysis of Firing Range metals and SVOCs.

Collocated sediment and surface water samples were collected from within the ponds only; no surface water was present in the drainage ditches. Nine wet sediment samples plus one field duplicate were collected using a Ponar dredge sampler to a total depth of approximately 0.5 feet below the top of sediment. Ten dry sediment samples plus one field duplicate were collected using a hand auger to a total

depth of approximately 2 feet below the top of sediment in the dry drainage ditches. Each sample was a vertical composite of the entire sample interval. Sediment samples were analyzed for Firing Range metals and SVOCs. Dry sediment samples are evaluated against soil screening criteria in Sections 4.2.2 and 5.2.

Nine surface water samples plus one field duplicate were collected from ECCL at pond locations coinciding with nine of the wet sediment sample locations. The drainage ditches were observed to be dry while mobilized for two weeks in June 2016; therefore, no surface water samples were collected at 10 dry ditch locations. Surface water samples were analyzed for Firing Range metals and SVOCs.

Additional observations regarding waste and debris at the ECCL firing range site during June 2016 field activities include the following:

- No painted building materials were observed during field reconnaissance.
- The pistol ranges berms had remnants of unpainted wooden and metal posts used for barricades. Shooting stand debris and a telephone pole were located behind the firing area of the eastern pistol range.
- The skeet range firing lanes were not present and concrete assumed to be previously removed.
- Trap and skeet fields had several areas completely covered with clay target fragments and/or shotgun wads and shells. These residual "piles' were surficial (and subgrade up to 1 foot BGS) in nature. Generally, there was no vegetation in these areas. The clay targets and shotgun wads were presumably raked into piles prior to bulk disposal by the ECCL.
- Burned building material pile was observed in the location of the former traphouse, including wood. Contents of the pile are unknown. However, based on field observations, materials should be investigated for asbestos-containing material (ACM) under the next phase of investigation.

Figures 7, 12, and 17 show the SI sample locations at ECCL Firing Range. **Tables 4-1** through **4-3** summarize the samples collected for laboratory analysis at each surface soil boring location and depth interval, dry sediment locations, as well as collocated sediment/surface water locations,.

4.2.2 Results

Multiple compounds were detected in each medium sampled. In addition, each medium contained multiple compounds at concentrations greater than screening criteria. This section presents the compounds that exceeded screening levels for each medium. Discussion of sample results is presented based on geographical location of collection. **Tables 4-4** through **4-10** present the analytical detections for the soil, sediment, and surface water samples.

4.2.2.1 Trap and Skeet Ranges

The trap and skeet ranges were combined for evaluation due to shared fields with overlapping shot fallout zones. Eighty-nine soil samples were collected from the trap and skeet range at ECCL. The soil samples were analyzed for firing range metals and SVOCs. **Table 4-4** summarizes the analytical results for soil, and **Figures 7 through 11** illustrates the sample locations and exceedances of screening criteria. Seven metals were detected across the trap and skeet range. Arsenic, copper, iron, lead, and zinc were detected in all 89 samples collected at the range. Antimony was detected in the majority of samples (79 of 89) and tin was detected in two of the 89 samples. Lead was detected in the highest concentrations at ECCL on

the trap and skeet range. The maximum detect of lead was 100,000 mg/kg at ECCL-SL-074 in the center of range. The highest concentrations of lead were within the center of the range with concentrations reducing upon approaching the perimeters of the investigation area. **Figure 8** illustrates the concentrations of the lead detected at the trap and skeet range. The following list details the metals that exceeded screening criteria:

- Antimony exceeded USEPA residential soil screening criteria in 13 samples, the ESV in 79 samples, and background in 25 samples;
- Arsenic exceeded USEPA residential soil screening criteria in all 89 samples, the ESV in 27 samples, and background in 13 samples;
- Copper exceeded the ESV in 15 samples and background in one sample;
- Lead exceeded USEPA residential soil screening criteria in 49 samples and the ESV in all 89 samples;
- The two detections of tin exceeded the ESV; and
- Zinc exceeded the ESV in 23 samples.

A total of 28 SVOCs were detected in at least one of the trap and skeet range samples. Seventeen of the 28 SVOCs were detected in concentrations that exceeded USEPA residential soil screening criteria and/or the ESV as follows:

USEPA Residential Soil Screening Criteria	ESV	USEPA Residential Soil Screening Criteria and ESV
Benzo(*k*)fluoranthene	2-Methylnaphthalene	Benz(*a*)anthracene
Indeno(1,2,3-*cd*)pyrene	Benzaldehyde *(no criteria)*	Benzo(*a*)pyrene
	Benzo(*g,h,i*)perylene	Benzo(*b*)fluoranthene
	Bis(2-ethylhexyl)phthalate	Carbazole *(no criteria)*
	Dibenzofuran *(no criteria)*	Chrysene
	Fluoranthene	Dibenz(*a,h*)anthracene
	Naphthalene	
	Phenanthrene	
	Pyrene	

4.2.2.2 Rifle Range

Thirty-seven soil samples were collected at the ECCL Rifle Range. Soil samples were analyzed for firing range metals and SVOCs. **Table 4-5** summarizes the analytical results for soil, and **Figures 12 through 15** illustrates the sample locations and exceedances of screening criteria. Five metals (arsenic, copper, iron, lead, and zinc) were detected in all 37 samples and antimony was detected in 34 of 37 samples collected at the Rifle Range. Antimony (maximum concentration 160 mg/kg) and lead (maximum concentration of 28,000 mg/kg) exceeded both USEPA residential soil screening criteria and the ESV. Copper exceeded only the ESV with a maximum concentration of 840 mg/kg.

Twenty-three SVOCs were detected in at least one sample at the Rifle Range. Ten of the 23 SVOCs were detected in concentrations that exceeded USEPA residential soil screening criteria and/or the ESV as follows:

- Benz(*a*)anthracene exceeded USEPA residential soil screening criteria in four samples;
- Benzaldehyde exceeded the ESV as no screening criteria exist;
- Benzo(*a*)pyrene exceeded USEPA residential soil screening criteria in 20 samples and the ESV in one sample;
- Benzo(*b*)fluoranthene exceeded the USEPA residential soil screening criteria in eight samples;
- Benzo(*g,h,i*)perylene did not exceed the ESV but remains an ecological concern as a PBT;
- Chrysene exceeded the ESV in one sample;
- Dibenz(*a,h*)anthracene exceeded the USEPA residential soil screening criteria in four samples;
- Dibenzofuran exceeded the ESV as no screening criteria exist;
- Indeno(1,2,3-*cd*)pyrene exceeded USEPA residential soil screening criteria in one sample; and
- Naphthalene exceeded the ESV in 21 samples.

4.2.2.3 Pistol Range (West)

The Pistol Range was divided into the East and West portions for evaluation purposes. Overall, there were more SVOCs detected in the West Pistol Range and at higher concentrations in comparison to the East Pistol Range. Both Pistol Ranges contained similar quantities and concentrations of firing range metals.

A total of 30 samples were collected in the West Pistol Range and analyzed for firing range metals and SVOCs. **Table 4-6** summarizes the analytical results for soil, and **Figures 12 and 16** illustrate the sample locations and exceedances of screening criteria. Five metals (arsenic, copper, iron, lead, and zinc) were detected in all 30 samples, antimony in 28 samples, and tin in five of the 30 samples collected at the West Pistol Range.

Concentrations of antimony, copper, lead, and zinc exceeded background concentrations at the West Pistol Range. Zinc exceeded the ESV while antimony, copper, and lead exceeded both the ESV and USEPA residential soil screening criteria at the West Pistol Range in at least one sample to all 30 samples.

A total of 27 SVOCs were detected in at least one sample from the West Pistol Range. Of the 27 detected SVOCs, 12 exceeded at least one or more screening criteria as follows:

USEPA Residential Soil Screening Criteria	ESV	USEPA Residential Soil Screening Criteria and ESV
Benz(*a*)anthracene	Benzaldehyde *(no criteria)*	Carbazole *(no criteria)*
Benzo(*a*)pyrene	Benzo(*g,h,i*)perylene	
Benzo(*b*)fluoranthene	Bis(2-ethylhexyl)phthalate	
Dibenz(*a,h*)anthracene	Butyl benzyl phthalate	
Indeno(1,2,3-*cd*)pyrene	Dibenzofuran *(no criteria)*	
	Naphthalene	

4.2.2.4 Pistol Range (East)

A total of 29 samples were collected in the East Pistol Range and analyzed for firing range metals and SVOCs. **Table 4-7** summarizes the analytical results for soil, and **Figures 12 and 16** illustrate the sample locations and exceedances of screening criteria. A total of seven metals were detected at the East Pistol Range. Five metals (arsenic, copper, iron, lead, and zinc) were detected in all 29 samples, antimony in 28 samples, and tin in 10 of the 29 samples collected at the East Pistol Range.

Concentrations of antimony, copper, and lead exceeded background concentrations at the East Pistol Range. No background criteria exist for tin. Copper and tin exceeded the ESV while antimony and lead exceeded both the ESV and USEPA residential soil screening criteria at the East Pistol Range in at least one sample to all 29 samples collected and analyzed.

A total of 26 SVOCs were detected in at least one sample from the East Pistol Range. Of the 26 SVOCs, seven exceeded at least one or more screening criteria. The following lists the SVOCs exceeding screening criteria:

- Benzaldehyde, caprolactam, and dibenzofuran exceeded the ESV as no criteria exist for these chemicals;
- Benzo(*a*)pyrene exceeded USEPA residential soil screening criteria in 13 samples;
- Benzo(*b*)fluoranthene exceeded USEPA residential soil screening criteria in three samples;
- Benzo(*g,h,i*)perylene was detected below all screening criteria but is a PBT chemical;
- Naphthalene exceeded the ESV in four samples.

4.2.2.5 Ditches

Ten dry sediment samples were collected within the ditches across ECCL. The dry sediment samples were analyzed for firing range metals and SVOCs. Ditches have been wet based on previous reconnaissance but were dry during sampling. The dry ditches were compared to soil criteria for evaluation rather than wet sediment criteria. **Table 4-8** summarizes the analytical results for soil, and **Figures 17 through 19** illustrate the sample locations and exceedances of screening criteria. Five metals (arsenic, copper, iron, lead, and zinc) were detected in all 10 samples and antimony was detected in nine of 10 samples. Concentrations of antimony, copper, lead, and zinc exceeded background concentrations within the ECCL ditches. Concentrations of lead exceeded the USEPA residential soil screening value of 400 mg/kg in four of the 10 samples with the maximum concentration of 1,600 mg/kg being detected at ECCL-SDSW-002. The metals antimony, copper, lead, and zinc exceeded ESVs.

A total of 23 SVOCs were detected in at least one of the ditch samples. The following lists the SVOCs exceeding screening levels:

- Benz(*a*)anthracene exceeded USEPA residential soil screening criteria in two samples and the ESV in one sample;
- Benzaldehyde exceeded the ESV in one sample as no criteria exist for this chemical;
- Benzo(*a*)pyrene exceeded USEPA residential soil screening criteria in six samples and the ESV in one sample;

- Benzo(*b*)fluoranthene exceeded USEPA residential soil screening criteria in three samples;
- Benzo(*g,h,i*)perylene was detected below all screening criteria but is a PBT chemical;
- Chrysene exceeded USEPA residential soil screening criteria and the ESV in one sample;
- Dibenz(*a,h*)anthracene exceeded USEPA residential soil screening criteria in one sample;
- Dibenzofuran exceeded the ESV in one sample as no criteria exist for this chemical; and
- Indeno(1,2,3-*cd*)pyrene exceeded USEPA residential soil screening criteria in one sample.

4.2.2.6 Sediment

Ten wet sediment samples were collected from within the ponds present at ECCL. The sediment samples were analyzed for firing range metals and SVOCs. Sediment samples were collocated with surface water samples discussed in the subsequent section. **Table 4-9** summarizes the analytical results for sediment, and **Figures 17 through 19** illustrate the sample locations and exceedances of screening criteria.

Five metals (arsenic, copper, iron, lead, and zinc) were detected in all 10 samples and antimony was detected in five samples. All six metals exceeded their respective ESV or SRV for ecological screening criteria. Concentrations of arsenic and lead also exceeded human health risk screening levels.

A total of 18 SVOCs were detected in at least one sediment sample collected as part of this investigation. The following lists the five SVOCs exceeding screening levels:

- The chemicals 1,1'-Biphenyl and caprolactam exceeded the ESV as no criteria exist for these chemicals;
- The SVOC 2-methylnapthalene exceeded the ESV in four samples;
- Benzo(*a*)pyrene exceeded USEPA human health risk screening levels in three samples; and
- Benzo(*g,h,i*)perylene was detected below all screening criteria but is a PBT chemical.

4.2.2.7 Surface Water

Ten surface water samples were collected from within the ponds present at ECCL. The surface water samples were analyzed for firing range metals and SVOCs. Surface water samples were collocated with sediment samples discussed in the previous section. **Table 4-10** summarizes the analytical results for surface water, and **Figures 17, 20, and 21** illustrate the sample locations and exceedances of screening criteria.

Four metals (arsenic, iron, lead, and zinc) were detected in all 10 samples, antimony in five samples, copper in eight samples, and tin in one sample. Copper and lead were the only metals that exceeded screening criteria, exceeding both human health risk screening levels and the ESV for surface water.

A total of two SVOCs were detected in at least one surface water sample collected as part of this investigation. The chemical caprolactam exceeded the ESV as no criteria exist for this chemical. No chemicals exceeded human health risk screening levels.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (stained, fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-001	ECCLSL0001	0–1.0	Firing Range Metals and SVOCs	Trap Range	Characterize trap field discharge area. Large clay target debris piles (subgrade) and shotgun shell wads present.
ECCL-SL-002	ECCLSL0002 ECCLSL9001	0–1.0	Firing Range Metals and SVOCs	Trap Range	Characterize trap field discharge area. Clay target debris present. Trapbox burned debris present. Suspect ACM in debris pile.
ECCL-SL-003	ECCLSL0003 ECCLSL0003MS/MSD	0–1.0	Firing Range Metals and SVOCs	Trap Range	Characterize trap field discharge area. Large clay target debris pile (subgrade) present. No vegetation.
ECCL-SL-004	ECCLSL0004	0–1.0	Firing Range Metals and SVOCs	Trap Range	Characterize trap field discharge area. Large clay target debris pile (subgrade) of shotgun shells present within trees and extends to nearby drainage ditch.
ECCL-SL-005	ECCLSL0005	0–1.0	Firing Range Metals and SVOCs	Trap Range	Characterize trap field discharge area. Clay target and shotgun wad debris present.
ECCL-SL-006	ECCLSL0006	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize standard shot fallout zone of trap field. Heavy vegetation / brush in area.
ECCL-SL-007	ECCLSL0007	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize standard shot fallout zone of trap field. Grassy area.
ECCL-SL-008	ECCLSL0008	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize standard shot fallout zone of trap field. Brushy area.
ECCL-SL-009	ECCLSL0009	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize standard shot fallout zone of trap field. Grassy area.
ECCL-SL-010	ECCLSL0010	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize standard shot fallout zone of trap field. Grassy area
ECCL-SL-011	ECCLSL0011	0–0.5	Firing Range Metals and SVOC	Trap Range	Characterize standard fallout zone of trap field. Just inside the tree line near eastern PBS fence boundary.
ECCL-SL-012	ECCLSL0012	0–0.5	Firing Range Metals and SVOC	Trap Range	Characterize standard shot fallout zone of trap field. Low vegetation area.
ECCL-SL-013	ECCLSL0013	0–0.5	Firing Range Metals and SVOC	Trap Range	Characterize standard shot fallout zone of trap field. Heavy vegetation (shrubs).

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-014	ECCLSL0014 ECCLSL9002	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize standard shot fallout zone of trap field. Shrub / Scrub vegetation in area.
ECCL-SL-015	ECCLSL0015	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize standard shot fallout zone of trap field. Dense vegetation. Located near a ditch.
ECCL-SL-016	ECCLSL0016	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize max shot fallout zone of trap field. Heavy vegetation in area (brush).
ECCL-SL-017	ECCLSL0017	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize max shot fallout zone of trap field. Heavy vegetation in area (brush). Located near tree line.
ECCL-SL-018	ECCLSL0018	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize max shot fallout zone of trap field. Located inside tree line / wooded area.
ECCL-SL-019	ECCLSL0019	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize max shot fallout zone of trap field. Located inside tree line / wooded area.
ECCL-SL-020	ECCLSL0020	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize max shot fallout zone of trap field. Located near tree line.
ECCL-SL-021	ECCLSL0021	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize max shot fallout zone of trap field. Located in grassy area near tree line.
ECCL-SL-022	ECCLSL0022	0–0.5	Firing Range Metals and SVOCs	Trap Range	Characterize max shot fallout zone of trap field. Dense vegetation / heavy brush.
ECCL-SL-023	ECCLSL0023	0–1	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet range discharge area. Pieces of clay targets present. Heavy / dense vegetation and mound south of location.
ECCL-SL-024	ECCLSL0024	0–1	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet range discharge area. Located in a grassy area.
ECCL-SL-025	ECCLSL0025 ECCLSL9003	0–1	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet range discharge area. Shotgun shell observed in area.
ECCL-SL-026	ECCLSL0026	0–1	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet range discharge area. Parts of clay targets observed in area. Grassy area.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-027	ECCLSL0027	0–1	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet range discharge area. Parts of clay targets observed in area. Grassy area.
ECCL-SL-028	ECCLSL0028	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap standard shot fallout zone. Clay target debris, shotgun shells and wads present. Dead spots in vegetation. Located near northern drainage ditch.
ECCL-SL-029	ECCLSL0029	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Clay targets and shotgun wads present.
ECCL-SL-030	ECCLSL0030	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field and trap field standard shot fallout zone. Shotgun wads and clay target debris pile (subgrade) present. No vegetation in area.
ECCL-SL-031	ECCLSL0031	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zone. Clay target debris and shotgun wads present.
ECCL-SL-032	ECCLSL0032	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet range standard shot fallout zone. High concentration of clay target debris and shotgun wads. Grassy area.
ECCL-SL-033	ECCLSL0033 ECCLSL9004	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet range and trap field standard shot fallout zone. Shotgun wads and clay target debris present. Grassy area.
ECCL-SL-034	ECCLSL0034	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Shotgun wads and clay target debris present.
ECCL-SL-035	ECCLSL0035	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Shotgun wads and clay target debris present.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-036	ECCLSL0036	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Shotgun wads and clay target debris present.
ECCL-SL-037	ECCLSL0037	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout area. Clay target debris present. Location near tree line and dense briars.
ECCL-SL-038	ECCLSL0038	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone and trap field max shot fallout zone. Clay target debris present. Grassy vegetation and brush in area.
ECCL-SL-039	ECCLSL0039	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zones. Large clay target debris pile (subgrade) and shotgun wads present.
ECCL-SL-040	ECCLSL0040	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zones. Clay target debris pile (subgrade) and shotgun wads present. Located in grassy / brushy vegetation.
ECCL-SL-041	ECCLSL0041	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zones. Clay target debris. Located near area of distressed vegetation.
ECCL-SL-042	ECCLSL0042 ECCLSL9005	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zones. Some clay target debris present.
ECCL-SL-043	ECCLSL0043	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zones. Grassy vegetation.
ECCL-SL-044	ECCLSL0044	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zones. Clay target debris present. Heavy / dense vegetation.
ECCL-SL-045	ECCLSL0045	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone and trap field max shot fallout zone. Vegetated with cottonwood and short ferns.
ECCL-SL-046	ECCLSL0046	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout and trap field max shot fallout zones.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-047	ECCLSL0047	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout and trap field max shot fallout zones. Low density vegetation area.
ECCL-SL-048	ECCLSL0048	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout and trap field max shot fallout zones.
ECCL-SL-049	ECCLSL0049	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap and skeet field standard shot fallout zones. Located in grassy vegetation.
ECCL-SL-050	ECCLSL0050	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Clay target debris present. Located in wooded area.
ECCL-SL-051	ECCLSL0051	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field standard shot fallout zones. Clay target pieces / debris present.
ECCL-SL-052	ECCLSL0052 ECCLSL0052MS/MSD	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Located in a grassy depression near NASA property line. Construction on other side of property line.
ECCL-SL-053	ECCLSL0053	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Dirt pile, silt fence, and vegetation located along parcel boundary near location. Construction on other side of property line.
ECCL-SL-054	ECCLSL0054	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout zone. Dirt pile, silt fence, and vegetation located along parcel boundary near location. Construction on other side of property line.
ECCL-SL-055	ECCLSL0055	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Located in a depression. Vegetation present.
ECCL-SL-056	ECCLSL0056	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Dense vegetation including ferns and briers.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-057	ECCLSL0057	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Dense vegetation in area.
ECCL-SL-058	ECCLSL0058	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Dense vegetation in area.
ECCL-SL-059	ECCLSL0059	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field standard shot fallout zone. Dense vegetation in area.
ECCL-SL-060	ECCLSL0060	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap and skeet field standard shot fallout zones. Dense vegetation.
ECCL-SL-061	ECCLSL0061	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap and skeet field standard shot fallout zones. Low vegetation.
ECCL-SL-062	ECCLSL0062	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap and skeet field standard shot fallout zones. Vegetation present.
ECCL-SL-063	ECCLSL0063	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap and skeet field standard shot fallout zones. Dense vegetation.
ECCL-SL-064	ECCLSL0064 ECCLSL9008	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap and skeet field standard shot fallout zones. Brush and tall grass present.
ECCL-SL-065	ECCLSL0065	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap and skeet field standard shot fallout zones. Grassy vegetation.
ECCL-SL-066	ECCLSL0066	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap field max shot fallout zone and skeet field standard shot fallout zone. Wooded vegetation.
ECCL-SL-067	ECCLSL0067	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap field max shot fallout zone and skeet field standard shot fallout zone. Wooded vegetation.
ECCL-SL-068	ECCLSL0068	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap field max shot fallout zone and skeet field max shot fallout zone. Dense vegetation.
ECCL-SL-069	ECCLSL0069 ECCLSL9006	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap field max shot fallout zone and skeet field max shot fallout zone. Brushy vegetation.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-070	ECCLSL0070	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap field max shot fallout zone and skeet field max shot fallout zone. Dense vegetation.
ECCL-SL-071	ECCLSL0071	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout zone and trap field standard shot fallout zone.
ECCL-SL-072	ECCLSL0072	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field max shot fallout zones. Dense vegetation.
ECCL-SL-073	ECCLSL0073	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize trap field max shot fallout zone and skeet field max shot fallout zone. Vegetation present.
ECCL-SL-074	ECCLSL0074	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet and trap field max shot fallout zones. Dense vegetation.
ECCL-SL-075	ECCLSL0075	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout zone and trap field standard shot fallout zone. Dense vegetation.
ECCL-SL-076	ECCLSL0076	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout and trap field standard shot fallout zones. Dense vegetation. Located in a depression.
ECCL-SL-077	ECCLSL0077 ECCLSL077MS/MSD	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout and trap field standard shot fallout zones. Low vegetation, mostly ferns.
ECCL-SL-078	ECCLSL0078	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout zone. Sparse vegetation. Located adjacent to construction on a bordering parcel.
ECCL-SL-079	ECCLSL0079 ECCLSL9007	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout zone. Dense vegetation.
ECCL-SL-080	ECCLSL0080	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout and trap field standard shot fallout zones. Vegetation present.
ECCL-SL-081	ECCLSL0081	0–0.5	Firing Range Metals and SVOCs	Skeet Range	Characterize skeet field max shot fallout zone. Dense vegetation.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-082	ECCLSL0082	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range south discharge zone. Sparse vegetation. Shale fragments on surface (due to previous excavation).
ECCL-SL-083	ECCLSL0083	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range south discharge zone. Sparse vegetation. Shale fragments on surface (due to previous excavation).
ECCL-SL-084	ECCLSL0084	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range south discharge zone. Sparse vegetation. Shale fragments on surface (due to previous excavation).
ECCL-SL-085	ECCLSL0085	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize pistol range west, north discharge area. Shale fragments on surface (due to previous excavation). Sparse vegetation.
ECCL-SL-086	ECCLSL0086	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize pistol range west, north discharge area. Shale fragments on surface(due to previous excavation). Sparse vegetation.
ECCL-SL-087	ECCLSL0087 ECCLSL9012	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize pistol range west, north discharge area. Shale fragments on surface(due to previous excavation). Sparse vegetation.
ECCL-SL-088	ECCLSL0088	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, target area, west side.
ECCL-SL-089	ECCLSL0089 ECCLSL9010	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, target area, center.
ECCL-SL-090	ECCLSL0090	0–1	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range target area. Railroad tie present.
ECCL-SL-091	ECCLSL0091	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm, west side. Many shale fragments.
ECCL-SL-092	ECCLSL0092	0–2.5	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm, west side. Many shale fragments. Refusal at 2.5 ft BGS.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-093	ECCLSL0093	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm, west side. Many shale fragments.
ECCL-SL-094	ECCLSL0094	0–2.5	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments. Refusal at 2.5 ft BGS.
ECCL-SL-095	ECCLSL0095	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-096	ECCLSL0096	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-097	ECCLSL0097	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-098	ECCLSL0098	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-099	ECCLSL0099	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-100	ECCLSL0100	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-101	ECCLSL0101	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-102	ECCLSL0102 ECCLSL9009	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, main berm. Many shale fragments.
ECCL-SL-103	ECCLSL0103	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, high-fire zone behind berm and concrete blocks.
ECCL-SL-104	ECCLSL0104	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, high-fire zone between berm and pond, behind concrete blocks.
ECCL-SL-105	ECCLSL0105	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range, high-fire zone behind berm.
ECCL-SL-106	ECCLSL0106	0–2.5	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm, east side. Many shale fragments. Refusal at 2.5 ft BGS
ECCL-SL-107	ECCLSL0107	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm, east side. Many shale fragments.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-108	ECCLSL0108	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm. Many shale fragments.
ECCL-SL-109	ECCLSL0109	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm. Many shale fragments.
ECCL-SL-110	ECCLSL0110	0–2.5	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm. Many shale fragments. Refusal at 2.5 ft BGS
ECCL-SL-111	ECCLSL0111	0–2.5	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm. Many shale fragments. Refusal at 2.5 ft BGS
ECCL-SL-112	ECCLSL0112	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm. Many shale fragments.
ECCL-SL-113	ECCLSL0113	0–2.5	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm. Many shale fragments. Refusal at 2.5 ft BGS
ECCL-SL-114	ECCLSL0114 ECCLSL9011	0–3	Firing Range Metals and SVOCs	Rifle Range	Characterize rifle range lateral berm. Many shale fragments.
ECCL-SL-115	ECCLSL0115	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, discharge area. Gravel area covered w/ casings.
ECCL-SL-116	ECCLSL0116	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, discharge area. Gravel area covered w/ casings.
ECCL-SL-117	ECCLSL0117	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, discharge area. Gravel area covered w/ casings.
ECCL-SL-118	ECCLSL0118	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, target area.
ECCL-SL-119	ECCLSL0119	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, target area. Shotgun casings, bottle caps, and miscellaneous debris present.
ECCL-SL-120	ECCLSL0120	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, target area.
ECCL-SL-121	ECCLSL0121	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments.
ECCL-SL-122	ECCLSL0122	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-123	ECCLSL0123	0–2	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments. Refusal at 2.0 ft BGS.
ECCL-SL-124	ECCLSL0124 ECCLSL9014	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments.
ECCL-SL-125	ECCLSL0125	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments.
ECCL-SL-126	ECCLSL0126	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments. Shotgun wads present.
ECCL-SL-127	ECCLSL0127	0–2	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments. Refusal at 2.0 ft BGS.
ECCL-SL-128	ECCLSL0128	0–2	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments. Refusal at 2.0 ft BGS.
ECCL-SL-129	ECCLSL0129	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, main berm. Many shale fragments.
ECCL-SL-130	ECCLSL0130	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, high-fire zone. North of ditch. Trees and brush.
ECCL-SL-131	ECCLSL0131	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, high-fire zone. North of ditch. Trees and brush.
ECCL-SL-132	ECCLSL0132	0–1	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, high-fire zone. Many shale fragments. Backside toe of impact berm.
ECCL-SL-133	ECCLSL0133	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm west. Many shale fragments.
ECCL-SL-134	ECCLSL0134 ECCLSL9013	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm west. Many shale fragments.
ECCL-SL-135	ECCLSL0135	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm west. Many shale fragments.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-136	ECCLSL0136	0–2	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm west. Many shale fragments. Refusal at 2.0 ft BGS
ECCL-SL-137	ECCLSL0137	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm west. Many shale fragments.
ECCL-SL-138	ECCLSL0138	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm east. Many shale fragments.
ECCL-SL-139	ECCLSL0139	0–2	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm east. Many shale fragments. Refusal at 2.0 ft BGS.
ECCL-SL-140	ECCLSL0140 ECCLSL0140MS/MSD	0–2.5	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm east. Many shale fragments. Refusal at 2.5 ft BGS.
ECCL-SL-141	ECCLSL0141 ECCLSL9015	0–3	Firing Range Metals and SVOCs	Pistol Range West	Characterize pistol range west, lateral berm east. Many shale fragments.
ECCL-SL-142	ECCLSL0142	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east discharge area. Bullet casings and pea gravel present at location.
ECCL-SL-143	ECCLSL0143	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east discharge area. Telephone pole, old shooting board, and casings present in area.
ECCL-SL-144	ECCLSL0144	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east discharge area. Casings present on ground.
ECCL-SL-145	ECCLSL0145	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, target area. Casings, bullets, and pea size gravel present on ground.
ECCL-SL-146	ECCLSL0146	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, target area. Casings, shotgun wads, and pea size gravel present on ground.
ECCL-SL-147	ECCLSL0147	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, target area.
ECCL-SL-148	ECCLSL0148	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm top. Many shale fragments.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-149	ECCLSL0149	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm top. Many shale fragments. Refusal at 1.0 ft BGS.
ECCL-SL-150	ECCLSL0150	0–2	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm. Many shale fragments. Bullets present on ground. Refusal at 2.0 ft BGS.
ECCL-SL-151	ECCLSL0151	0–2	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm. Many shale fragments. Bullets present on ground. Refusal at 2.0 ft BGS.
ECCL-SL-152	ECCLSL0152	0–2	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm. Many shale fragments. Bullets present on ground. Refusal at 2.0 ft BGS.
ECCL-SL-153	ECCLSL0153	0–2	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm. Many shale fragments. Bullets present on ground. Refusal at 2.0 ft BGS.
ECCL-SL-154	ECCLSL0154 ECCLSL9017	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm. Many shale fragments.
ECCL-SL-155	ECCLSL0155	0–2.5	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm. Many shale fragments. Refusal at 2.5 ft BGS.
ECCL-SL-156	ECCLSL0156	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, main berm. Many shale fragments.
ECCL-SL-157	ECCLSL0157	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, high-fire area. Located 5 ft from backside toe of impact berm. Wooded area.
ECCL-SL-158	ECCLSL0158	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, high-fire area. Wooded area.
ECCL-SL-159	ECCLSL0159	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, high-fire area. Wooded area.
ECCL-SL-160	ECCLSL0160	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm west. Many shale fragments.

Table 4-1. Soil Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected (ft BGS)	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SL-161	ECCLSL0161 ECCLSL9016	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm west. Many shale fragments. Shotgun wads and casings at surface.
ECCL-SL-162	ECCLSL0162	0–2	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm west. Many shale fragments. Shell casings observed. Refusal at 2.0 ft BGS.
ECCL-SL-163	ECCLSL0163	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm west. Many shale fragments.
ECCL-SL-164	ECCLSL0164	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm east. Many shale fragments. Wood and metal debris present.
ECCL-SL-165	ECCLSL0165	0–1	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm east. Many shale fragments. Wood and metal debris present. Refusal at 1.0 ft BGS
ECCL-SL-166	ECCLSL0166	0–3	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm east. Many shale fragments.
ECCL-SL-167	ECCLSL0167	0–2	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm east. Many shale fragments. Refusal at 2.0 ft BGS.
ECCL-SL-168	ECCLSL0168	0–2	Firing Range Metals and SVOCs	Pistol Range East	Characterize pistol range east, lateral berm east. Many shale fragments.

BGS = Below Ground Surface.
ft = Feet.
ID = Identifier.
NA = Not Applicable.
RR = Railroad.
SVOC = Semivolatile Organic Compound.

Table 4-2. Sediment Sample Location Summary: ECCL Firing Range

Soil Boring ID	Sample IDs	Sample Depth Interval Collected	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SDSW-001	ECCLSD001	0–1.75	Firing Range Metals and SVOC	Drainage Ditches	Runoff from rifle/pistol firing ranges, immediately downstream of confluence of small channel on backside of berms. Dry, no surface water at this location. Refusal at 1.75 ft BGS.
ECCL-SDSW-002	ECCLSD002 ECCLSD9002	0–1.5	Firing Range Metals and SVOC	Drainage Ditches	Discharge drainage ditch North of Trap/Skeet discharge area. Clay targets present on ground. No surface water at this location. Refusal at 1.5 ft BGS.
ECCL-SDSW-003	ECCLSD003	0–1.5	Firing Range Metals and SVOC	Drainage Ditches	Drainage ditch North of Trap/Skeet firing ranges (downstream of bend in ditch). No surface water at this location. Refusal at 1.5 ft BGS.
ECCL-SD-004	ECCLSD004	0–1.5	Firing Range Metals and SVOC	Drainage Ditches	Drainage ditch North of Trap/Skeet firing ranges (downstream location). No surface water at this location. Refusal at 1.5 ft BGS.
ECCL-SD-005	ECCLSD005	0–1.5	Firing Range Metals and SVOC	Drainage Ditches	Drainage ditch North of Trap/Skeet firing ranges (midstream location). No surface water at this location. Refusal at 1.5 ft BGS.
ECCL-SD-006	ECCLSD006	0–2.0	Firing Range Metals and SVOC	Drainage Ditches	Drainage ditch North of Trap/Skeet firing ranges. Adjacent culvert is nearly blocked with sediment. No surface water at this location. Significant concentration of shotgun wads and clay target debris adjacent to sample location and ditch banks.
ECCL-SD-007	ECCLSD007	0–1.5	Firing Range Metals and SVOC	Drainage Ditches	Drainage ditch North/East of rifle/pistol ranges. Located at northern bend in ditch upstream of culvert. Significant sediment buildup. No surface water at this location. Refusal at 1.5 ft BGS.

Table 4-2. Sediment Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SD-008	ECCLSD008	0–2.0	Firing Range Metals and SVOC	Drainage Ditches	Drainage ditch North/East of rifle/pistol ranges. No surface water at this location.
ECCL-SD-009	ECCLSD009	0–2.0	Firing Range Metals and SVOC	Drainage Ditches	Drainage ditch North of rifle/pistol ranges (upstream location). Adjacent berm/fallen tree rootball west of location. No surface water at this location.
ECCL-SDSW-010	ECCLSD010 ECCLSD010MS/MSD	0–<0.1	Firing Range Metals and SVOC	Ponds	Eastern deep pond location, southwest. Minimal sediment due to shale bedrock; attempted to collect with Ponar and hand auger, but scoop used instead. Surface water collected at this location.
ECCL-SDSW-011	ECCLSD011 ECCLSD9001	0–<0.1	Firing Range Metals and SVOC	Ponds	Eastern deep pond location, north. Minimal sediment due to shale bedrock; attempted to collect with Ponar and hand auger, but scoop used instead. Surface water collected at this location.
ECCL-SDSW-012	ECCLSD012	0–<0.1	Firing Range Metals and SVOC	Ponds	Eastern deep pond location, southeast. Minimal sediment due to shale bedrock, but able to collect enough volume with Ponar sampler. Surface water collected at this location.
ECCL-SDSW-013	ECCLSD013	0–0.5	Firing Range Metals and SVOC	Ponds	Long, shallow pond location, north. Ponar sampler utilized. Surface water collected at this location.
ECCL-SDSW-014	ECCLSD014	0–0.5	Firing Range Metals and SVOC	Ponds	Long, shallow pond location, south. Ponar sampler utilized. Surface water collected at this location.
ECCL-SDSW-015	ECCLSD015	0–0.5	Firing Range Metals and SVOC	Ponds	Short, shallow pond location, north. Ponar sampler utilized. Surface water collected at this location.
ECCL-SDSW-016	ECCLSD016	0–0.5	Firing Range Metals and SVOC	Ponds	Short, shallow pond location, south. Ponar sampler utilized. Surface water collected at this location.

Table 4-2. Sediment Sample Location Summary: ECCL Firing Range (continued)

Soil Boring ID	Sample IDs	Sample Depth Interval Collected	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris in sample, nearby surface debris, dry/no surface water, etc.)
ECCL-SDSW-017	ECCLSD017	0–0.5	Firing Range Metals and SVOC	Ponds	Square, shallow pond location, north. Ponar sampler utilized. Surface water collected at this location.
ECCL-SDSW-018	ECCLSD018	0–0.5	Firing Range Metals and SVOC	Ponds	Square, shallow pond location, south. Ponar sampler utilized. Surface water collected at this location.

BGS = Below Ground Surface.
ft = Feet.
ID = Identifier.
NA = Not Applicable.
SVOC = Semivolatile Organic Compound.

Table 4-3. Surface Water Sample Location Summary: ECCL Firing Range

Station ID	Sample IDs	Sample Depth Interval Collected	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris, nearby surface debris, dry/no surface water, etc.)
ECCL-SDSW-001	NA	NA	None	Drainage Ditches	Runoff from rifle/pistol firing ranges, immediately downstream of confluence of small channel on backside of berms. Dry, no surface water at this location.
ECCL-SDSW-002	NA	NA	None	Drainage Ditches	Discharge drainage ditch North of Trap/Skeet discharge area. Clay targets present on ground. Dry, no surface water at this location.
ECCL-SDSW-003	NA	NA	None	Drainage Ditches	Drainage ditch North of Trap/Skeet firing ranges (downstream of bend in ditch). Dry, no surface water at this location.
ECCL-SDSW-010	ECCLSW010	N/A	Firing Range Metals and SVOC	Ponds	Main deeper pond, southwest. Water depth 2.5 ft. Co-located sediment sample.
ECCL-SDSW-011	ECCLSW011 ECCLSW011MS/MSD	N/A	Firing Range Metals and SVOC	Ponds	Main deeper pond, north. Water depth 4 ft. Co-located sediment sample.
ECCL-SDSW-012	ECCLSW012	N/A	Firing Range Metals and SVOC	Ponds	Main deeper pond, southeast. Water depth 5 ft. Co-located sediment sample.
ECCL-SDSW-013	ECCLSW013	N/A	Firing Range Metals and SVOC	Ponds	Long shallow pond, north. Water depth 2 ft. Co-located sediment sample.
ECCL-SDSW-014	ECCLSW014	N/A	Firing Range Metals and SVOC	Ponds	Long shallow pond, south. Water depth 2 ft. Co-located sediment sample.
ECCL-SDSW-015	ECCLSW015	N/A	Firing Range Metals and SVOC	Ponds	Short shallow pond, north. Water depth 2.5 ft. Connects to square shallow pond to south. Co-located sediment sample.
ECCL-SDSW-016	ECCLSW016	N/A	Firing Range Metals and SVOC	Ponds	Short shallow pond, south. Water depth 2.5 ft. Connects to square shallow pond to south. Co-located sediment sample.
ECCL-SDSW-017	ECCLSW017	N/A	Firing Range Metals and SVOC	Ponds	Square shallow pond, north. Water depth 2 ft. Connects to short shallow pond to north. Co-located sediment sample.

Table 4-3. Surface Water Sample Location Summary: ECCL Firing Range (continued)

Station ID	Sample IDs	Sample Depth Interval Collected	Analyses Performed	Sub-Area	Rationale/Comments (fill/debris, nearby surface debris, dry/no surface water, etc.)
ECCL-SDSW-018	ECCLSW018	N/A	Firing Range Metals and SVOC	Ponds	Square shallow pond, south. Water depth 2.5 ft. Connects to short shallow pond to north. Co-located sediment sample.

BGS = Below Ground Surface.
ft = Feet.
ID = Identifier.
NA = Not Applicable.
SVOC = Semivolatile Organic Compound

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Table 4-4. Analytical Detections: ECCL Trap and Skeet Ranges Surface Soil Samples

				Station	ECCL-SL-001	ECCL-SL-002	ECCL-SL-002	ECCL-SL-003	ECCL-SL-004	ECCL-SL-005	ECCL-SL-006	ECCL-SL-007	ECCL-SL-008	ECCL-SL-009
				Sample ID	ECCLSL0001	ECCLSL9001	ECCLSL0002	ECCLSL0003	ECCLSL0004	ECCLSL0005	ECCLSL0006	ECCLSL0007	ECCLSL0008	ECCLSL0009
				Sample Type	GR	FD	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	0.0–1.0	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	06/10/16	06/10/16	06/10/16
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**1.1 J**	**0.61 J**	**0.88 J**	**1.4 J**	**0.91 J**	**1 J**	**3.2**	**3.6**	**4.7**	**4900 *#**
Arsenic	36.5	0.68	18	N	**16**	**15**	**19**	**24 J**	**13**	**8.9**	**14**	**14**	**12**	**1600 *#**
Copper	56.2	3100	28	N	**41**	**29**	**36**	**25 J**	**21**	**14**	**28**	**31**	**23**	**20**
Iron	234000	55000	None	N	**18000**	**17000**	**16000**	**43000 J**	**14000**	**13000**	**13000**	**11000**	**18000**	**11000**
Lead	48.6	400	11	Y	**140 #**	**49 #**	**51 #**	**62 J#**	**55 #**	**140 #**	**820 *#**	**1500 *#**	**380 #**	**85000 *#**
Tin		47000	50	N	<12 U	<9.8 U	<9.7 U	<12 U	<12 U	<11 U	<11 U	<12 U	<10 U	<10 U
Zinc	322	23000	46	N	**22**	**57**	**54**	**53**	**21**	**26**	**23**	**28**	**49**	**19**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<3.2 U	<0.061 U	<0.062 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U	<0.058 U
2-Methylnaphthalene	None	240	3.24	N	<0.42 U	**0.0056 J**	**0.0047 J**	<0.41 U	**1.5**	<0.081 U	<0.0081 U	<0.0082 U	<0.0076 U	<0.0078 U
2-Methylphenol	None	3200	40.4	N	<13 U	<0.25 U	<0.25 U	<12 UJ	<12 U	<2.4 U	<0.24 U	<0.25 U	<0.23 U	<0.23 U
Acenaphthene	None	3600	20	N	<0.42 U	**0.022**	**0.011**	**2.8 J**	**1.7**	**0.05 J**	**0.024**	<0.0082 U	<0.0076 U	<0.0078 U
Acenaphthylene	None	1800	682	N	<0.42 U	<0.0082 U	<0.0083 U	<0.41 U	<0.41 U	<0.081 U	**0.1**	<0.0082 U	<0.0076 U	<0.0078 U
Acetophenone	None	7800	300	N	<6.3 U	<0.12 U	<0.12 U	<6.2 U	<6.2 U	<1.2 U	<0.12 U	<0.12 U	<0.11 U	**0.014 J**
Anthracene	None	18000	1480	N	**0.32 J**	**0.019**	**0.014**	**1.7 J**	**1.2**	**0.081**	**0.17**	<0.0082 U	<0.0076 U	<0.0078 U
Benz(*a*)anthracene	None	0.16	5.21	N	**21 *#**	**0.55 ***	**0.32 ***	**21 *#**	**43 *#**	**3.8 ***	**0.48 ***	**0.0077 J**	**0.0085**	**0.0063 J**
Benzaldehyde	None	170	None	N	<6.3 U	<0.12 U	<0.12 U	<6.2 U	**2.8 J#**	<1.2 U	**0.022 J#**	<0.12 U	<0.11 U	**0.02 J#**
Benzo(*a*)pyrene	None	0.016	1.52	N	**24 *#**	**0.86 ***	**0.53 ***	**32 *#**	**54 *#**	**4.1 *#**	**0.46 ***	**0.01**	**0.012**	**0.0076 J**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**12 ***	**0.82 ***	**0.5 ***	**37 ***	**50 ***	**2.9 ***	**0.73 ***	**0.016**	**0.014**	**0.014**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**9.8**	**0.32**	**0.19**	**18**	**29**	**1.8**	**0.13**	**0.0064 J**	**0.0078**	**0.0052 J**
Benzo(*k*)fluoranthene	None	1.6	148	N	**1.5**	**0.24**	**0.13**	**12 ***	**19 ***	**0.6**	**0.22**	**0.0047 J**	**0.0047 J**	**0.0051 J**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<4.4 U	<0.086 U	<0.087 U	<4.3 U	<4.3 U	<0.85 U	<0.085 U	<0.086 U	<0.08 U	<0.082 U
Carbazole	None	None	None	N	<3.2 U	<0.061 U	<0.062 U	**2 J*#**	<3.1 U	<0.61 U	**0.075 *#**	<0.061 U	<0.057 U	<0.058 U
Chrysene	None	16	4.73	N	**43 *#**	**0.89**	**0.57**	**28 *#**	**71 *#**	**7.7 #**	**0.49**	**0.012**	**0.018**	**0.009**
Di-n-butyl phthalate	None	6300	200	N	<4.4 U	**0.16**	**0.075 J**	<4.3 U	<4.3 U	<0.85 U	**0.022 J**	**0.019 J**	**0.035 J**	**0.036 J**
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	**3.2 ***	**0.086 ***	**0.064 ***	**4.5 ***	**7.4 ***	**0.67 ***	**0.053 ***	<0.0082 U	<0.0076 U	<0.0078 U
Dibenzofuran	None	73	None	N	<3.2 U	<0.061 U	<0.062 U	<3.1 U	<3.1 U	<0.61 U	**0.035 J#**	<0.061 U	<0.057 U	<0.058 U
Fluoranthene	None	2400	122	N	**1.1**	**0.34**	**0.24**	**31**	**23**	**1**	**1.3**	**0.014**	**0.012**	**0.016**
Fluorene	None	2400	30	N	<0.42 U	**0.0058 J**	<0.0083 U	**0.54 J**	**0.54**	<0.081 U	**0.057**	<0.0082 U	<0.0076 U	<0.0078 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**2.3 ***	**0.2 ***	**0.12**	**14 ***	**18 ***	**0.78 ***	**0.15**	**0.0053 J**	**0.0043 J**	<0.0078 U
N-Nitrosodiphenylamine	None	110	20	N	<3.2 U	**0.19**	**0.079**	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U	<0.058 U
Naphthalene	None	3.8	0.0994	N	**0.28 J#**	<0.0082 U	<0.0083 U	**0.24 J#**	**0.63 #**	**0.086**	**0.0052 J**	<0.0082 U	<0.0076 U	<0.0078 U
Pentachlorophenol	None	1	2.1	N	<9.5 U	<0.18 U	<0.19 U	<9.3 U	<9.3 U	<1.8 U	<0.18 U	<0.18 U	<0.17 U	<0.17 U
Phenanthrene	None	1800	45.7	N	**1.8**	**0.11**	**0.083**	**9.9**	**6.7**	**0.48**	**0.87**	**0.0065 J**	**0.0069 J**	**0.0081**
Phenol	None	19000	30	N	<3.2 U	<0.061 U	<0.062 U	<3.1 U	<3.1 U	<0.61 U	<0.061 U	<0.061 U	<0.057 U	<0.058 U
Pyrene	None	1800	78.5	N	**13**	**0.48**	**0.31**	**31**	**34**	**2.6**	**0.93**	**0.012**	**0.01**	**0.014**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

				Station	ECCL-SL-010	ECCL-SL-011	ECCL-SL-012	ECCL-SL-013	ECCL-SL-014	ECCL-SL-014	ECCL-SL-015	ECCL-SL-016	ECCL-SL-017	ECCL-SL-018
				Sample ID	ECCLSL0010	ECCLSL0011	ECCLSL0012	ECCLSL0013	ECCLSL9002	ECCLSL0014	ECCLSL0015	ECCLSL0016	ECCLSL0017	ECCLSL0018
				Sample Type	GR	GR	GR	GR	FD	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
				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
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**19 #**	<2.1 U	**2.2**	**1 J**	<2 U	<2.4 U	**0.99 J**	<2.1 U	<3.2 U	**22 #**
Arsenic	36.5	0.68	18	N	**15**	**3.7**	**8.5**	**5.6**	**8**	**6.9**	**7.9**	**3.8**	**8.6**	**30**
Copper	56.2	3100	28	N	**16**	**4.4**	**11**	**17**	**13**	**13**	**18**	**5.6**	**11**	**30**
Iron	234000	55000	None	N	**15000**	**10000**	**20000**	**22000**	**27000**	**24000**	**16000 J**	**8400**	**15000**	**38000**
Lead	48.6	400	11	Y	**1300 *#**	**50 #**	**94 #**	**34**	**110 #**	**180 #**	**160 J#**	**130 #**	**340 #**	**2900 *#**
Tin		47000	50	N	<9.9 U	<11 U	<11 U	<10 U	<10 U	<12 U	<10 U	<10 U	<10 U	<12 U
Zinc	322	23000	46	N	**46**	**26**	**71**	**56**	**42**	**43**	**140**	**37**	**86**	**360 #**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.061 U	<0.063 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U
2-Methylnaphthalene	None	240	3.24	N	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	**0.0049 J**	**0.0065 J**	<0.0083 U	<0.0077 U	<0.0077 U	**0.0056 J**
2-Methylphenol	None	3200	40.4	N	<0.22 U	<0.26 U	<0.23 U	<0.27 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.23 U	<0.26 U
Acenaphthene	None	3600	20	N	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.0081 U	<0.0084 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U
Acenaphthylene	None	1800	682	N	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.0081 U	**0.0065 J**	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U
Acetophenone	None	7800	300	N	<0.11 U	<0.13 U	<0.11 U	<0.13 U	<0.12 U	<0.13 U	<0.13 U	<0.12 U	<0.12 U	<0.13 U
Anthracene	None	18000	1480	N	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.0081 U	<0.0084 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.0075**	**0.0049 J**	**0.0056 J**	**0.011**	**0.0092**	**0.018**	**0.0087**	**0.0066 J**	**0.0056 J**	**0.013**
Benzaldehyde	None	170	None	N	<0.11 U	**0.043 J#**	**0.018 J#**	**0.021 J#**	**0.033 J#**	**0.023 J#**	**0.019 J#**	<0.12 U	**0.017 J#**	**0.038 J#**
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.0095**	**0.0052 J**	**0.0068 J**	**0.012**	**0.012**	**0.024 ***	**0.011**	**0.0071 J**	**0.0075 J**	**0.016**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.02**	**0.0075 J**	**0.014**	**0.024**	**0.024**	**0.035**	**0.022**	**0.014**	**0.014**	**0.028**
Benzo(*g,h,i*)perylene	None	1800	119	Y	<0.0075 U	<0.0087 U	**0.0049 J**	**0.012**	**0.0074 J**	**0.016**	<0.0083 U	**0.0056 J**	**0.005 J**	**0.014**
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.0041 J**	<0.0087 U	<0.0075 U	**0.012**	**0.0053 J**	**0.017**	**0.0081 J**	**0.0042 J**	**0.0061 J**	**0.012**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.078 U	<0.091 U	<0.079 U	<0.094 U	<0.089 U	<0.088 U	**0.05 J**	<0.081 U	<0.081 U	<0.091 U
Carbazole	None	None	None	N	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.061 U	<0.063 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U
Chrysene	None	16	4.73	N	**0.0087**	**0.0068 J**	**0.0078**	**0.018**	**0.017**	**0.026**	**0.016**	**0.0082**	**0.011**	**0.019**
Di-n-butyl phthalate	None	6300	200	N	**0.027 J**	**0.039 J**	<0.079 U	**0.056 J**	**0.051 J**	**0.039 J**	<0.088 U	<0.081 U	**0.017 J**	<0.091 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.0081 U	<0.0084 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U
Dibenzofuran	None	73	None	N	<0.056 U	**0.023 J#**	**0.0098 J#**	<0.067 U	**0.0099 J#**	**0.013 J#**	<0.063 U	<0.058 U	**0.015 J#**	<0.065 U
Fluoranthene	None	2400	122	N	**0.015**	**0.01**	**0.014**	**0.03**	**0.026**	**0.045**	**0.02**	**0.019**	**0.015**	**0.034**
Fluorene	None	2400	30	N	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.0081 U	<0.0084 U	<0.0083 U	<0.0077 U	<0.0077 U	<0.0087 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.0075 U	<0.0087 U	<0.0075 U	**0.0084 J**	**0.0081**	**0.016**	<0.0083 U	**0.0049 J**	**0.0048 J**	**0.014**
N-Nitrosodiphenylamine	None	110	20	N	<0.056 U	<0.065 U	<0.057 U	<0.067 U	<0.061 U	<0.063 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U
Naphthalene	None	3.8	0.0994	N	<0.0075 U	<0.0087 U	<0.0075 U	<0.009 U	<0.0081 U	**0.0047 J**	<0.0083 U	<0.0077 U	<0.0077 U	**0.0044 J**
Pentachlorophenol	None	1	2.1	N	<0.17 U	<0.19 U	<0.17 U	<0.2 U	<0.18 U	<0.19 U	<0.19 U	**0.062 J**	**0.048 J**	<0.2 U
Phenanthrene	None	1800	45.7	N	**0.0064 J**	<0.0087 U	**0.0063 J**	**0.012**	**0.011**	**0.023**	**0.0091**	**0.0081**	**0.0073 J**	**0.015**
Phenol	None	19000	30	N	<0.056 U	<0.065 U	<0.057 U	**0.016 J**	**0.015 J**	<0.063 U	<0.063 U	<0.058 U	<0.058 U	<0.065 U
Pyrene	None	1800	78.5	N	**0.012**	**0.0083 J**	**0.011**	**0.023**	**0.02**	**0.038**	**0.017**	**0.023**	**0.014**	**0.026**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

				Station	ECCL-SL-019	ECCL-SL-020	ECCL-SL-021	ECCL-SL-022	ECCL-SL-023	ECCL-SL-024	ECCL-SL-025	ECCL-SL-025	ECCL-SL-026	ECCL-SL-027
				Sample ID	ECCLSL0019	ECCLSL0020	ECCLSL0021	ECCLSL0022	ECCLSL0023	ECCLSL0024	ECCLSL9003	ECCLSL0025	ECCLSL0026	ECCLSL0027
				Sample Type	GR	GR	GR	GR	GR	GR	FD	GR	GR	GR
				Depth (ft)	0.0–0.5	0.0–0.5	0.0–0.5	0.0–0.5	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	06/13/16	06/10/16	06/10/16	06/10/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16	06/07/16
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**0.85 J**	**9.4 #**	**6.2**	**4.3**	**1.8 J**	<2.1 U	**0.99 J**	**1 J**	**0.88 J**	**0.54 J**
Arsenic	36.5	0.68	18	N	**6.8**	**19**	**13**	**9.4**	**5.5**	**8.1**	**6.8**	**7.3**	**12**	**5.9**
Copper	56.2	3100	28	N	**5.9**	**16**	**10**	**5.6**	**7.3**	**15**	**19**	**20**	**18**	**8**
Iron	234000	55000	None	N	**20000**	**16000**	**9100**	**12000**	**9600**	**15000**	**8900**	**9400**	**14000**	**11000**
Lead	48.6	400	11	Y	**130 #**	**2100 *#**	**1500 *#**	**1300 *#**	**120 #**	**57 #**	**74 #**	**84 #**	**110 #**	**30**
Tin		47000	50	N	<9.5 U	<9.3 U	<9.4 U	<9.8 U	<9.3 U	<11 U	<11 U	<9.3 U	<10 U	<11 U
Zinc	322	23000	46	N	**43**	**88**	**50**	**33**	**33**	**51**	**29**	**26**	**25**	**23**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U	**0.016 J**	<0.69 U	<0.22 U	<0.15 U	<0.059 U
2-Methylnaphthalene	None	240	3.24	N	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	<0.015 U	**0.056**	**0.16**	**0.061**	**0.058**	<0.0079 U
2-Methylphenol	None	3200	40.4	N	<0.24 U	<0.23 U	<0.23 U	<0.23 U	<0.44 U	<0.59 U	<2.8 U	<0.88 U	<0.58 U	<0.24 U
Acenaphthene	None	3600	20	N	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	**0.0098 J**	**0.12**	**0.34**	<0.029 U	**0.011 J**	<0.0079 U
Acenaphthylene	None	1800	682	N	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	<0.015 U	**0.032**	<0.092 U	<0.029 U	<0.019 U	<0.0079 U
Acetophenone	None	7800	300	N	<0.12 U	<0.11 U	<0.11 U	<0.12 U	<0.22 U	<0.29 U	<1.4 U	<0.44 U	<0.29 U	<0.12 U
Anthracene	None	18000	1480	N	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	**0.035**	**0.19**	**0.9**	**0.082**	**0.1**	**0.0019 J**
Benz(*a*)anthracene	None	0.16	5.21	N	**0.0087**	**0.0085**	**0.0043 J**	**0.0064 J**	**1.1 ***	**1.7 ***	**9.7 *#**	**1.9 ***	**1.6 ***	**0.035**
Benzaldehyde	None	170	None	N	**0.017 J#**	<0.11 U	<0.11 U	**0.021 J#**	<0.22 U	<0.29 U	<1.4 U	<0.44 U	<0.29 U	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.013**	**0.012**	**0.0061 J**	**0.0087**	**1.5 ***	**1.9 *#**	**11 *#**	**2.1 *#**	**2.8 *#**	**0.054 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.017**	**0.023**	**0.013**	**0.016**	**0.85 ***	**2.2 ***	**12 ***	**1.1 ***	**0.97 ***	**0.043**
Benzo(*g,h,i*)perylene	None	1800	119	Y	<0.008 U	**0.0071 J**	**0.0041 J**	**0.0055 J**	**0.64**	**0.73**	**3.7**	**0.77**	**0.89**	**0.028**
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.0055 J**	**0.0056 J**	<0.0075 U	**0.0064 J**	**0.19**	**0.7**	**3.1 ***	**0.22**	**0.17**	**0.013**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.084 U	<0.08 U	<0.079 U	<0.082 U	<0.15 U	<0.2 U	<0.97 U	<0.31 U	<0.2 U	<0.083 U
Carbazole	None	None	None	N	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U	**0.22 *#**	**0.95 *#**	<0.22 U	<0.15 U	<0.059 U
Chrysene	None	16	4.73	N	**0.01**	**0.015**	**0.0082**	**0.01**	**2.1**	**3**	**15 #**	**3.1**	**2.3**	**0.06**
Di-n-butyl phthalate	None	6300	200	N	<0.084 U	**0.028 J**	<0.079 U	**0.018 J**	<0.17 U	<0.21 U	<0.97 U	<0.31 U	<0.2 U	<0.083 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	**0.21 ***	**0.3 ***	**1.5 ***	**0.19 ***	**0.24 ***	**0.015**
Dibenzofuran	None	73	None	N	<0.06 U	**0.012 J#**	<0.056 U	**0.013 J#**	<0.11 U	**0.14 J#**	**0.18 J#**	<0.22 U	<0.15 U	<0.059 U
Fluoranthene	None	2400	122	N	**0.016**	**0.022**	**0.013**	**0.019**	**0.29**	**2.4**	**9.6**	**0.46**	**0.27**	**0.028**
Fluorene	None	2400	30	N	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	**0.0079 J**	**0.23**	**0.29**	**0.017 J**	**0.022**	<0.0079 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.008 U	**0.0061 J**	<0.0075 U	**0.005 J**	**0.25 ***	**0.56 ***	**2.8 ***	**0.26 ***	**0.25 ***	**0.016**
N-Nitrosodiphenylamine	None	110	20	N	<0.06 U	<0.057 U	<0.056 U	<0.059 U	**0.45**	<0.15 U	<0.69 U	**0.27**	<0.15 U	<0.059 U
Naphthalene	None	3.8	0.0994	N	<0.008 U	<0.0077 U	<0.0075 U	<0.0078 U	<0.015 U	**0.07**	<0.092 U	**0.021 J**	<0.019 U	<0.0079 U
Pentachlorophenol	None	1	2.1	N	<0.18 U	<0.17 U	<0.17 U	<0.18 U	<0.33 U	<0.44 U	<2.1 U	<0.66 U	<0.44 U	**<0.18 R**
Phenanthrene	None	1800	45.7	N	**0.0081**	**0.009**	**0.0058 J**	**0.0083**	**0.21**	**2.1**	**5.2**	**0.88**	**0.53**	**0.014**
Phenol	None	19000	30	N	<0.06 U	<0.057 U	<0.056 U	<0.059 U	<0.11 U	<0.15 U	<0.69 U	<0.22 U	<0.15 U	<0.059 U
Pyrene	None	1800	78.5	N	**0.013**	**0.021**	**0.015**	**0.018**	**0.87**	**2**	**10**	**1.9**	**1.8**	**0.043**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

				Station	ECCL-SL-028	ECCL-SL-029	ECCL-SL-030	ECCL-SL-031	ECCL-SL-032	ECCL-SL-033	ECCL-SL-033	ECCL-SL-034	ECCL-SL-035	ECCL-SL-036
				Sample ID	ECCLSL0028	ECCLSL0029	ECCLSL0030	ECCLSL0031	ECCLSL0032	ECCLSL9004	ECCLSL0033	ECCLSL0034	ECCLSL0035	ECCLSL0036
				Sample Type	GR	GR	GR	GR	GR	FD	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
				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
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**3.1**	**5**	**4.1**	**12 #**	**2.4**	**1.6 J**	**1.6 J**	**1.7 J**	**1 J**	**1.4 J**
Arsenic	36.5	0.68	18	N	**16**	**23**	**41 *#**	**17**	**25**	**11**	**12**	**10**	**13**	**12**
Copper	56.2	3100	28	N	**83 #**	**29**	**42**	**31**	**37**	**24**	**27**	**30**	**34**	**26**
Iron	234000	55000	None	N	**16000**	**25000**	**54000**	**10000**	**28000**	**8500**	**15000**	**8100**	**11000**	**15000**
Lead	48.6	400	11	Y	**240 #**	**190 #**	**240 #**	**860 *#**	**190 #**	**500 *#**	**500 *#**	**520 *#**	**220 #**	**440 *#**
Tin		47000	50	N	<12 U	<10 U	<12 U	<12 U	<11 U	<10 U	<11 U	<12 U	<11 U	<11 U
Zinc	322	23000	46	N	**58**	**42**	**42**	**32**	**200**	**25**	**24**	**23**	**23**	**23**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<7.6 U	<6.2 U	<3.2 U	<0.43 U	<1.2 U
2-Methylnaphthalene	None	240	3.24	N	**8.7 #**	**5.3 #**	**1.4**	**2**	**2.8**	**3.4 #**	**1.4**	**0.29 J**	**0.06**	<0.15 U
2-Methylphenol	None	3200	40.4	N	<31 U	<59 U	<14 U	<51 U	<59 U	<31 U	<25 U	<13 U	<1.7 U	<4.6 U
Acenaphthene	None	3600	20	N	**7.1**	**6.6**	**0.78**	**1.1 J**	**7.4**	**9.6**	**2.8**	**1.7**	**0.28**	<0.15 U
Acenaphthylene	None	1800	682	N	<1 U	<2 U	<0.46 U	<1.7 U	<2 U	<1 U	<0.83 U	<0.43 U	<0.058 U	<0.15 U
Acetophenone	None	7800	300	N	<16 U	<30 U	<7 U	<26 U	<29 U	<15 U	<12 U	<6.4 U	<0.87 U	<2.3 U
Anthracene	None	18000	1480	N	**8.6**	**6.8**	**1.8**	**3**	**5.4**	**8.5**	**2.7**	**1.3**	**0.42**	**0.23**
Benz(*a*)anthracene	None	0.16	5.21	N	**170 *#**	**180 *#**	**32 *#**	**110 *#**	**130 *#**	**120 *#**	**63 *#**	**29 *#**	**6.6 *#**	**13 *#**
Benzaldehyde	None	170	None	N	<16 U	<30 U	<7 U	<26 U	<29 U	<15 U	<12 U	<6.4 U	<0.87 U	<2.3 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**220 *#**	**220 *#**	**41 *#**	**130 *#**	**160 *#**	**190 *#**	**91 *#**	**35 *#**	**8.7 *#**	**15 *#**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**150 *#**	**200 *#**	**45 ***	**64 *#**	**170 *#**	**210 *#**	**100 *#**	**29 ***	**8.2 ***	**6.4 ***
Benzo(*g,h,i*)perylene	None	1800	119	Y	**110**	**140 #**	**14**	**79**	**59**	**68**	**35**	**18**	**3**	**7.3**
Benzo(*k*)fluoranthene	None	1.6	148	N	**49 ***	**65 ***	**11 ***	**19 ***	**38 ***	**77 ***	**34 ***	**9.5 ***	**2.6 ***	**1.4**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<11 U	<21 U	<4.9 U	<18 U	<21 U	<11 U	<8.7 U	<4.5 U	<0.61 U	<1.6 U
Carbazole	None	None	None	N	**8.7 *#**	<15 U	<3.5 U	<13 U	<15 U	**7.3 J*#**	<6.2 U	<3.2 U	**0.41 J*#**	<1.2 U
Chrysene	None	16	4.73	N	**220 *#**	**280 *#**	**54 *#**	**240 *#**	**230 *#**	**180 *#**	**96 *#**	**51 *#**	**9.9 #**	**27 *#**
Di-n-butyl phthalate	None	6300	200	N	<11 U	<21 U	<4.9 U	<18 U	<21 U	<11 U	<8.7 U	<4.5 U	<0.61 U	<1.6 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	**32 *#**	**41 *#**	**4.8 ***	**24 *#**	**19 *#**	**24 *#**	**9.9 ***	**7.5 ***	**1.1 ***	**3.4 ***
Dibenzofuran	None	73	None	N	**1.3 J#**	<15 U	<3.5 U	<13 U	<15 U	**1.6 J#**	<6.2 U	<3.2 U	<0.43 U	<1.2 U
Fluoranthene	None	2400	122	N	**110**	**110**	**24**	**18**	**88**	**100**	**52**	**21**	**5.1**	**0.61**
Fluorene	None	2400	30	N	**3.2**	**2**	**0.45 J**	<1.7 U	**1.9 J**	**3.2**	**0.87**	**0.42 J**	**0.11**	<0.15 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**55 ***	**88 ***	**11 ***	**25 ***	**44 ***	**63 ***	**29 ***	**12 ***	**2.1 ***	**1.9 ***
N-Nitrosodiphenylamine	None	110	20	N	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<7.6 U	<6.2 U	<3.2 U	<0.43 U	<1.2 U
Naphthalene	None	3.8	0.0994	N	**2 #**	**1.4 J#**	**0.28 J#**	<1.7 U	**1 J#**	**1.4 #**	**0.9 #**	<0.43 U	<0.058 U	<0.15 U
Pentachlorophenol	None	1	2.1	N	<23 U	<45 U	<10 U	<38 U	<44 U	<23 U	<19 U	<9.6 U	<1.3 U	<3.5 U
Phenanthrene	None	1800	45.7	N	**54 #**	**36**	**7.9**	**15**	**30**	**34**	**14**	**8.1**	**2.2**	**1.3**
Phenol	None	19000	30	N	<7.8 U	<15 U	<3.5 U	<13 U	<15 U	<7.6 U	<6.2 U	<3.2 U	<0.43 U	<1.2 U
Pyrene	None	1800	78.5	N	**200 #**	**160 #**	**27**	**75**	**100 #**	**110 #**	**60**	**30**	**6.3**	**6.6**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

				Station	ECCL-SL-037	ECCL-SL-038	ECCL-SL-039	ECCL-SL-040	ECCL-SL-041	ECCL-SL-042	ECCL-SL-042	ECCL-SL-043	ECCL-SL-044	ECCL-SL-045
				Sample ID	ECCLSL0037	ECCLSL0038	ECCLSL0039	ECCLSL0040	ECCLSL0041	ECCLSL9005	ECCLSL0042	ECCLSL0043	ECCLSL0044	ECCLSL0045
				Sample Type	GR	GR	GR	GR	GR	FD	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
				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
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**2.1**	**3.5**	**1.4 J**	**6.2**	**1.9 J**	**2.5**	**3.3**	**2.9**	**13 #**	**12 #**
Arsenic	36.5	0.68	18	N	**18**	**15**	**6.9**	**8.4**	**11**	**10**	**10**	**13**	**14**	**14**
Copper	56.2	3100	28	N	**35**	**15**	**8.7**	**7.4**	**26**	**15**	**15**	**29**	**4.2**	**4.2**
Iron	234000	55000	None	N	**19000**	**14000**	**6300**	**7000**	**9800**	**9200**	**9300**	**13000**	**5900**	**6600**
Lead	48.6	400	11	Y	**620 *#**	**580 *#**	**230 #**	**450 *#**	**540 *#**	**760 *#**	**750 *#**	**680 *#**	**1700 *#**	**2600 *#**
Tin		47000	50	N	<10 U	<9.6 U	<11 U	<11 U	<11 U	<11 U	<11 U	<12 U	<9 U	<10 U
Zinc	322	23000	46	N	**29**	**26**	**32**	**29**	**31**	**29**	**31**	**61**	**22**	**24**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.16 U	<2.9 U	<15 U	<6.3 U	<0.063 U	<0.061 UJ	<0.061 U	<0.065 U	<0.061 U	<0.06 U
2-Methylnaphthalene	None	240	3.24	N	**0.011 J**	**0.38 J**	**7.9 #**	**1.3**	**0.0076 J**	<0.0081 UJ	**0.0073 J**	<0.0087 U	<0.0082 U	<0.008 U
2-Methylphenol	None	3200	40.4	N	<0.64 U	<12 U	<58 U	<25 U	<0.25 U	<0.24 UJ	<0.24 U	<0.26 U	<0.24 U	<0.24 U
Acenaphthene	None	3600	20	N	<0.021 U	**3.1**	**7.7**	**3.9**	**0.028**	<0.0081 UJ	<0.0081 U	<0.0087 U	<0.0082 U	<0.008 U
Acenaphthylene	None	1800	682	N	<0.021 U	<0.39 U	<1.9 U	<0.83 U	<0.0084 U	<0.0081 UJ	**0.0056 J**	<0.0087 U	<0.0082 U	<0.008 U
Acetophenone	None	7800	300	N	<0.32 U	<5.8 U	<29 U	<13 U	<0.13 U	<0.12 UJ	<0.12 U	<0.13 U	<0.12 U	<0.12 U
Anthracene	None	18000	1480	N	**0.024**	**2.4**	**9.6**	**3.9**	**0.033**	<0.0081 UJ	**0.0063 J**	**0.0048 J**	<0.0082 U	<0.008 U
Benz(*a*)anthracene	None	0.16	5.21	N	**1 ***	**56 *#**	**200 *#**	**70 *#**	**0.58 ***	**0.04 J**	**0.19 ***	**0.035**	**0.014**	**0.015**
Benzaldehyde	None	170	None	N	**0.093 J#**	<5.8 U	<29 U	<13 U	**0.017 J#**	<0.12 UJ	**0.016 J#**	**0.072 J#**	<0.12 U	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.92 ***	**64 *#**	**210 *#**	**91 *#**	**0.73 ***	**0.059 J***	**0.19 ***	**0.049 ***	**0.019 ***	**0.019 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.47 ***	**58 ***	**200 *#**	**71 *#**	**0.69 ***	**0.069 J**	**0.16**	**0.063**	**0.022**	**0.022**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.46**	**32**	**110**	**49**	**0.51**	**0.047 J**	**0.13**	**0.035**	**0.016**	**0.016**
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.086**	**17 ***	**57 ***	**23 ***	**0.28**	**0.023 J**	**0.048**	**0.024**	**0.009**	**0.012**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.26 U	<4.1 U	<20 U	<8.8 U	<0.089 U	<0.085 UJ	<0.085 U	<0.091 U	<0.086 U	<0.084 U
Carbazole	None	None	None	N	<0.16 U	**2.7 J*#**	**10 J*#**	<6.3 U	**0.035 J*#**	<0.061 UJ	<0.061 U	<0.065 U	<0.061 U	<0.06 U
Chrysene	None	16	4.73	N	**1.7**	**87 *#**	**370 *#**	**120 *#**	**0.95**	**0.062 J**	**0.41**	**0.057**	**0.02**	**0.025**
Di-n-butyl phthalate	None	6300	200	N	<0.22 U	<4.1 U	<20 U	<8.8 U	<0.089 U	<0.085 UJ	<0.085 U	<0.091 U	<0.086 U	<0.084 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	**0.2 ***	**13 ***	**42 *#**	**21 *#**	**0.18 ***	**0.012 J**	**0.052 ***	**0.0094**	<0.0082 U	<0.008 U
Dibenzofuran	None	73	None	N	**0.031 J#**	<2.9 U	<15 U	**0.84 J#**	<0.063 U	<0.061 UJ	<0.061 U	<0.065 U	<0.061 U	<0.06 U
Fluoranthene	None	2400	122	N	**0.13**	**39**	**130 #**	**30**	**0.56**	**0.052 J**	**0.086**	**0.065**	**0.019**	**0.024**
Fluorene	None	2400	30	N	<0.021 U	**0.7**	**3.2**	**1.7**	**0.0084**	<0.0081 UJ	<0.0081 U	<0.0087 U	<0.0082 U	<0.008 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**0.16**	**21 ***	**71 ***	**31 ***	**0.36 ***	**0.034 J**	**0.064**	**0.029**	**0.0083**	**0.012**
N-Nitrosodiphenylamine	None	110	20	N	<0.16 U	<2.9 U	<15 U	<6.3 U	<0.063 U	<0.061 UJ	<0.061 U	<0.065 U	<0.061 U	<0.06 U
Naphthalene	None	3.8	0.0994	N	<0.021 U	**0.3 J#**	**1.9 #**	**0.49 J#**	**0.0056 J**	<0.0081 UJ	<0.0081 U	<0.0087 U	<0.0082 U	<0.008 U
Pentachlorophenol	None	1	2.1	N	<0.48 U	<8.7 U	<44 U	<19 U	<0.19 U	<0.18 UJ	<0.18 U	<0.19 U	<0.18 U	<0.18 U
Phenanthrene	None	1800	45.7	N	**0.13**	**14**	**54 #**	**15**	**0.2**	**0.017 J**	**0.038**	**0.029**	**0.0075 J**	**0.0083**
Phenol	None	19000	30	N	<0.16 U	<2.9 U	<15 U	<6.3 U	<0.063 U	<0.061 UJ	<0.061 U	<0.065 U	<0.061 U	<0.06 U
Pyrene	None	1800	78.5	N	**0.56**	**51**	**180 #**	**50**	**0.67**	**0.054 J**	**0.12**	**0.058**	**0.02**	**0.023**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

				Station	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	ECCL-SL-055
				Sample ID	ECCLSL0046	ECCLSL0047	ECCLSL0048	ECCLSL0049	ECCLSL0050	ECCLSL0051	ECCLSL0052	ECCLSL0053	ECCLSL0054	ECCLSL0055
				Sample Type	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
				Date	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	06/09/16
Analyte (mg/kg)	Background Criteria	RSL	ESV	PBT Chemical?										
Metals														
Antimony	9.3	31	0.27	N	**10000 *#**	**35 *#**	**15 #**	**1300 *#**	**2.2 J**	**1600 *#**	**1.2 J**	**2**	**1 J**	<5 U
Arsenic	36.5	0.68	18	N	**2200 *#**	**22**	**20**	**640 *#**	**16**	**710 *#**	**5**	**16**	**5.3**	**8.7**
Copper	56.2	3100	28	N	**11 J**	**6.7 J**	**10 J**	**14**	**27**	**15**	**18 J**	**25**	**19**	**18 J**
Iron	234000	55000	None	N	**5900**	**15000**	**17000**	**15000**	**22000**	**14000**	**7000 J**	**13000**	**7300**	**8800**
Lead	48.6	400	11	Y	**92000 *#**	**2600 *#**	**2200 *#**	**47000 *#**	**500 *#**	**51000 *#**	**120 J#**	**160 #**	**83 #**	**350 #**
Tin		47000	50	N	**190 #**	<11 U	<9.2 U	<9.8 U	<11 U	<9.7 U	<10 U	<9.7 U	<11 U	<10 U
Zinc	322	23000	46	N	**18**	**26**	**21**	**20**	**50**	**18**	**19**	**16**	**19**	**14**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<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	<0.063 U
2-Methylnaphthalene	None	240	3.24	N	<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	<0.0084 U
2-Methylphenol	None	3200	40.4	N	<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	<0.25 U
Acenaphthene	None	3600	20	N	<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	<0.0084 U
Acenaphthylene	None	1800	682	N	<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	<0.0084 U
Acetophenone	None	7800	300	N	<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	<0.13 U
Anthracene	None	18000	1480	N	<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	<0.0084 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.025 J**	**0.013**	**0.017**	**0.018**	**0.033**	**1.1 ***	**0.012**	**0.013**	**0.018**	**0.0085**
Benzaldehyde	None	170	None	N	<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	<0.13 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.034 J***	**0.018 ***	**0.021 ***	**0.024 ***	**0.045 ***	**1.3 ***	**0.019 ***	**0.017 ***	**0.023 ***	**0.011**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.043 J**	**0.029**	**0.033**	**0.033**	**0.072**	**0.73 ***	**0.034**	**0.028**	**0.038**	**0.018**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.018**	<0.008 U	**0.011**	**0.022**	**0.033**	**0.63**	<0.0082 U	**0.015**	**0.013**	<0.0084 U
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.015**	**0.01**	**0.014**	**0.012**	**0.027**	**0.12**	**0.014**	**0.014**	**0.019**	**0.0086**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<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	<0.088 U
Carbazole	None	None	None	N	<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	<0.063 U
Chrysene	None	16	4.73	N	**0.041**	**0.018**	**0.024**	**0.027**	**0.054**	**2.3**	**0.021**	**0.021**	**0.023**	**0.012**
Di-n-butyl phthalate	None	6300	200	N	<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	<0.088 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<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	<0.0084 U
Dibenzofuran	None	73	None	N	<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#**	<0.063 U
Fluoranthene	None	2400	122	N	**0.031**	**0.025**	**0.028**	**0.033**	**0.08**	**0.14**	**0.033**	<0.0081 U	**0.036**	**0.02**
Fluorene	None	2400	30	N	<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	<0.0084 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**0.014**	<0.008 U	<0.0074 U	**0.015**	**0.031**	**0.2 ***	**0.0099**	**0.013**	**0.013**	<0.0084 U
N-Nitrosodiphenylamine	None	110	20	N	<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	<0.063 U
Naphthalene	None	3.8	0.0994	N	<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	<0.0084 U
Pentachlorophenol	None	1	2.1	N	<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	<0.19 U
Phenanthrene	None	1800	45.7	N	**0.014**	**0.0088**	**0.012**	<0.0082 U	**0.036**	**0.1**	**0.012**	**0.011**	**0.012**	**0.0076 J**
Phenol	None	19000	30	N	<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	<0.063 U
Pyrene	None	1800	78.5	N	**0.033 J**	**0.022**	**0.024**	**0.033**	**0.069**	**0.62**	**0.027**	**0.025**	**0.03**	**0.016**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

				Station	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-064
				Sample ID	ECCLSL0056	ECCLSL0057	ECCLSL0058	ECCLSL0059	ECCLSL0060	ECCLSL0061	ECCLSL0062	ECCLSL0063	ECCLSL9008	ECCLSL0064
				Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	FD	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
				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
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**6.8**	**2.8**	**2.4**	**1.9**	**39 *#**	**4.1**	**7.4**	**8.8**	**3.3**	**3.9**
Arsenic	36.5	0.68	18	N	**9.4**	**5.9**	**5.6**	**8.9**	**37 *#**	**11**	**12**	**22**	**10**	**10**
Copper	56.2	3100	28	N	**7.1**	**4.7**	**4.4**	**5.2**	**9.6**	**4.9**	**4.4**	**19**	**5.6**	**5.7**
Iron	234000	55000	None	N	**10000**	**11000**	**8400**	**8200**	**10000**	**8900**	**8000**	**23000 J**	**9000 J**	**10000 J**
Lead	48.6	400	11	Y	**880 *#**	**280 #**	**230 #**	**270 #**	**3000 *#**	**530 *#**	**930 *#**	**1900 J*#**	**390 J#**	**390 J#**
Tin		47000	50	N	<12 U	<10 U	<11 U	<9.2 U	<11 U	<11 U	<10 U	<10 U	<8.9 U	<9.9 U
Zinc	322	23000	46	N	**20**	**17**	**25**	**30**	**28**	**32**	**29**	**180**	**36**	**41**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<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	<0.062 U
2-Methylnaphthalene	None	240	3.24	N	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.0083 U	<0.0082 U
2-Methylphenol	None	3200	40.4	N	<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	<0.25 U
Acenaphthene	None	3600	20	N	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.0083 U	<0.0082 U
Acenaphthylene	None	1800	682	N	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.0083 U	<0.0082 U
Acetophenone	None	7800	300	N	<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	<0.12 U
Anthracene	None	18000	1480	N	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.0083 U	<0.0082 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.0087**	**0.006 J**	**0.011**	**0.0064 J**	**0.0073 J**	<0.0081 U	**0.0049 J**	**0.026**	**0.0064 J**	**0.008 J**
Benzaldehyde	None	170	None	N	<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#**	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.012**	**0.0091**	**0.013**	**0.0081**	**0.01**	**0.0051 J**	**0.0072 J**	**0.058 ***	**0.009**	**0.012**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.016**	**0.016**	**0.015**	**0.013**	**0.017**	<0.0081 U	**0.012**	**0.085**	**0.018**	<0.0082 U
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.0069 J**	**0.0069 J**	**0.013**	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	**0.028**	<0.0083 U	<0.0082 U
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.008 J**	<0.0086 U	**0.01**	**0.0048 J**	**0.0084**	<0.0081 U	**0.0059 J**	**0.032**	<0.0083 U	<0.0082 U
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	**0.034 J**	**0.028 J**	**0.033 J**	**0.046 J**	<0.083 U	**0.027 J**	<0.08 U	**0.14**	**0.06 J**	**0.031 J**
Carbazole	None	None	None	N	<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	<0.062 U
Chrysene	None	16	4.73	N	**0.012**	**0.01**	**0.014**	**0.0088**	**0.01**	<0.0081 U	**0.0073 J**	**0.048**	**0.009**	**0.0094**
Di-n-butyl phthalate	None	6300	200	N	<0.091 U	<0.091 U	<0.084 U	<0.083 U	<0.083 U	<0.085 U	<0.08 U	<0.086 U	<0.087 U	<0.086 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.0083 U	<0.0082 U
Dibenzofuran	None	73	None	N	<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	<0.062 U
Fluoranthene	None	2400	122	N	**0.019**	**0.014**	**0.022**	**0.011**	<0.0079 U	<0.0081 U	**0.011**	**0.035**	**0.013**	**0.015**
Fluorene	None	2400	30	N	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.0083 U	<0.0082 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.0087 U	<0.0086 U	**0.011**	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	**0.022**	<0.0083 U	<0.0082 U
N-Nitrosodiphenylamine	None	110	20	N	<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	<0.062 U
Naphthalene	None	3.8	0.0994	N	<0.0087 U	<0.0086 U	<0.008 U	<0.0079 U	<0.0079 U	<0.0081 U	<0.0076 U	<0.0082 U	<0.0083 U	<0.0082 U
Pentachlorophenol	None	1	2.1	N	<0.19 U	<0.19 U	<0.18 U	<0.18 U	<0.18 U	<0.18 U	**0.12 J**	<0.18 U	<0.19 U	<0.18 U
Phenanthrene	None	1800	45.7	N	**0.0071 J**	**0.0064 J**	<0.008 U	<0.0079 U	**0.0064 J**	<0.0081 U	**0.0052 J**	**0.013**	**0.0058 J**	**0.0074 J**
Phenol	None	19000	30	N	<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	<0.062 U
Pyrene	None	1800	78.5	N	**0.015**	**0.011**	**0.021**	**0.0091**	**0.013**	**0.007 J**	**0.011**	**0.033**	**0.012**	**0.012**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

				Station	ECCL-SL-065	ECCL-SL-066	ECCL-SL-067	ECCL-SL-068	ECCL-SL-069	ECCL-SL-069	ECCL-SL-070	ECCL-SL-071	ECCL-SL-072	ECCL-SL-073
				Sample ID	ECCLSL0065	ECCLSL0066	ECCLSL0067	ECCLSL0068	ECCLSL9006	ECCLSL0069	ECCLSL0070	ECCLSL0071	ECCLSL0072	ECCLSL0073
				Sample Type	GR	GR	GR	GR	FD	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
				Date	06/13/16	06/13/16	06/13/16	06/08/16	06/08/16	06/08/16	06/09/16	06/07/16	06/09/16	06/09/16
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**4.1**	**3.2**	**2.4 J**	**6.7 J**	**4400 *#**	**510 *#**	**5000 *#**	**11 #**	**11 #**	**28 #**
Arsenic	36.5	0.68	18	N	**10**	**6.6**	**7.8**	**20**	**1100 *#**	**220 *#**	**1400 *#**	**16**	**21**	**31**
Copper	56.2	3100	28	N	**7.5**	**5.3**	**11**	**27 J**	**9 J**	**16 J**	**13 J**	**9.8**	**29**	**16 J**
Iron	234000	55000	None	N	**52000**	**14000**	**59000**	**14000 J**	**6200**	**7100**	**5200**	**11000**	**14000 J**	**14000**
Lead	48.6	400	11	Y	**240 #**	**440 *#**	**150 #**	**1700 J*#**	**86000 *#**	**60000 *#**	**85000 *#**	**1900 *#**	**2400 J*#**	**3100 *#**
Tin		47000	50	N	<11 U	<9.6 U	<9.9 U	<12 U	<8.3 U	<12 U	<8.6 U	<12 U	<9.6 U	<11 U
Zinc	322	23000	46	N	**120**	**51**	**91**	**82 J**	**28**	**33**	**22**	**30**	**100**	**100**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.056 U	<0.055 U	<0.059 U	<0.063 U	**0.044 J**	<0.06 U	<0.062 U	<0.064 U	<0.06 U	<0.058 U
2-Methylnaphthalene	None	240	3.24	N	**0.0048 J**	<0.0074 U	**0.0041 J**	**0.045**	**0.66**	<0.008 U	**0.006 J**	**0.0048 J**	<0.008 U	<0.0078 U
2-Methylphenol	None	3200	40.4	N	<0.23 U	<0.22 U	<0.23 U	<0.25 U	**0.014 J**	<0.24 U	<0.25 U	<0.26 U	<0.24 U	<0.23 U
Acenaphthene	None	3600	20	N	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U	<0.008 U	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U
Acenaphthylene	None	1800	682	N	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U	<0.008 U	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U
Acetophenone	None	7800	300	N	<0.11 U	<0.11 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U
Anthracene	None	18000	1480	N	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U	<0.008 U	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.01**	**0.0058 J**	**0.01**	**0.026**	**0.034**	**0.013**	**0.02**	**0.014**	**0.0085**	**0.0085**
Benzaldehyde	None	170	None	N	<0.11 U	<0.11 U	**0.017 J#**	**0.027 J#**	<0.12 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	**0.033 J#**
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.016**	**0.0058 J**	**0.012**	**0.034 ***	**0.029 ***	**0.016**	**0.025 ***	**0.017 ***	**0.012**	**0.01**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.024**	**0.011**	**0.022**	**0.06**	**0.049**	**0.028**	**0.044**	**0.024**	**0.019**	**0.018**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.013**	**0.0058 J**	**0.011**	<0.0084 U	<0.008 U	<0.008 U	**0.011**	**0.018**	**0.01**	**0.0087**
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.0059 J**	**0.004 J**	**0.006 J**	**0.024**	**0.016**	**0.0097**	**0.017**	**0.013**	**0.0068 J**	**0.008**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.079 U	<0.078 U	<0.082 U	**0.028 J**	<0.084 U	<0.084 U	<0.087 U	<0.089 U	**1.5 #**	<0.082 U
Carbazole	None	None	None	N	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U	<0.06 U	<0.062 U	<0.064 U	<0.06 U	<0.058 U
Chrysene	None	16	4.73	N	**0.017**	**0.0085**	**0.016**	**0.046**	**0.036**	**0.02**	**0.026**	**0.018**	**0.014**	**0.014**
Di-n-butyl phthalate	None	6300	200	N	<0.079 U	<0.078 U	<0.082 U	**0.024 J**	<0.084 U	**0.018 J**	**0.022 J**	<0.089 U	<0.083 U	<0.082 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	<0.008 U	<0.008 U	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U
Dibenzofuran	None	73	None	N	<0.056 U	<0.055 U	<0.059 U	<0.063 U	**0.12 #**	<0.06 U	<0.062 U	<0.064 U	<0.06 U	<0.058 U
Fluoranthene	None	2400	122	N	**0.021**	**0.018**	**0.022**	**0.049**	**0.047**	**0.025**	**0.04**	**0.026**	**0.018**	<0.0078 U
Fluorene	None	2400	30	N	<0.0075 U	<0.0074 U	<0.0078 U	<0.0084 U	**0.016**	<0.008 U	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**0.0099**	<0.0074 U	**0.01**	<0.0084 U	<0.008 U	<0.008 U	**0.01**	**0.013**	<0.008 U	<0.0078 U
N-Nitrosodiphenylamine	None	110	20	N	<0.056 U	<0.055 U	<0.059 U	<0.063 U	<0.06 U	<0.06 U	<0.062 U	<0.064 U	<0.06 U	<0.058 U
Naphthalene	None	3.8	0.0994	N	<0.0075 U	<0.0074 U	<0.0078 U	**0.016**	**0.5 #**	<0.008 U	<0.0083 U	<0.0085 U	<0.008 U	<0.0078 U
Pentachlorophenol	None	1	2.1	N	<0.17 U	<0.17 U	<0.18 U	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.19 U	<0.18 U	<0.17 U
Phenanthrene	None	1800	45.7	N	**0.0096**	<0.0074 U	**0.0099**	**0.029**	**0.17**	<0.008 U	**0.014**	**0.012**	**0.007 J**	**0.0071 J**
Phenol	None	19000	30	N	<0.056 U	<0.055 U	<0.059 U	<0.063 U	**0.027 J**	<0.06 U	**0.017 J**	<0.064 U	<0.06 U	<0.058 U
Pyrene	None	1800	78.5	N	**0.019**	**0.0097**	**0.021**	**0.043**	**0.05**	**0.022**	**0.036**	**0.026**	**0.013**	**0.015**

Table 4-4. Analytical Detections: ECCL Trap and Skeet Surface Soil Samples (continued)

Station					ECCL-SL-074	ECCL-SL-075	ECCL-SL-076	ECCL-SL-077	ECCL-SL-078	ECCL-SL-079	ECCL-SL-079	ECCL-SL-080	ECCL-SL-081
Sample ID					ECCLSL0074	ECCLSL0075	ECCLSL0076	ECCLSL0077	ECCLSL0078	ECCLSL9007	ECCLSL0079	ECCLSL0080	ECCLSL0081
Sample Type					GR	GR	GR	GR	GR	FD	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
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
Analyte (mg/kg)	Background Criteria	RSL	ESV	PBT Chemical?									
Metals													
Antimony	9.3	31	0.27	N	**2300 *#**	**79 *#**	**510 *#**	**28 #**	<4.2 U	<4.9 U	<8.3 U	**29 #**	**3900 *#**
Arsenic	36.5	0.68	18	N	**680 *#**	**61 *#**	**260 *#**	**30**	**13**	**10**	**16**	**36**	**210 *#**
Copper	56.2	3100	28	N	**17 J**	**5.1 J**	**10 J**	**7.4**	**27 J**	**13 J**	**12 J**	**7.2**	**7.7 J**
Iron	234000	55000	None	N	**6900**	**6300**	**9100**	**12000**	**13000**	**12000**	**11000**	**8900**	**6500**
Lead	48.6	400	11	Y	**100000 *#**	**8400 *#**	**45000 *#**	**3400 *#**	**370 #**	**690 *#**	**1100 *#**	**3600 *#**	**81000 *#**
Tin		47000	50	N	<10 U	<9.7 U	<12 U	<12 U	<11 U	<12 U	<10 U	<9.9 U	**300 #**
Zinc	322	23000	46	N	**34**	**21**	**30**	**28**	**17**	**20**	**19**	**40**	**27**
Organics-Semivolatile													
1,1'-Biphenyl	None	47	60	N	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.062 U	<0.061 U	<0.059 U	<0.061 U
2-Methylnaphthalene	None	240	3.24	N	**0.0056 J**	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	<0.0079 U	<0.0082 U
2-Methylphenol	None	3200	40.4	N	<0.25 U	<0.24 U	<0.25 U	<0.25 U	<0.23 U	<0.25 U	<0.24 U	<0.24 U	<0.24 U
Acenaphthene	None	3600	20	N	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	<0.0079 U	<0.0082 U
Acenaphthylene	None	1800	682	N	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	<0.0079 U	<0.0082 U
Acetophenone	None	7800	300	N	<0.13 U	<0.12 U	<0.12 U	<0.13 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U
Anthracene	None	18000	1480	N	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	<0.0079 U	<0.0082 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.0086**	**0.0065 J**	**0.014**	**0.0072 J**	**0.012**	**0.011**	**0.0066 J**	**0.012**	**0.0049 J**
Benzaldehyde	None	170	None	N	<0.13 U	**0.014 J#**	**0.016 J#**	<0.13 U	**0.017 J#**	**0.019 J#**	<0.12 U	<0.12 U	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.01**	**0.0087**	**0.018 ***	**0.0093**	**0.015**	**0.015**	**0.0083**	**0.016**	**0.0065 J**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.015**	**0.013**	**0.029**	**0.016**	**0.027**	**0.028**	**0.015**	**0.023**	<0.0082 U
Benzo(*g,h,i*)perylene	None	1800	119	Y	<0.0084 U	<0.0079 U	**0.011**	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	**0.0097**	<0.0082 U
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.0073 J**	**0.0066 J**	**0.011**	<0.0084 U	**0.011**	**0.0096**	<0.0082 U	**0.011**	<0.0082 U
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.088 U	<0.082 U	<0.086 U	<0.088 U	<0.082 U	**0.03 J**	<0.086 U	<0.083 U	**0.031 J**
Carbazole	None	None	None	N	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.062 U	<0.061 U	<0.059 U	<0.061 U
Chrysene	None	16	4.73	N	**0.012**	**0.009**	**0.023**	**0.011**	**0.018**	**0.017**	**0.01**	**0.016**	**0.0074 J**
Di-n-butyl phthalate	None	6300	200	N	<0.088 U	<0.082 U	<0.086 U	<0.088 U	**0.022 J**	<0.087 U	<0.086 U	**0.019 J**	**0.019 J**
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	<0.0079 U	<0.0082 U
Dibenzofuran	None	73	None	N	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.062 U	<0.061 U	<0.059 U	<0.061 U
Fluoranthene	None	2400	122	N	<0.0084 U	**0.011**	**0.034**	**0.015**	**0.03**	**0.028**	**0.015**	**0.025**	<0.0082 U
Fluorene	None	2400	30	N	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	<0.0079 U	<0.0082 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.0084 U	<0.0079 U	**0.01**	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	**0.009**	<0.0082 U
N-Nitrosodiphenylamine	None	110	20	N	<0.063 U	<0.059 U	<0.061 U	<0.063 U	<0.058 U	<0.062 U	<0.061 U	<0.059 U	<0.061 U
Naphthalene	None	3.8	0.0994	N	<0.0084 U	<0.0079 U	<0.0082 U	<0.0084 U	<0.0078 U	<0.0083 U	<0.0082 U	<0.0079 U	<0.0082 U
Pentachlorophenol	None	1	2.1	N	<0.19 U	<0.18 U	<0.18 U	<0.19 U	<0.18 U	<0.19 U	<0.18 U	**0.069 J**	<0.18 U
Phenanthrene	None	1800	45.7	N	**0.008 J**	<0.0079 U	**0.016**	**0.0063 J**	**0.011**	**0.011**	**0.0057 J**	**0.0096**	<0.0082 U
Phenol	None	19000	30	N	<0.063 U	**0.015 J**	<0.061 U	<0.063 U	<0.058 U	<0.062 U	<0.061 U	<0.059 U	<0.061 U
Pyrene	None	1800	78.5	N	**0.013**	**0.0097**	**0.03**	**0.013**	**0.023**	**0.022**	**0.012**	**0.022**	**0.0092**

Result Qualifiers:
U - Analyte not detected.
UJ - Analyte not detected. Quantitation limit is estimated.
J - Estimated concentration.
R - Result was rejected in validation and considered unusable.
* - Result of potential human health concern.
# - Result potential ecological concern.
*# - Result of potential human health and ecological concern.
Bolded result indicates that an analyte was detected.

ESV = Ecological Screening Value.
HH = Human Health.
mg/kg = Milligrams per kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
RSL = Regional Screening Level.

Table 4-5. Analytical Detections: ECCL Rifle Range Surface Soil Samples

				Station	ECCL-SL-082	ECCL-SL-083	ECCL-SL-084	ECCL-SL-085	ECCL-SL-086	ECCL-SL-087	ECCL-SL-087	ECCL-SL-088	ECCL-SL-089	ECCL-SL-089
				Sample ID	ECCLSL0082	ECCLSL0083	ECCLSL0084	ECCLSL0085	ECCLSL0086	ECCLSL9012	ECCLSL0087	ECCLSL0088	ECCLSL9010	ECCLSL0089
				Sample Type	GR	GR	GR	GR	GR	FD	GR	GR	FD	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	0.0–1.0
				Date	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/13/16	06/13/16	06/13/16
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	<2.2 U	**0.54 J**	**0.71 J**	<2 U	**0.53 J**	<2 U	**0.71 J**	**3.6**	**160 *#**	**13 #**
Arsenic	36.5	0.68	18	N	**28**	**31**	**34**	**29**	**22**	**26**	**27**	**17**	**20**	**19**
Copper	56.2	3100	28	N	**60 #**	**54**	**66 #**	**55**	**72 #**	**69 #**	**69 #**	**160 #**	**300 #**	**310 #**
Iron	234000	55000	None	N	**30000**	**33000**	**34000**	**32000**	**22000**	**28000**	**29000**	**25000**	**21000**	**25000**
Lead	48.6	400	11	Y	**30**	**30**	**33**	**32**	**34**	**33**	**37**	**680 *#**	**16000 *#**	**2900 *#**
Zinc	322	23000	46	N	**16**	**14**	**14**	**19**	**18**	**25**	**23**	**96**	**37**	**50**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.23 U	<0.39 U	**0.022 J**	**0.015 J**	**0.012 J**
2-Methylnaphthalene	None	240	3.24	N	**0.8**	**1.2**	**0.59**	**1.3**	**0.67**	**1.2**	**1.1**	**0.77**	**0.6**	**0.41**
Acenaphthene	None	3600	20	N	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	<0.019 U	<0.0086 U	<0.0084 U
Acenaphthylene	None	1800	682	N	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	**0.015 J**	**0.0098**	**0.0082 J**
Anthracene	None	18000	1480	N	**0.043**	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	<0.019 U	**0.0065 J**	**0.0056 J**
Benz(*a*)anthracene	None	0.16	5.21	N	**0.11**	<0.078 U	**0.031**	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	**0.023**	**0.022**	**0.026**
Benzaldehyde	None	170	None	N	<0.47 U	<1.2 U	<0.47 U	<1.1 U	<0.12 U	<0.46 U	<0.77 U	<0.28 U	<0.13 U	**0.15 #**
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.11 ***	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	**0.033 ***	**0.027 ***	**0.025 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.16**	<0.078 U	<0.031 U	<0.074 U	**0.018**	<0.031 U	<0.051 U	**0.042**	**0.046**	**0.047**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.056**	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	**0.016 J**	**0.014**	**0.017**
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.071**	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	**0.021**	**0.016**	**0.015**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.32 U	<0.54 U	<0.2 U	<0.09 U	<0.088 U
Chrysene	None	16	4.73	N	**0.17**	<0.078 U	**0.046**	<0.074 U	**0.043**	<0.031 U	<0.051 U	**0.085**	**0.068**	**0.072**
Di-n-butyl phthalate	None	6300	200	N	<0.33 U	<0.82 U	<0.33 U	<0.78 U	<0.085 U	<0.32 U	<0.54 U	<0.2 U	<0.09 U	<0.088 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	<0.019 U	<0.0086 U	<0.0084 U
Dibenzofuran	None	73	None	N	**0.054 J#**	<0.58 U	**0.041 J#**	<0.56 U	<0.061 U	<0.23 U	<0.39 U	**0.039 J#**	**0.06 J#**	**0.054 J#**
Fluoranthene	None	2400	122	N	**0.32**	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	**0.051**	**0.05**	**0.054**
Fluorene	None	2400	30	N	<0.032 U	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	<0.019 U	<0.0086 U	<0.0084 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**0.047**	<0.078 U	<0.031 U	<0.074 U	<0.0081 U	<0.031 U	<0.051 U	<0.019 U	**0.012**	**0.013**
N-Nitrosodiphenylamine	None	110	20	N	<0.24 U	<0.58 U	<0.23 U	<0.56 U	<0.061 U	<0.23 U	<0.39 U	<0.14 U	<0.064 U	<0.063 U
Naphthalene	None	3.8	0.0994	N	**0.22 #**	**0.32 #**	**0.15 #**	**0.38 #**	**0.17 #**	**0.35 #**	**0.31 #**	**0.22 #**	**0.23 #**	**0.14 #**
Phenanthrene	None	1800	45.7	N	**0.44**	**0.46**	**0.25**	**0.45**	**0.2**	**0.33**	**0.35**	**0.3**	**0.16**	**0.14**
Pyrene	None	1800	78.5	N	**0.28**	**0.094**	**0.064**	<0.074 U	**0.045**	**0.056**	**0.06**	**0.062**	**0.053**	**0.068**

Table 4-5. Analytical Detections: ECCL Rifle Range Surface Soil Samples (continued)

				Station	**ECCL-SL-090**	**ECCL-SL-091**	**ECCL-SL-092**	**ECCL-SL-093**	**ECCL-SL-094**	**ECCL-SL-095**	**ECCL-SL-096**	**ECCL-SL-097**	**ECCL-SL-098**	**ECCL-SL-099**
				Sample ID	**ECCLSL0090**	**ECCLSL0091**	**ECCLSL0092**	**ECCLSL0093**	**ECCLSL0094**	**ECCLSL0095**	**ECCLSL0096**	**ECCLSL0097**	**ECCLSL0098**	**ECCLSL0099**
				Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
				Depth (ft)	**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**	**0.0–3.0**	**0.0–3.0**	**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**
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**51 *#**	**2.2**	**24 #**	**69 *#**	**2.6**	**39 *#**	**110 *#**	**21 #**	**14 #**	**53 *#**
Arsenic	36.5	0.68	18	N	**21**	**17**	**18**	**25**	**20**	**18**	**21**	**18**	**12**	**13**
Copper	56.2	3100	28	N	**320 #**	**140 #**	**460 #**	**580 #**	**140 #**	**570 #**	**840 #**	**540 #**	**310 #**	**460 #**
Iron	234000	55000	None	N	**24000**	**24000**	**25000**	**28000**	**28000**	**22000**	**23000**	**24000**	**15000**	**15000**
Lead	48.6	400	11	Y	**6600 *#**	**430 *#**	**4600 *#**	**28000 *#**	**360 #**	**9600 *#**	**18000 *#**	**3500 *#**	**2800 *#**	**6800 *#**
Zinc	322	23000	46	N	**34**	**15**	**66**	**170**	**18**	**71**	**110**	**26**	**93**	**88**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	**0.017 J**	**0.02 J**	**0.019 J**	**0.01 J**	**0.013 J**	**0.012 J**	**0.017 J**	<0.23 U	<0.14 U	**0.0038 J**
2-Methylnaphthalene	None	240	3.24	N	**0.6**	**0.46**	**0.53**	**0.096**	**0.32**	**0.31**	**0.5**	**0.37**	**0.16**	**0.076**
Acenaphthene	None	3600	20	N	<0.008 U	<0.019 U	**0.015 J**	**0.045**	<0.015 U	<0.018 U	<0.018 U	<0.031 U	**0.0093 J**	<0.007 U
Acenaphthylene	None	1800	682	N	**0.011**	**0.013 J**	**0.015 J**	**0.035**	**0.014 J**	<0.018 U	<0.018 U	<0.031 U	<0.018 U	<0.007 U
Anthracene	None	18000	1480	N	<0.008 U	<0.019 U	**0.024**	**0.17**	<0.015 U	<0.018 U	**0.011 J**	<0.031 U	**0.013 J**	**0.0064 J**
Benz(*a*)anthracene	None	0.16	5.21	N	**0.02**	**0.048**	**0.084**	**0.47 ***	<0.015 U	**0.075**	**0.068**	<0.031 U	**0.13**	**0.1**
Benzaldehyde	None	170	None	N	<0.12 U	**0.087 J#**	<0.28 U	**0.063 J#**	**0.29 #**	**0.11 J#**	<0.27 U	<0.46 U	**0.19 J#**	**0.046 J#**
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.021 ***	**0.053 ***	**0.084 ***	**0.47 ***	<0.015 U	**0.082 ***	**0.066 ***	<0.031 U	**0.19 ***	**0.14 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.04**	**0.064**	**0.17 ***	**0.93 ***	**0.03**	**0.11**	**0.095**	<0.031 U	**0.26 ***	**0.18 ***
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.013**	<0.019 U	**0.041**	**0.16**	<0.015 U	**0.047**	**0.028**	<0.031 U	**0.08**	**0.075**
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.0091**	**0.024**	**0.071**	**0.25**	<0.015 U	**0.041**	**0.033**	<0.031 U	**0.068**	**0.04**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U	<0.32 U	<0.19 U	<0.073 U
Chrysene	None	16	4.73	N	**0.067**	**0.11**	**0.19**	**0.73**	**0.064**	**0.21**	**0.18**	**0.074**	**0.22**	**0.25**
Di-n-butyl phthalate	None	6300	200	N	<0.084 U	<0.2 U	<0.19 U	<0.2 U	<0.16 U	<0.19 U	<0.19 U	<0.32 U	<0.19 U	<0.073 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.008 U	<0.019 U	<0.018 U	**0.058 ***	<0.015 U	<0.018 U	<0.018 U	<0.031 U	<0.018 U	<0.007 U
Dibenzofuran	None	73	None	N	<0.06 U	**0.031 J#**	**0.046 J#**	**0.051 J#**	**0.023 J#**	**0.019 J#**	**0.034 J#**	<0.23 U	<0.14 U	<0.052 U
Fluoranthene	None	2400	122	N	**0.046**	**0.078**	**0.22**	**0.47**	**0.025**	**0.042**	**0.079**	**0.026 J**	**0.19**	**0.083**
Fluorene	None	2400	30	N	<0.008 U	<0.019 U	**0.011 J**	**0.043**	<0.015 U	<0.018 U	<0.018 U	<0.031 U	<0.018 U	<0.007 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.008 U	<0.019 U	**0.037**	**0.16**	<0.015 U	**0.024**	<0.018 U	<0.031 U	**0.074**	**0.047**
N-Nitrosodiphenylamine	None	110	20	N	<0.06 U	<0.15 U	<0.14 U	<0.14 U	<0.11 U	<0.14 U	<0.14 U	<0.23 U	**0.062 J**	**0.067**
Naphthalene	None	3.8	0.0994	N	**0.18 #**	**0.12 #**	**0.16 #**	**0.021**	**0.08**	**0.073**	**0.12 #**	**0.078**	**0.039**	**0.017**
Phenanthrene	None	1800	45.7	N	**0.2**	**0.28**	**0.32**	**0.27**	**0.21**	**0.21**	**0.27**	**0.24**	**0.15**	**0.094**
Pyrene	None	1800	78.5	N	**0.051**	**0.093**	**0.15**	**0.45**	**0.046**	**0.076**	**0.094**	**0.045**	**0.19**	**0.1**

Table 4-5. Analytical Detections: ECCL Rifle Range Surface Soil Samples (continued)

				Station	**ECCL-SL-100**	**ECCL-SL-101**	**ECCL-SL-102**	**ECCL-SL-102**	**ECCL-SL-103**	**ECCL-SL-104**	**ECCL-SL-105**	**ECCL-SL-106**	**ECCL-SL-107**	**ECCL-SL-108**
				Sample ID	**ECCLSL0100**	**ECCLSL0101**	**ECCLSL9009**	**ECCLSL0102**	**ECCLSL0103**	**ECCLSL0104**	**ECCLSL0105**	**ECCLSL0106**	**ECCLSL0107**	**ECCLSL0108**
				Sample Type	**GR**	**GR**	**FD**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
				Depth (ft)	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**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**
				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**
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**3 J**	**24 #**	**51 *#**	**5.1**	**1.2 J**	**1.8 J**	**1.1 J**	**3.1**	**0.88 J**	**28 #**
Arsenic	36.5	0.68	18	N	**19**	**12**	**12**	**11**	**15**	**14**	**30**	**17**	**18**	**28**
Copper	56.2	3100	28	N	**170 #**	**350 #**	**150 #**	**120 #**	**130 #**	**91 #**	**66 #**	**160 #**	**48**	**62 #**
Iron	234000	55000	None	N	**28000**	**15000**	**21000**	**17000**	**26000**	**22000**	**30000**	**24000**	**22000**	**28000**
Lead	48.6	400	11	Y	**490 *#**	**3500 *#**	**5500 *#**	**860 *#**	**170 #**	**240 #**	**84 #**	**590 *#**	**100 #**	**12000 *#**
Zinc	322	23000	46	N	**18**	**56**	**84**	**77**	**22**	**18**	**19**	**19**	**38**	**42**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	**0.02 J**	<0.53 U	<0.057 U	<0.058 U	**0.009 J**	**0.011 J**	**0.034 J**	**0.023 J**	**0.0055 J**	**0.012 J**
2-Methylnaphthalene	None	240	3.24	N	**0.73 J**	**0.49**	**0.095**	**0.083**	**0.19**	**0.32**	**1.1**	**0.72**	**0.2**	**0.37**
Acenaphthene	None	3600	20	N	<0.019 U	<0.07 U	<0.0076 U	<0.0077 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	**0.019**
Acenaphthylene	None	1800	682	N	**0.011 J**	<0.07 U	**0.01**	<0.0077 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	**0.043**
Anthracene	None	18000	1480	N	<0.019 U	**0.038 J**	**0.0097**	**0.0092**	**0.0059 J**	<0.0076 U	**0.015**	<0.0075 U	<0.0078 U	**0.067**
Benz(*a*)anthracene	None	0.16	5.21	N	<0.019 U	**4.5 ***	**0.054**	**0.032**	**0.013**	**0.011**	**0.0084 J**	**0.013**	**0.0095**	**0.31 ***
Benzaldehyde	None	170	None	N	**0.2 J#**	<1.1 U	**0.092 J#**	**0.083 J#**	**0.056 J#**	**0.031 J#**	<0.23 U	**0.18 #**	**0.064 J#**	<0.23 U
Benzo(*a*)pyrene	None	0.016	1.52	N	<0.019 U	**4.9 *#**	**0.051 ***	**0.037 ***	**0.017 ***	**0.012**	**0.011 J**	**0.015**	**0.011**	**0.32 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	<0.019 U	**2.8 ***	**0.098**	**0.051**	**0.022**	**0.014**	**0.023**	**0.015**	**0.014**	**0.57 ***
Benzo(*g,h,i*)perylene	None	1800	119	Y	<0.019 U	**1.7**	**0.028**	**0.027**	**0.011**	**0.012**	<0.015 U	<0.0075 U	**0.0088**	**0.12**
Benzo(*k*)fluoranthene	None	1.6	148	N	<0.019 U	**0.3**	**0.024**	**0.014**	**0.0087**	<0.0076 U	<0.015 U	<0.0075 U	**0.0057 J**	**0.18**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.2 U	<0.74 U	<0.08 U	**0.037 J**	<0.091 U	**0.026 J**	<0.16 U	**0.032 J**	<0.082 U	<0.16 U
Chrysene	None	16	4.73	N	**0.06**	**11 #**	**0.087**	**0.06**	**0.036**	**0.029**	**0.063**	**0.052**	**0.02**	**0.46**
Di-n-butyl phthalate	None	6300	200	N	<0.2 U	**0.22 J**	<0.08 U	<0.081 U	<0.091 U	<0.079 U	<0.16 U	<0.078 U	<0.082 U	<0.16 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.019 U	**0.71 ***	<0.0076 U	<0.0077 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	**0.046 ***
Dibenzofuran	None	73	None	N	**0.03 J#**	<0.53 U	<0.057 U	**0.014 J#**	**0.039 J#**	<0.057 U	**0.062 J#**	**0.065 #**	**0.017 J#**	**0.033 J#**
Fluoranthene	None	2400	122	N	**0.011 J**	**0.21**	**0.07**	**0.056**	**0.027**	**0.023**	**0.014 J**	**0.019**	**0.018**	**0.68**
Fluorene	None	2400	30	N	<0.019 U	**0.036 J**	<0.0076 U	<0.0077 U	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	<0.0078 U	**0.028**
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.019 U	**0.58 ***	**0.019**	**0.019**	<0.0087 U	<0.0076 U	<0.015 U	<0.0075 U	**0.0074 J**	**0.11**
N-Nitrosodiphenylamine	None	110	20	N	<0.14 U	<0.53 U	**0.18**	**0.025 J**	<0.065 U	<0.057 U	<0.11 U	<0.056 U	<0.058 U	<0.12 U
Naphthalene	None	3.8	0.0994	N	**0.23 #**	**0.11 #**	**0.023**	**0.031**	**0.044**	**0.09**	**0.33 #**	**0.25 #**	**0.067**	**0.11 #**
Phenanthrene	None	1800	45.7	N	**0.26**	**0.51**	**0.057**	**0.062**	**0.11**	**0.16**	**0.37**	**0.3**	**0.059**	**0.54**
Pyrene	None	1800	78.5	N	**0.03**	**1.8**	**0.077**	**0.054**	**0.033**	**0.031**	**0.079**	**0.052**	**0.018**	**0.55**

Table 4-5. Analytical Detections: ECCL Rifle Range Surface Soil Samples (continued)

				Station	**ECCL-SL-109**	**ECCL-SL-110**	**ECCL-SL-111**	**ECCL-SL-112**	**ECCL-SL-113**	**ECCL-SL-114**	**ECCL-SL-114**
				Sample ID	**ECCLSL0109**	**ECCLSL0110**	**ECCLSL0111**	**ECCLSL0112**	**ECCLSL0113**	**ECCLSL9011**	**ECCLSL0114**
				Sample Type	**GR**	**GR**	**GR**	**GR**	**GR**	**FD**	**GR**
				Depth (ft)	**0.0–3.0**	**0.0–2.5**	**0.0–2.5**	**0.0–3.0**	**0.0–2.5**	**0.0–3.0**	**0.0–3.0**
				Date	**06/14/16**	**06/13/16**	**06/13/16**	**06/13/16**	**06/14/16**	**06/14/16**	**06/14/16**
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**							
Metals											
Antimony	9.3	31	0.27	N	**0.62 J**	**0.72 J**	**0.78 J**	**1.4 J**	**0.76 J**	**0.6 J**	**0.73 J**
Arsenic	36.5	0.68	18	N	**6.1**	**27**	**23**	**11**	**13**	**20**	**18**
Copper	56.2	3100	28	N	**15**	**56**	**47**	**56**	**27**	**33**	**32**
Iron	234000	55000	None	N	**14000**	**29000**	**26000**	**17000**	**19000 J**	**24000**	**24000**
Lead	48.6	400	11	Y	**62 #**	**46**	**90 #**	**520 *#**	**58 J#**	**24**	**22**
Zinc	322	23000	46	N	**22**	**36**	**34**	**25**	**54**	**75**	**73**
Organics-Semivolatile											
1,1'-Biphenyl	None	47	60	N	<0.055 U	**0.016 J**	**0.016 J**	<0.055 U	<0.059 U	<0.059 U	<0.059 U
2-Methylnaphthalene	None	240	3.24	N	**0.027**	**0.43**	**0.49**	**0.061**	<0.0079 U	**0.098**	**0.019**
Acenaphthene	None	3600	20	N	<0.0073 U	**0.012 J**	**0.018**	<0.0073 U	<0.0079 U	<0.0079 U	<0.0079 U
Acenaphthylene	None	1800	682	N	<0.0073 U	**0.023**	**0.036**	<0.0073 U	<0.0079 U	<0.0079 U	<0.0079 U
Anthracene	None	18000	1480	N	<0.0073 U	**0.027**	**0.054**	**0.0052 J**	<0.0079 U	<0.0079 U	<0.0079 U
Benz(*a*)anthracene	None	0.16	5.21	N	<0.0073 U	**0.11**	**0.2 ***	**0.028**	**0.0061 J**	**0.006 J**	<0.0079 U
Benzaldehyde	None	170	None	N	**0.015 J#**	**0.99 #**	<0.24 U	**0.088 J#**	**0.022 J#**	<0.12 U	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N	<0.0073 U	**0.14 ***	**0.2 ***	**0.029 ***	**0.0078 J**	**0.0076 J**	<0.0079 U
Benzo(*b*)fluoranthene	None	0.16	59.8	N	<0.0073 U	**0.25 ***	**0.43 ***	**0.041**	**0.012**	**0.011**	**0.013**
Benzo(*g,h,i*)perylene	None	1800	119	Y	<0.0073 U	**0.052**	**0.076**	**0.019**	**0.0073 J**	<0.0079 U	<0.0079 U
Benzo(*k*)fluoranthene	None	1.6	148	N	<0.0073 U	**0.081**	**0.13**	**0.013**	**0.004 J**	**0.0067 J**	<0.0079 U
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.077 U	<0.2 U	<0.17 U	<0.077 U	<0.083 U	<0.083 U	<0.082 U
Chrysene	None	16	4.73	N	<0.0073 U	**0.2**	**0.29**	**0.04**	**0.011**	**0.016**	<0.0079 U
Di-n-butyl phthalate	None	6300	200	N	<0.077 U	<0.2 U	<0.17 U	<0.077 U	<0.083 U	<0.083 U	<0.082 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0073 U	<0.019 U	**0.034 ***	<0.0073 U	<0.0079 U	<0.0079 U	<0.0079 U
Dibenzofuran	None	73	None	N	<0.055 U	**0.029 J#**	**0.035 J#**	**0.013 J#**	<0.059 U	<0.059 U	<0.059 U
Fluoranthene	None	2400	122	N	<0.0073 U	**0.31**	**0.6**	**0.048**	**0.01**	**0.011**	**0.013**
Fluorene	None	2400	30	N	<0.0073 U	**0.014 J**	**0.036**	<0.0073 U	<0.0079 U	<0.0079 U	<0.0079 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.0073 U	**0.053**	**0.078**	**0.015**	**0.0048 J**	<0.0079 U	<0.0079 U
N-Nitrosodiphenylamine	None	110	20	N	<0.055 U	<0.14 U	<0.12 U	<0.055 U	<0.059 U	<0.059 U	<0.059 U
Naphthalene	None	3.8	0.0994	N	**0.0082**	**0.15 #**	**0.15 #**	**0.019**	<0.0079 U	**0.04**	**0.0068 J**
Phenanthrene	None	1800	45.7	N	**0.015**	**0.38**	**0.52**	**0.044**	**0.0071 J**	**0.039**	**0.016**
Pyrene	None	1800	78.5	N	**0.0077**	**0.28**	**0.45**	**0.046**	**0.0092**	**0.014**	**0.013**

Result Qualifiers:
U - Analyte not detected.
UJ - Analyte not detected. Quantitation limit is estimated.
J - Estimated concentration.
R - Result was rejected in validation and considered unusable.
* - Result of potential human health concern.
# - Result potential ecological concern.
*# - Result of potential human health and ecological concern.
Bolded result indicates that an analyte was detected.

ESV = Ecological Screening Value.
HH = Human Health.
mg/kg = Milligrams per kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
RSL = Regional Screening Level.

Table 4-6. Analytical Detections: ECCL Pistol Range (West) Surface Soil Samples

				Station	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
				Sample ID	ECCLSL0115	ECCLSL0116	ECCLSL0117	ECCLSL0118	ECCLSL0119	ECCLSL0120	ECCLSL0121	ECCLSL0122	ECCLSL0123	ECCLSL9014
				Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR	FD
				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	0.0–3.0	0.0–3.0	0.0–2.0	0.0–2.0
				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	06/14/16
Analyte (mg/kg)	Background Criteria	RSL	ESV	PBT Chemical?										
Metals														
Antimony	9.3	31	0.27	N	<2.1 U	<2.7 U	**1 J**	**7.8**	**53 J*#**	**6.9**	**53 *#**	**6.5**	**8.6**	**19 #**
Arsenic	36.5	0.68	18	N	**6.3**	**7.7**	**14**	**9.7**	**12**	**6**	**14**	**8.1**	**18**	**10**
Copper	56.2	3100	28	N	**8700 *#**	**88 #**	**660 #**	**190 #**	**470 #**	**96 #**	**550 #**	**250 #**	**190 #**	**400 #**
Iron	234000	55000	None	N	**8300**	**10000**	**19000**	**15000**	**14000 J**	**12000**	**18000**	**14000**	**23000**	**15000**
Lead	48.6	400	11	Y	**33**	**27**	**110 #**	**1600 *#**	**7200 *#**	**1300 *#**	**12000 *#**	**940 *#**	**1500 *#**	**4600 *#**
Tin	None	47000	50	N	<11 U	<14 U	<13 U	**5.4 J**	<15 U	<9.4 U	**35**	<9.4 U	<10 U	<9.5 U
Zinc	322	23000	46	N	**1300 #**	**150**	**440 #**	**69**	**600 #**	**69**	**63**	**31**	**48**	**38**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<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	<0.058 U
2-Methylnaphthalene	None	240	3.24	N	<0.0077 U	<0.0096 U	<0.009 U	**0.13**	**0.073**	**0.048**	**0.3**	**0.033**	**0.14**	**0.31**
Acenaphthene	None	3600	20	N	<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	<0.0077 U
Acenaphthylene	None	1800	682	N	<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	<0.0077 U
Acetophenone	None	7800	300	N	<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	<0.12 U
Anthracene	None	18000	1480	N	<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	<0.0077 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.0073 J**	<0.0096 U	**0.14**	**0.051**	**0.068**	**0.09**	**0.68 ***	<0.0077 U	**0.02**	**0.028**
Benzaldehyde	None	170	None	N	<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#**	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.0074 J**	<0.0096 U	**0.27 ***	**0.078 ***	**0.096 ***	**0.14 ***	**0.33 ***	**0.0082**	**0.024 ***	**0.037 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.02**	**0.021**	**0.35 ***	**0.073**	**0.1**	**0.15**	**1.4 ***	**0.011**	**0.038**	**0.051**
Benzo(*g,h,i*)perylene	None	1800	119	Y	<0.0077 U	<0.0096 U	**0.12**	**0.036**	**0.043**	**0.075**	**0.13**	<0.0077 U	**0.012**	**0.024**
Benzo(*k*)fluoranthene	None	1.6	148	N	<0.0077 U	**0.0086 J**	**0.15**	**0.023**	**0.027**	**0.056**	**0.6**	<0.0077 U	**0.012**	**0.018**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<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	<0.096 U
Butyl benzyl phthalate	None	290	0.239	N	<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	<0.081 U
Carbazole	None	None	None	N	<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	<0.058 U
Chrysene	None	16	4.73	N	**0.014**	**0.014**	**0.19**	**0.12**	**0.16**	**0.19**	**3.9**	**0.015**	**0.049**	**0.063**
Di-n-butyl phthalate	None	6300	200	N	**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**
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<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	<0.0077 U
Dibenzofuran	None	73	None	N	<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#**
Diethyl phthalate	None	51000	100	N	<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	<0.081 U
Fluoranthene	None	2400	122	N	**0.018**	**0.011**	**0.12**	**0.04**	**0.066**	**0.081**	**2.1**	<0.0077 U	**0.03**	**0.042**
Fluorene	None	2400	30	N	<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	<0.0077 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.0077 U	<0.0096 U	**0.11**	**0.018**	<0.0076 U	**0.049**	**0.1**	<0.0077 U	<0.0077 U	<0.0077 U
N-Nitrosodiphenylamine	None	110	20	N	**0.076**	<0.072 U	**0.16**	**0.11**	**0.28**	**0.16**	<0.14 U	<0.058 U	<0.058 U	<0.058 U
Naphthalene	None	3.8	0.0994	N	<0.0077 U	<0.0096 U	<0.009 U	**0.045**	**0.02**	**0.012**	**0.085**	**0.0085**	**0.043**	**0.1 #**
Phenanthrene	None	1800	45.7	N	**0.012**	<0.0096 U	**0.02**	**0.06**	**0.043**	**0.054**	**0.26**	**0.032**	**0.066**	**0.12**
Pyrene	None	1800	78.5	N	**0.015**	**0.0099**	**0.16**	**0.077**	**0.067**	**0.12**	**1.6**	**0.018**	**0.039**	**0.071**

Table 4-6. Analytical Detections: ECCL Pistol Range (West) Surface Soil Samples (continued)

				Station	ECCL-SL-124	ECCL-SL-125	ECCL-SL-126	ECCL-SL-127	ECCL-SL-128	ECCL-SL-129	ECCL-SL-130	ECCL-SL-131	ECCL-SL-132	ECCL-SL-133
				Sample ID	ECCLSL0124	ECCLSL0125	ECCLSL0126	ECCLSL0127	ECCLSL0128	ECCLSL0129	ECCLSL0130	ECCLSL0131	ECCLSL0132	ECCLSL0133
				Sample Type	GR	GR	GR	GR	GR	GR	GR	GR	GR	GR
				Depth (ft)	0.0–2.0	0.0–3.0	0.0–3.0	0.0–2.0	0.0–2.0	0.0–3.0	0.0–1.0	0.0–1.0	0.0–1.0	0.0–3.0
				Date	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16	06/14/16
Analyte (mg/kg)	Background Criteria	RSL	ESV	PBT Chemical?										
Metals														
Antimony	9.3	31	0.27	N	**42 *#**	**3.2**	**9.1**	**24 #**	**20 #**	**31 #**	**1.1 J**	**0.94 J**	**4.4**	**4.5**
Arsenic	36.5	0.68	18	N	**14**	**6.8**	**9.3**	**17**	**19**	**16**	**12**	**21**	**13**	**17**
Copper	56.2	3100	28	N	**370 #**	**240 #**	**310 #**	**820 #**	**620 #**	**1200 #**	**76 #**	**34**	**220 #**	**72 #**
Iron	234000	55000	None	N	**19000**	**13000**	**16000**	**19000**	**22000**	**20000**	**15000**	**19000**	**16000**	**23000**
Lead	48.6	400	11	Y	**13000 *#**	**990 *#**	**1100 *#**	**6000 *#**	**6100 *#**	**9000 *#**	**310 #**	**230 #**	**1100 *#**	**820 *#**
Tin	None	47000	50	N	<16 U	<9.6 U	<9.6 U	<11 U	<11 U	<14 U	<12 U	<14 U	<8.9 U	<8.8 U
Zinc	322	23000	46	N	**30**	**26**	**130**	**260**	**140**	**120**	**28**	**27**	**24**	**66**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	**0.0072 J**	<0.059 U	<0.058 U	**0.013 J**	<0.06 U	<0.23 U	<0.061 U	<0.071 U	**0.014 J**	<0.059 U
2-Methylnaphthalene	None	240	3.24	N	**0.22**	**0.12**	**0.079**	**0.3**	**0.35**	**0.53**	**0.0099**	<0.0095 U	**0.52**	**0.027**
Acenaphthene	None	3600	20	N	<0.0075 U	<0.0078 U	<0.0077 U	**0.045**	<0.008 U	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U
Acenaphthylene	None	1800	682	N	<0.0075 U	<0.0078 U	**0.017**	<0.0079 U	<0.008 U	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U
Acetophenone	None	7800	300	N	<0.11 U	<0.12 U	<0.12 U	<0.12 U	<0.12 U	<0.46 U	**0.013 J**	<0.14 U	<0.11 U	<0.12 U
Anthracene	None	18000	1480	N	**0.0078**	<0.0078 U	**0.029**	**0.03**	<0.008 U	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.059**	**0.018**	**0.069**	**0.1**	**0.04**	**0.049**	**0.013**	**0.0081 J**	**0.017**	**0.032**
Benzaldehyde	None	170	None	N	<0.11 U	<0.12 U	<0.12 U	**0.076 J#**	<0.12 U	<0.46 U	**0.027 J#**	**0.66 #**	**0.29 #**	**0.15 #**
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.073 ***	**0.02 ***	**0.088 ***	**0.11 ***	**0.056 ***	**0.074 ***	**0.014**	**0.01**	**0.019 ***	**0.047 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.099**	**0.025**	**0.17 ***	**0.18 ***	**0.07**	**0.074**	**0.017**	**0.015**	**0.024**	**0.064**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.023**	**0.013**	**0.038**	**0.053**	**0.029**	**0.047**	**0.011**	<0.0095 U	**0.017**	**0.023**
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.033**	**0.0065 J**	**0.071**	**0.067**	**0.022**	**0.026 J**	**0.0096**	<0.0095 U	**0.011**	**0.021**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.12 U	<0.087 U	<0.081 U	<0.13 U	<0.49 U	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U
Butyl benzyl phthalate	None	290	0.239	N	**0.024 J**	<0.082 U	<0.081 U	<0.083 U	<0.084 U	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U
Carbazole	None	None	None	N	<0.057 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U
Chrysene	None	16	4.73	N	**0.13**	**0.051**	**0.15**	**0.21**	**0.098**	**0.15**	**0.018**	**0.012**	**0.032**	**0.058**
Di-n-butyl phthalate	None	6300	200	N	<0.079 U	**0.025 J**	**0.017 J**	**0.054 J**	**0.03 J**	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0075 U	<0.0078 U	<0.0077 U	<0.0079 U	<0.008 U	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U
Dibenzofuran	None	73	None	N	<0.057 U	<0.059 U	<0.058 U	**0.053 J#**	<0.06 U	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U
Diethyl phthalate	None	51000	100	N	<0.079 U	<0.082 U	<0.081 U	<0.083 U	<0.084 U	<0.32 U	<0.085 U	<0.099 U	<0.078 U	<0.082 U
Fluoranthene	None	2400	122	N	**0.068**	**0.016**	**0.034**	**0.31**	**0.043**	**0.065**	**0.023**	**0.015**	**0.029**	**0.05**
Fluorene	None	2400	30	N	<0.0075 U	<0.0078 U	<0.0077 U	<0.0079 U	<0.008 U	<0.03 U	<0.0081 U	<0.0095 U	<0.0075 U	<0.0078 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**0.017**	<0.0078 U	**0.039**	**0.039**	**0.016**	**0.022 J**	**0.0095**	<0.0095 U	**0.0078**	**0.013**
N-Nitrosodiphenylamine	None	110	20	N	<0.057 U	<0.059 U	<0.058 U	<0.059 U	<0.06 U	<0.23 U	<0.061 U	<0.071 U	<0.056 U	<0.059 U
Naphthalene	None	3.8	0.0994	N	**0.042**	**0.039**	**0.028**	**0.1 #**	**0.11 #**	**0.16 #**	**0.0049 J**	<0.0095 U	**0.18 #**	**0.009**
Phenanthrene	None	1800	45.7	N	**0.1**	**0.045**	**0.027**	**0.24**	**0.13**	**0.21**	**0.015**	**0.0078 J**	**0.14**	**0.031**
Pyrene	None	1800	78.5	N	**0.073**	**0.026**	**0.049**	**0.27**	**0.083**	**0.093**	**0.019**	**0.014**	**0.038**	**0.05**

Table 4-6. Analytical Detections: ECCL Pistol Range (West) Surface Soil Samples (continued)

				Station	ECCL-SL-134	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-141
				Sample ID	ECCLSL9013	ECCLSL0134	ECCLSL0135	ECCLSL0136	ECCLSL0137	ECCLSL0138	ECCLSL0139	ECCLSL0140	ECCLSL9015	ECCLSL0141
				Sample Type	FD	GR	GR	GR	GR	GR	GR	GR	FD	GR
				Depth (ft)	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	0.0–3.0
				Date	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	06/14/16
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**5.4**	**9.8 #**	**2.8**	**0.82 J**	**0.58 J**	**1.3 J**	**2.6**	**3.8 J**	**0.7 J**	**0.69 J**
Arsenic	36.5	0.68	18	N	**13**	**12**	**19**	**17**	**15**	**29**	**18**	**26 J**	**19**	**20**
Copper	56.2	3100	28	N	**110 #**	**110 #**	**69 #**	**36**	**32**	**55**	**87 #**	**91 J#**	**56**	**55**
Iron	234000	55000	None	N	**18000**	**19000**	**25000**	**21000**	**21000**	**28000**	**25000**	**28000 J**	**24000**	**19000**
Lead	48.6	400	11	Y	**1100 *#**	**4300 *#**	**600 *#**	**41**	**55 #**	**280 #**	**680 *#**	**930 J*#**	**44**	**44**
Tin	None	47000	50	N	<9.8 U	<11 U	<9.3 U	<9.9 U	<11 U	**4.3 J**	**5.2 J**	**6.9 J**	<9.8 U	<11 U
Zinc	322	23000	46	N	**62**	**57**	**56**	**57**	**60**	**59**	**56**	**47 J**	**14**	**13**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.057 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	<0.059 U
2-Methylnaphthalene	None	240	3.24	N	**0.06**	**0.085**	**0.12**	<0.0076 U	**0.056**	**0.31**	**0.35**	**0.12**	**0.14**	**0.1**
Acenaphthene	None	3600	20	N	<0.0076 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	**0.043**	<0.0074 U	<0.0082 U	<0.0078 U	<0.0078 U
Acenaphthylene	None	1800	682	N	<0.0076 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	**0.08**	**0.034**	**0.013**	<0.0078 U	<0.0078 U
Acetophenone	None	7800	300	N	<0.11 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	<0.12 U
Anthracene	None	18000	1480	N	<0.0076 U	**0.0068 J**	<0.0079 U	<0.0076 U	<0.0079 U	**0.14**	**0.035**	**0.012**	<0.0078 U	<0.0078 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.029**	**0.066**	**0.021**	**0.0055 J**	<0.0079 U	**0.46 ***	**0.14**	**0.071**	<0.0078 U	<0.0078 U
Benzaldehyde	None	170	None	N	**0.066 J#**	**0.093 J#**	<0.12 U	**0.015 J#**	<0.12 U	<0.24 U	<0.11 U	**0.13 #**	<0.12 U	**0.071 J#**
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.044 ***	**0.083 ***	**0.034 ***	<0.0076 U	<0.0079 U	**0.57 ***	**0.15 ***	**0.08 ***	<0.0078 U	**0.01**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.055**	**0.089**	**0.04**	**0.014**	**0.014**	**1 ***	**0.24 ***	**0.094**	**0.023**	**0.019**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.018**	**0.031**	<0.0079 U	<0.0076 U	<0.0079 U	**0.2**	**0.087**	**0.047**	<0.0078 U	<0.0078 U
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.017**	**0.026**	**0.018**	**0.0051 J**	<0.0079 U	**0.35**	**0.09**	**0.031**	<0.0078 U	<0.0078 U
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.079 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	<0.082 U
Butyl benzyl phthalate	None	290	0.239	N	<0.079 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	<0.082 U
Carbazole	None	None	None	N	<0.057 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	<0.059 U
Chrysene	None	16	4.73	N	**0.068**	**0.14**	**0.046**	**0.012**	**0.016**	**0.6**	**0.2**	**0.1**	<0.0078 U	<0.0078 U
Di-n-butyl phthalate	None	6300	200	N	<0.079 U	<0.079 U	<0.083 U	<0.08 U	<0.083 U	**0.037 J**	**0.04 J**	<0.086 U	**0.028 J**	**0.037 J**
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0076 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	<0.016 U	**0.023 ***	<0.0082 U	<0.0078 U	<0.0078 U
Dibenzofuran	None	73	None	N	<0.057 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	<0.059 U
Diethyl phthalate	None	51000	100	N	<0.079 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	<0.082 U
Fluoranthene	None	2400	122	N	**0.032**	**0.044**	**0.019**	**0.0091**	**0.0093**	**1.3**	**0.31**	**0.086**	**0.013**	**0.012**
Fluorene	None	2400	30	N	<0.0076 U	<0.0076 U	<0.0079 U	<0.0076 U	<0.0079 U	**0.073**	<0.0074 U	<0.0082 U	<0.0078 U	<0.0078 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<0.0076 U	**0.015**	<0.0079 U	<0.0076 U	<0.0079 U	**0.21 ***	**0.07**	**0.033**	<0.0078 U	**0.002 J**
N-Nitrosodiphenylamine	None	110	20	N	<0.057 U	**0.042 J**	**0.13**	<0.057 U	<0.059 U	<0.12 U	<0.056 U	**0.066**	<0.059 U	<0.059 U
Naphthalene	None	3.8	0.0994	N	**0.019**	**0.024**	**0.045**	<0.0076 U	**0.017**	**0.1 #**	**0.12 #**	**0.034**	**0.03**	**0.03**
Phenanthrene	None	1800	45.7	N	**0.043**	**0.055**	**0.033**	**0.0091**	**0.035**	**0.88**	**0.26**	**0.085**	**0.097**	**0.066**
Pyrene	None	1800	78.5	N	**0.045**	**0.065**	**0.036**	**0.012**	**0.013**	**1.1**	**0.32**	**0.093**	**0.048**	**0.045**

Result Qualifiers:
U - Analyte not detected.
UJ - Analyte not detected. Quantitation limit is estimated.
J - Estimated concentration.
R - Result was rejected in validation and considered unusable.
* - Result of potential human health concern.
# - Result potential ecological concern.
*# - Result of potential human health and ecological concern.
Bolded result indicates that an analyte was detected.

ESV = Ecological Screening Value.
HH = Human Health.
mg/kg = Milligrams per kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
RSL = Regional Screening Level.

Table 4-7. Analytical Detections: ECCL Pistol Range (East) Surface Soil Samples

				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**
				Sample ID	**ECCLSL0142**	**ECCLSL0143**	**ECCLSL0144**	**ECCLSL0145**	**ECCLSL0146**	**ECCLSL0147**	**ECCLSL0148**	**ECCLSL0149**	**ECCLSL0150**	**ECCLSL0151**
				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**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–1.0**	**0.0–2.0**	**0.0–2.0**
				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**
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**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**
Arsenic	36.5	0.68	18	N	**4.4**	**6.6**	**8.9**	**18**	**20**	**19**	**18**	**20**	**17**	**22**
Copper	56.2	3100	28	N	**100 #**	**60 #**	**33**	**60 #**	**78 #**	**55**	**140 #**	**67 #**	**100 #**	**100 #**
Iron	234000	55000	None	N	**10000**	**15000**	**20000**	**18000**	**18000**	**17000**	**24000**	**26000**	**17000**	**26000**
Lead	48.6	400	11	Y	**140 #**	**22**	**13**	**630 *#**	**90 #**	**350 #**	**1200 *#**	**470 *#**	**760 *#**	**1500 *#**
Tin	None	47000	50	N	<9.7 U	<10 U	<11 U	**4.6 J**	**3.9 J**	**4.5 J**	<10 U	<10 U	<11 U	<11 U
Zinc	322	23000	46	N	**250**	**100**	**74**	**53**	**20**	**28 J**	**65**	**64**	**34**	**53**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<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**
2,4-Dinitrotoluene	None	1.7	1.28	N	<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
2-Methylnaphthalene	None	240	3.24	N	<0.0073 U	<0.0075 U	<0.0075 U	**0.037**	**0.05**	**0.031**	<0.0075 U	**0.033**	**0.1**	**0.072**
Acenaphthylene	None	1800	682	N	<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
Acetophenone	None	7800	300	N	<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
Anthracene	None	18000	1480	N	<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
Benz(*a*)anthracene	None	0.16	5.21	N	<0.0073 U	<0.0075 U	<0.0075 U	**0.018**	**0.014**	**0.011**	<0.0075 U	**0.023**	**0.014**	**0.015**
Benzaldehyde	None	170	None	N	<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 #**
Benzo(*a*)pyrene	None	0.016	1.52	N	<0.0073 U	<0.0075 U	<0.0075 U	**0.023 ***	**0.021 ***	**0.016**	<0.0075 U	**0.029 ***	**0.016**	**0.021 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N	<0.0073 U	<0.0075 U	<0.0075 U	**0.03**	**0.032**	**0.021**	<0.0075 U	**0.041**	**0.028**	**0.027**
Benzo(*g,h,i*)perylene	None	1800	119	Y	<0.0073 U	<0.0075 U	<0.0075 U	**0.015**	**0.019**	**0.013**	<0.0075 U	**0.021**	**0.014**	**0.02**
Benzo(*k*)fluoranthene	None	1.6	148	N	<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**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	**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
Caprolactam	None	31000	None	N	<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
Chrysene	None	16	4.73	N	<0.0073 U	<0.0075 U	<0.0075 U	**0.037**	**0.028**	**0.023**	<0.0075 U	**0.046**	**0.036**	**0.043**
Di-n-butyl phthalate	None	6300	200	N	<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**
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<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
Dibenzofuran	None	73	None	N	<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
Diethyl phthalate	None	51000	100	N	<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
Fluoranthene	None	2400	122	N	<0.0073 U	<0.0075 U	<0.0075 U	**0.03**	**0.027**	**0.016**	<0.0075 U	**0.024**	**0.023**	**0.019**
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	<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**
Isophorone	None	570	139	N	<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
N-Nitrosodiphenylamine	None	110	20	N	**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
Naphthalene	None	3.8	0.0994	N	<0.0073 U	<0.0075 U	<0.0075 U	**0.011**	**0.011**	**0.0087**	<0.0075 U	**0.01**	**0.024**	**0.016**
Phenanthrene	None	1800	45.7	N	<0.0073 U	**0.0069 J**	<0.0075 U	**0.053**	**0.042**	**0.025**	<0.0075 U	**0.026**	**0.06**	**0.04**
Pyrene	None	1800	78.5	N	<0.0073 U	**0.0085**	<0.0075 U	**0.037**	**0.031**	**0.025**	<0.0075 U	**0.025**	**0.037**	**0.028**

Table 4-7. Analytical Detections: ECCL Pistol Range (East) Surface Soil Samples (continued)

				Station	ECCL-SL-152	ECCL-SL-153	ECCL-SL-154	ECCL-SL-154	ECCL-SL-155	ECCL-SL-156	ECCL-SL-157	ECCL-SL-158	ECCL-SL-159	ECCL-SL-160
				Sample ID	ECCLSL0152	ECCLSL0153	ECCLSL9017	ECCLSL0154	ECCLSL0155	ECCLSL0156	ECCLSL0157	ECCLSL0158	ECCLSL0159	ECCLSL0160
				Sample Type	GR	GR	FD	GR	GR	GR	GR	GR	GR	GR
				Depth (ft)	0.0–2.0	0.0–2.0	0.0–3.0	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
				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
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**460 *#**	**6.6**	**4.5**	**1.8 J**	**64 *#**	**5**	**1.8 J**	**0.56 J**	**0.58 J**	**1.1 J**
Arsenic	36.5	0.68	18	N	**30**	**25**	**19**	**19**	**25**	**27**	**18**	**16**	**17**	**26**
Copper	56.2	3100	28	N	**270 #**	**160 #**	**150 #**	**110 #**	**540 #**	**580 #**	**44**	**34**	**40**	**57 #**
Iron	234000	55000	None	N	**20000**	**27000**	**21000**	**18000**	**19000**	**25000**	**20000**	**20000**	**18000 J**	**29000**
Lead	48.6	400	11	Y	**35000 *#**	**1300 *#**	**2700 *#**	**1100 *#**	**17000 *#**	**6100 *#**	**630 *#**	**64 #**	**160 J#**	**110 #**
Tin		47000	50	N	**320 #**	<9.5 U	<11 U	<6 U	<13 U	<13 U	<12 U	<10 U	<11 U	**3.4 J**
Zinc	322	23000	46	N	**61**	**27**	**59**	**45**	**180**	**180**	**26**	**24**	**22**	**12**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.057 U	<0.15 U	<0.06 U	<0.062 U	<0.06 U	<0.066 U	<0.063 U	<0.061 U	<0.061 U	<0.062 U
2,4-Dinitrotoluene	None	1.7	1.28	N	<0.23 U	<0.58 U	<0.24 U	<0.25 U	<0.24 U	<0.26 U	<0.25 U	<0.24 U	<0.24 U	<0.25 U
2-Methylnaphthalene	None	240	3.24	N	**0.2**	**0.45**	**0.017**	**0.026**	**0.022**	**0.023**	**0.0089**	**0.0055 J**	**0.0056 J**	**0.0061 J**
Acenaphthylene	None	1800	682	N	<0.0076 U	<0.019 U	<0.008 U	<0.0082 U	<0.008 U	<0.0088 U	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U
Acetophenone	None	7800	300	N	<0.11 U	<0.29 U	<0.12 U	<0.12 U	<0.12 U	<0.13 U	**0.012 J**	**0.011 J**	**0.013 J**	<0.12 U
Anthracene	None	18000	1480	N	<0.0076 U	<0.019 U	<0.008 U	<0.0082 U	<0.008 U	<0.0088 U	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.16**	**0.042**	**0.0097**	**0.014**	**0.018**	**0.0084 J**	**0.0068 J**	**0.0075 J**	**0.011**	**0.0059 J**
Benzaldehyde	None	170	None	N	<0.11 U	<0.29 U	**0.16 #**	**0.13 #**	**0.015 J#**	**0.026 J#**	**0.061 J#**	**0.027 J#**	**0.067 J#**	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.18 ***	**0.064 ***	**0.014**	**0.02 ***	**0.025 ***	**0.012**	**0.0096**	**0.0092**	**0.015**	**0.0064 J**
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.13**	**0.085**	**0.022**	**0.031**	**0.033**	**0.027**	**0.014**	**0.015**	**0.023**	**0.0099**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.085**	**0.042**	<0.008 U	**0.014**	**0.01**	<0.0088 U	**0.0091**	**0.0083**	**0.012**	<0.0083 U
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.038**	**0.029**	**0.0076 J**	**0.013**	**0.012**	**0.011**	**0.0044 J**	**0.0053 J**	**0.0079 J**	**0.0056 J**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	**0.031 J**	**0.06 J**	<0.084 U	**0.029 J**	**0.028 J**	**0.026 J**	<0.088 U	<0.085 U	<0.085 U	<0.087 U
Caprolactam	None	31000	None	N	<0.38 U	<0.96 U	<0.4 U	<0.41 U	<0.39 U	<0.44 U	<0.41 U	<0.4 U	<0.4 U	<0.41 U
Chrysene	None	16	4.73	N	**0.3**	**0.1**	**0.022**	**0.032**	**0.045**	**0.016**	**0.012**	**0.011**	**0.018**	**0.0077 J**
Di-n-butyl phthalate	None	6300	200	N	<0.08 U	<0.2 U	<0.084 U	<0.086 U	<0.083 U	<0.092 U	<0.088 U	<0.085 U	**0.022 J**	<0.087 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.0076 U	<0.019 U	<0.008 U	<0.0082 U	<0.008 U	<0.0088 U	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U
Dibenzofuran	None	73	None	N	<0.057 U	<0.15 U	<0.06 U	<0.062 U	<0.06 U	<0.066 U	<0.063 U	<0.061 U	<0.061 U	<0.062 U
Diethyl phthalate	None	51000	100	N	<0.08 U	<0.2 U	<0.084 U	<0.086 U	<0.083 U	<0.092 U	<0.088 U	<0.085 U	<0.085 U	<0.087 U
Fluoranthene	None	2400	122	N	**0.084**	**0.067**	**0.016**	**0.022**	**0.022**	<0.0088 U	**0.014**	**0.017**	**0.025**	**0.0083**
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**0.031**	**0.025**	<0.008 U	<0.0082 U	<0.008 U	<0.0088 U	**0.0075 J**	**0.0067 J**	**0.011**	<0.0083 U
Isophorone	None	570	139	N	<0.057 U	<0.15 U	<0.06 U	<0.062 U	<0.06 U	<0.066 U	<0.063 U	<0.061 U	<0.061 U	<0.062 U
N-Nitrosodiphenylamine	None	110	20	N	<0.057 U	<0.15 U	<0.06 U	<0.062 U	<0.06 U	<0.066 U	<0.063 U	<0.061 U	<0.061 U	<0.062 U
Naphthalene	None	3.8	0.0994	N	**0.054**	**0.15 #**	<0.008 U	<0.0082 U	**0.0081**	**0.01**	<0.0084 U	<0.0081 U	<0.0081 U	<0.0083 U
Phenanthrene	None	1800	45.7	N	**0.099**	**0.17**	**0.017**	**0.033**	**0.029**	**0.023**	**0.011**	**0.0096**	**0.014**	**0.012**
Pyrene	None	1800	78.5	N	**0.16**	**0.086**	**0.019**	**0.03**	**0.023**	**0.035**	**0.011**	**0.013**	**0.019**	**0.012**

Table 4-7. Analytical Detections: ECCL Pistol Range (East) Surface Soil Samples (continued)

Analyte (mg/kg)	Background Criteria	RSL	ESV	PBT Chemical?	Station	ECCL-SL-161	ECCL-SL-162	ECCL-SL-163	ECCL-SL-164	ECCL-SL-165	ECCL-SL-166	ECCL-SL-167	ECCL-SL-168
					Sample ID	ECCLSL9016	ECCLSL0161	ECCLSL0162	ECCLSL0163	ECCLSL0164	ECCLSL0165	ECCLSL0166	ECCLSL0167	ECCLSL0168
					Sample Type	FD	GR	GR	GR	GR	GR	GR	GR	GR
					Depth (ft)	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
					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
Metals														
Antimony	9.3	31	0.27	N		**1.7 J**	**4.8**	**6.6**	**1 J**	**2.9**	**3.7**	**1.7 J**	**0.55 J**	**1.3 J**
Arsenic	36.5	0.68	18	N		**22**	**21**	**11**	**13**	**18**	**13**	**17**	**13**	**19**
Copper	56.2	3100	28	N		**60 #**	**180 #**	**150 #**	**36**	**92 #**	**59 #**	**40**	**59 #**	**50**
Iron	234000	55000	None	N		**26000**	**28000**	**16000**	**20000**	**20000**	**18000**	**23000**	**16000**	**24000**
Lead	48.6	400	11	Y		**330 #**	**1200 *#**	**1500 *#**	**110 #**	**600 *#**	**950 *#**	**320 #**	**230 #**	**200 #**
Tin		47000	50	N		**3.7 J**	**4.6 J**	**7.3 J**	**3.4 J**	<11 U	<9.6 U	<9.8 U	<9.3 U	**3.8 J**
Zinc	322	23000	46	N		**29**	**32**	**42**	**41**	**38**	**59**	**54**	**44**	**56**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N		<0.057 U	<0.058 U	<0.28 U	**0.0079 J**	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U
2,4-Dinitrotoluene	None	1.7	1.28	N		<0.23 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
2-Methylnaphthalene	None	240	3.24	N		**0.076**	**0.1**	**0.37**	**0.17**	**0.43**	**0.052**	**0.16**	**0.42**	**0.14**
Acenaphthylene	None	1800	682	N		<0.0076 U	<0.0078 U	**0.027 J**	<0.0074 U	<0.032 U	**0.037**	**0.041**	**0.033**	**0.012**
Acetophenone	None	7800	300	N		<0.11 U	<0.12 U	<0.55 U	<0.11 U	<0.48 U	**0.013 J**	<0.11 U	<0.12 U	<0.12 U
Anthracene	None	18000	1480	N		<0.0076 U	<0.0078 U	**0.019 J**	<0.0074 U	<0.032 U	**0.018**	**0.02**	**0.019**	**0.0082**
Benz(*a*)anthracene	None	0.16	5.21	N		**0.0094**	**0.0094**	**0.09**	**0.011**	**0.03 J**	**0.12**	**0.1**	**0.065**	**0.033**
Benzaldehyde	None	170	None	N		**0.1 J#**	**0.065 J#**	**0.47 J#**	<0.11 U	<0.48 U	**0.1 J#**	<0.11 U	**0.24 #**	<0.12 U
Benzo(*a*)pyrene	None	0.016	1.52	N		**0.0094**	**0.012**	**0.1 ***	**0.0098**	<0.032 U	**0.15 ***	**0.13 ***	**0.089 ***	**0.039 ***
Benzo(*b*)fluoranthene	None	0.16	59.8	N		**0.015**	**0.018**	**0.2 ***	**0.012**	<0.032 U	**0.21 ***	**0.25 ***	**0.15**	**0.057**
Benzo(*g,h,i*)perylene	None	1800	119	Y		**0.0084**	<0.0078 U	**0.11**	<0.0074 U	<0.032 U	**0.07**	**0.052**	**0.042**	**0.025**
Benzo(*k*)fluoranthene	None	1.6	148	N		**0.0069 J**	**0.0081**	**0.076**	<0.0074 U	<0.032 U	**0.091**	**0.088**	**0.06**	**0.019**
Bis(2-ethylhexyl)phthalate	None	39	0.925	N		<0.08 U	<0.082 U	<0.39 U	<0.077 U	<0.33 U	**0.048 J**	**0.038 J**	<0.081 U	<0.086 U
Caprolactam	None	31000	None	N		<0.38 U	<0.39 U	<1.8 U	<0.36 U	<1.6 U	<0.38 U	<0.37 U	<0.38 U	<0.4 U
Chrysene	None	16	4.73	N		**0.021**	**0.03**	**0.18**	**0.034**	**0.08**	**0.15**	**0.13**	**0.096**	**0.057**
Di-n-butyl phthalate	None	6300	200	N		<0.08 U	<0.082 U	<0.39 U	<0.077 U	<0.33 U	<0.08 U	<0.078 U	<0.081 U	<0.086 U
Dibenz(*a,h*)anthracene	None	0.016	18.4	N		<0.0076 U	<0.0078 U	<0.037 U	<0.0074 U	<0.032 U	<0.0076 U	<0.0075 U	<0.0077 U	<0.0082 U
Dibenzofuran	None	73	None	N		**0.014 J#**	<0.058 U	<0.28 U	**0.017 J#**	<0.24 U	**0.012 J#**	**0.019 J#**	**0.024 J#**	**0.017 J#**
Diethyl phthalate	None	51000	100	N		<0.08 U	<0.082 U	<0.39 U	<0.077 U	<0.33 U	<0.08 U	<0.078 U	<0.081 U	<0.086 U
Fluoranthene	None	2400	122	N		**0.011**	**0.016**	**0.084**	**0.012**	**0.042**	**0.17**	**0.17**	**0.13**	**0.049**
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N		<0.0076 U	<0.0078 U	**0.057**	<0.0074 U	<0.032 U	**0.058**	**0.06**	**0.041**	**0.019**
Isophorone	None	570	139	N		<0.057 U	<0.058 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	<0.061 U
N-Nitrosodiphenylamine	None	110	20	N		<0.057 U	<0.058 U	<0.28 U	<0.055 U	<0.24 U	<0.057 U	<0.056 U	<0.058 U	**0.25**
Naphthalene	None	3.8	0.0994	N		**0.025**	**0.035**	**0.15 #**	**0.048**	**0.13 #**	**0.033**	**0.064**	**0.16 #**	**0.053**
Phenanthrene	None	1800	45.7	N		**0.04**	**0.048**	**0.16**	**0.067**	**0.17**	**0.064**	**0.11**	**0.14**	**0.046**
Pyrene	None	1800	78.5	N		**0.022**	**0.027**	**0.097**	**0.017**	**0.052**	**0.15**	**0.16**	**0.12**	**0.049**

Result Qualifiers:
U - Analyte not detected.
UJ - Analyte not detected. Quantitation limit is estimated.
J - Estimated concentration.
R - Result was rejected in validation and considered unusable.
* - Result of potential human health concern.
# - Result potential ecological concern.
*# - Result of potential human health and ecological concern.
Bolded result indicates that an analyte was detected.

ESV = Ecological Screening Value.
HH = Human Health.
mg/kg = Milligrams per kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
RSL = Regional Screening Level.

Table 4-8. Analytical Detections: ECCL Firing Range Ditches Surface Soil Samples

				Station	ECCL-SDSW-001	ECCL-SDSW-002	ECCL-SDSW-002	ECCL-SDSW-003	ECCL-SD-004	ECCL-SD-005	ECCL-SD-006	ECCL-SD-007	ECCL-SD-008	ECCL-SD-009
				Sample ID	ECCLSD001	ECCLSD9002	ECCLSD002	ECCLSD003	ECCLSD004	ECCLSD005	ECCLSD006	ECCLSD007	ECCLSD008	ECCLSD009
				Sample Type	GR	FD	GR	GR	GR	GR	GR	GR	GR	GR
				Depth (ft)	0.0–1.8	0.0–1.5	0.0–1.5	0.0–1.5	0.0–1.5	0.0–1.5	0.0–2.0	0.0–1.5	0.0–1.5	0.0–2.0
				Date	06/10/16	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/09/16	06/10/16	06/10/16	06/10/16
Analyte (mg/kg)	**Background Criteria**	**RSL**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	9.3	31	0.27	N	**1 J**	**14 #**	**9**	**5.5 J**	<5.9 U	**6.6**	**1.8 J**	**2.6 J**	**4.3**	**4.3 J**
Arsenic	36.5	0.68	18	N	**12**	**35**	**24**	**26**	**9.3**	**20**	**21**	**19**	**28**	**18**
Copper	56.2	3100	28	N	**110 #**	**80 #**	**56**	**44**	**67 #**	**100 #**	**73 #**	**120 #**	**170 #**	**230 #**
Iron	234000	55000	None	N	**9500**	**24000 J**	**22000 J**	**70000 J**	**26000 J**	**16000 J**	**24000 J**	**16000 J**	**30000 J**	**21000**
Lead	48.6	400	11	Y	**200 #**	**1600 J*#**	**990 J*#**	**550 J*#**	**100 J#**	**1200 J*#**	**260 J#**	**200 J#**	**380 J#**	**250 #**
Zinc	322	23000	46	N	**36**	**260**	**160**	**690 #**	**320**	**290**	**300**	**94**	**79**	**45**
Organics-Semivolatile														
1,1'-Biphenyl	None	47	60	N	<0.083 U	<0.12 U	<0.087 U	<0.077 U	<0.099 U	<0.095 U	<4.3 U	<0.09 U	**0.0089 J**	<0.14 U
2-Methylnaphthalene	None	240	3.24	N	**0.0063 J**	<0.016 U	**0.0089 J**	<0.01 U	<0.013 U	**0.043**	<0.57 U	<0.012 U	**0.094**	<0.018 U
Acenaphthene	None	3600	20	N	<0.011 U	**0.015 J**	<0.012 U	<0.01 U	<0.013 U	<0.013 U	<0.57 U	<0.012 U	<0.014 U	<0.018 U
Acenaphthylene	None	1800	682	N	<0.011 U	**0.022**	**0.019**	<0.01 U	<0.013 U	**0.0074 J**	<0.57 U	**0.01 J**	<0.014 U	<0.018 U
Anthracene	None	18000	1480	N	<0.011 U	**0.044**	**0.025**	<0.01 U	<0.013 U	<0.013 U	**0.56 J**	**0.0098 J**	<0.014 U	<0.018 U
Benz(*a*)anthracene	None	0.16	5.21	N	**0.025**	**0.24 ***	**0.15**	<0.01 U	**0.0094 J**	**0.064**	**20 *#**	**0.061**	**0.0098 J**	<0.018 U
Benzaldehyde	None	170	None	N	<0.17 U	<0.23 U	<0.17 U	<0.15 U	**0.029 J#**	<0.19 U	<8.5 U	**0.079 J#**	<0.21 U	<0.28 U
Benzo(*a*)pyrene	None	0.016	1.52	N	**0.034 ***	**0.32 ***	**0.2 ***	**0.0077 J**	**0.012 J**	**0.089 ***	**19 *#**	**0.051 ***	**0.013 J**	<0.018 U
Benzo(*b*)fluoranthene	None	0.16	59.8	N	**0.034**	**0.46 ***	**0.28 ***	**0.011**	<0.013 U	**0.13**	**11 ***	**0.091**	**0.022**	**0.0097 J**
Benzo(*g,h,i*)perylene	None	1800	119	Y	**0.018**	**0.16**	**0.1**	<0.01 U	<0.013 U	**0.07**	**7.1**	**0.02**	<0.014 U	<0.018 U
Benzo(*k*)fluoranthene	None	1.6	148	N	**0.011**	**0.27**	**0.13**	<0.01 U	<0.013 U	**0.06**	<0.57 U	**0.027**	<0.014 U	<0.018 U
Bis(2-ethylhexyl)phthalate	None	39	0.925	N	<0.12 U	**0.048 J**	**0.041 J**	**0.036 J**	**0.087 J**	**0.084 J**	<6 U	<0.13 U	<0.15 U	<0.19 U
Chrysene	None	16	4.73	N	**0.052**	**0.34**	**0.23**	<0.01 U	**0.016**	**0.1**	**41 *#**	**0.084**	**0.035**	<0.018 U
Di-n-butyl phthalate	None	6300	200	N	**0.033 J**	<0.16 U	<0.12 U	<0.11 U	<0.14 U	<0.13 U	<6 U	**0.041 J**	**0.05 J**	**0.052 J**
Dibenz(*a,h*)anthracene	None	0.016	18.4	N	<0.011 U	<0.016 U	<0.012 U	<0.01 U	<0.013 U	<0.013 U	**3.5 ***	<0.012 U	<0.014 U	<0.018 U
Dibenzofuran	None	73	None	N	**0.015 J#**	<0.12 U	<0.087 U	<0.077 U	<0.099 U	<0.095 U	<4.3 U	**0.037 J#**	**0.057 J#**	<0.14 U
Fluoranthene	None	2400	122	N	**0.019**	**0.61**	**0.37**	**0.013**	**0.023**	**0.15**	**2.5**	**0.12**	<0.014 U	**0.012 J**
Fluorene	None	2400	30	N	<0.011 U	**0.019**	**0.019**	<0.01 U	<0.013 U	<0.013 U	<0.57 U	<0.012 U	<0.014 U	<0.018 U
Indeno(1,2,3-*cd*)pyrene	None	0.16	109	N	**0.011**	**0.16**	**0.097**	<0.01 U	<0.013 U	**0.051**	**2.5 ***	**0.018**	<0.014 U	<0.018 U
Naphthalene	None	3.8	0.0994	N	<0.011 U	<0.016 U	<0.012 U	<0.01 U	<0.013 U	**0.013**	<0.57 U	<0.012 U	**0.02**	<0.018 U
Phenanthrene	None	1800	45.7	N	**0.011**	**0.34**	**0.19**	**0.0063 J**	**0.0092 J**	**0.078**	**2.8**	**0.063**	**0.1**	**0.028**
Phenol	None	19000	30	N	<0.083 U	<0.12 U	<0.087 U	<0.077 U	**0.069 J**	<0.095 U	<4.3 U	**0.041 J**	<0.11 U	<0.14 U
Pyrene	None	1800	78.5	N	**0.029**	**0.38**	**0.28**	**0.01**	**0.015**	**0.095**	**11**	**0.17**	**0.026**	**0.012 J**

Result Qualifiers:
U - Analyte not detected.
UJ - Analyte not detected. Quantitation limit is estimated.
J - Estimated concentration.
R - Result was rejected in validation and considered unusable.
* - Result of potential human health concern.
# - Result potential ecological concern.
*# - Result of potential human health and ecological concern.
Bolded result indicates that an analyte was detected.

ESV = Ecological Screening Value.
HH = Human Health.
mg/kg = Milligrams per kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
RSL = Regional Screening Level.

Table 4-9. Analytical Detections: ECCL Firing Range Ponds Sediment Samples

				Station	**ECCL-SDSW-010**	**ECCL-SDSW-011**	**ECCL-SDSW-011**	**ECCL-SDSW-012**	**ECCL-SDSW-013**	**ECCL-SDSW-014**	**ECCL-SDSW-015**	**ECCL-SDSW-016**	**ECCL-SDSW-017**	**ECCL-SDSW-018**
				Sample ID	**ECCLSD010**	**ECCLSD9001**	**ECCLSD011**	**ECCLSD012**	**ECCLSD013**	**ECCLSD014**	**ECCLSD015**	**ECCLSD016**	**ECCLSD017**	**ECCLSD018**
				Sample Type	**GR**	**FD**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**	**GR**
				Depth (ft)	**0.0–0.0**	**0.0–0.0**	**0.0–0.0**	**0.0–0.0**	**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**	**06/08/16**
Analyte (mg/kg)	**RSL**	**Ohio SRV**	**ESV**	**PBT Chemical?**										
Metals														
Antimony	31	0.84	None	N	**0.93 J#**	**1 J#**	<3.2 U	**1.3 J#**	**2.2 J#**	**1.7 J#**	<13 U	<8.5 U	<10 U	<11 U
Arsenic	0.68	11	9.79	N	**31 *#**	**11 ***	**8.2 ***	**23 *#**	**9 ***	**13 *#**	**9.8 ***	**13 *#**	**17 *#**	**24 *#**
Copper	3100	42	31.6	N	**66 J#**	**43 #**	**35**	**88 #**	**78 #**	**100 #**	**290 J#**	**200 J#**	**530 #**	**540 #**
Iron	55000	44000	None	N	**41000**	**16000**	**15000**	**34000**	**8800**	**13000**	**24000**	**30000**	**32000**	**53000 #**
Lead	400	47	35.8	Y	**20**	**33**	**21**	**29**	**330 #**	**270 #**	**650 *#**	**590 *#**	**2100 *#**	**3500 *#**
Zinc	23000	190	121	N	**22**	**43**	**35**	**58**	**220 #**	**260 #**	**360 #**	**250 #**	**480 #**	**410 #**
Organics-Semivolatile														
1,1'-Biphenyl	47	None	None	N	**0.018 J#**	<0.097 U	<0.09 U	**0.013 J#**	<0.15 U	<0.17 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U
2-Methylnaphthalene	240	None	0.0202	N	**0.38 J#**	**0.054 #**	**0.13 #**	**0.32 #**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	**0.019 J**
Anthracene	18000	None	0.0572	N	<0.01 U	<0.013 U	<0.012 U	**0.012 J**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Benz(*a*)anthracene	0.16	None	0.108	N	<0.01 U	**0.03**	**0.026**	**0.061**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Benzo(*a*)pyrene	0.016	None	0.15	N	<0.01 U	**0.046 ***	**0.04 ***	**0.084 ***	<0.02 U	**0.012 J**	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Benzo(*b*)fluoranthene	0.16	None	10.4	N	<0.01 U	**0.038**	**0.036**	**0.09**	<0.02 U	**0.015 J**	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Benzo(*g,h,i*)perylene	1800	None	0.17	Y	<0.01 U	**0.034**	**0.031**	**0.055**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Benzo(*k*)fluoranthene	1.6	None	0.24	N	<0.01 U	**0.012 J**	**0.013**	**0.034**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Bis(2-ethylhexyl)phthalate	39	None	0.182	N	<0.11 U	<0.14 U	<0.13 U	<0.2 U	<0.21 U	<0.24 U	<1 U	**0.12 J**	<0.42 U	<0.33 U
Caprolactam	31000	None	None	N	<0.52 U	<0.64 U	<0.59 U	<0.95 U	<0.97 U	<1.1 U	<4.9 U	<1.9 U	**0.31 J#**	<1.6 U
Chrysene	16	None	0.166	N	**0.031**	**0.062**	**0.05**	**0.098**	<0.02 U	**0.012 J**	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Di-n-butyl phthalate	6300	None	1.114	N	<0.11 U	<0.14 U	<0.13 U	<0.2 U	<0.21 U	<0.24 U	<1 U	**0.1 J**	<0.42 U	<0.33 U
Dibenzofuran	73	None	0.449	N	<0.079 U	<0.097 U	<0.09 U	**0.019 J**	<0.15 U	<0.17 U	<0.74 U	<0.29 U	<0.3 U	<0.24 U
Fluoranthene	2400	None	0.423	N	**0.011**	**0.024**	**0.025**	**0.12**	**0.012 J**	**0.024**	<0.098 U	<0.038 U	**0.03 J**	**0.027 J**
Indeno(1,2,3-*cd*)pyrene	0.16	None	0.2	N	<0.01 U	**0.016**	**0.017**	**0.04**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Naphthalene	3.8	None	0.176	N	**0.087**	**0.021**	**0.053**	**0.12**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	<0.032 U
Phenanthrene	1800	None	0.204	N	**0.16 J**	<0.013 U	**0.039**	**0.15**	<0.02 U	<0.023 U	<0.098 U	<0.038 U	<0.04 U	**0.016 J**
Pyrene	1800	None	0.195	N	**0.062**	**0.035**	**0.04**	**0.12**	<0.02 U	**0.016 J**	<0.098 U	<0.038 U	**0.024 J**	**0.027 J**

Result Qualifiers:
U - Analyte not detected.
UJ - Analyte not detected. Quantitation limit is estimated.
J - Estimated concentration.
R - Result was rejected in validation and considered unusable.
* - Result of potential human health concern.
# - Result potential ecological concern.
*# - Result of potential human health and ecological concern.
Bolded result indicates that an analyte was detected.

ESV = Ecological Screening Value.
HH = Human Health.
mg/kg = Milligrams per kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
RSL = Regional Screening Level.

Table 4-10. Analytical Detections: ECCL Firing Range Ponds Surface Water Samples

						Station	**ECCL-SDSW-010**	**ECCL-SDSW-011**	**ECCL-SDSW-012**	**ECCL-SDSW-012**	**ECCL-SDSW-013**	**ECCL-SDSW-014**	**ECCL-SDSW-015**	**ECCL-SDSW-016**	**ECCL-SDSW-017**	**ECCL-SDSW-018**
						Sample ID	**ECCLSW010**	**ECCLSW011**	**ECCLSW9001**	**ECCLSW012**	**ECCLSW013**	**ECCLSW014**	**ECCLSW015**	**ECCLSW016**	**ECCLSW017**	**ECCLSW018**
						Sample Type	**GR**	**GR**	**FD**	**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**	**06/08/16**
Analyte (µg/L)	**Tap RSL**	**MCL**	**Ohio HH Drinking Water**	**Ohio HH Nondrinking Water**	**ESV**	**PBT Chemical?**										
Metals																
Antimony	7.8	6	9.7	780	900	N	<2 U	**0.24 J**	<2 U	<2 U	<2 U	<2 U	**0.52 J**	**0.35 J**	**0.32 J**	**0.26 J**
Arsenic	0.052	10	10	580	340	N	**0.88 J***	**1 J***	**0.93 J***	**0.85 J***	**0.87 J***	**0.81 J***	**0.9 J***	**0.66 J***	**0.7 J***	**0.62 J***
Copper	800	1300	790	64000	13	N	**4**	**4.2**	**4.2**	**4.2**	**3.9**	**4.4**	<18 U	<19 U	**24 #**	**22 #**
Iron	14000	None	300	None	1000	N	**320**	**310**	**320**	**300**	**840**	**870**	**340**	**270**	**270**	**250**
Lead	15	15	None	None	97	Y	**2.4**	**2.6**	**2.5**	**2.4**	**27 ***	**28 ***	**19 ***	**20 ***	**27 ***	**25 ***
Tin	12000	None	None	None	1600	N	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	**2.3 J**	<10 U	<10 U	<10 U
Zinc	6000	None	5000	35000	120	N	**67**	**65**	**67**	**64**	**63**	**64**	**44**	**53**	**55**	**49**
Organics-Semivolatile																
Caprolactam	9900	None	None	None	None	N	<5.1 U	**<5 R**	<5.1 U	<5.1 U	**0.33 J#**	<5.6 U	**0.32 J#**	<5 U	<5 U	**0.37 J#**
Isophorone	78	None	None	None	7500	N	<1 U	<1 U	<1 U	<1 U	<1 U	<1.1 U	**0.35 J**	<0.99 U	<1 U	<1 U

Result Qualifiers:
U - Analyte not detected.
UJ - Analyte not detected. Quantitation limit is estimated.
J - Estimated concentration.
R - Result was rejected in validation and considered unusable.
* - Result of potential human health concern.
# - Result potential ecological concern.
*# - Result of potential human health and ecological concern.
Bolded result indicates that an analyte was detected.

ESV = Ecological Screening Value.
HH = Human Health.
mg/kg = Milligrams per kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
RSL = Regional Screening Level.

5.0 ENVIRONMENTAL HAZARD ASSESSMENT

Ecological and human health risk screenings were conducted to determine the presence of any chemicals of potential ecological concern (COPECs) or chemicals of potential concern (COPCs). Surface soil data were aggregated into the following subareas: Ditches, Pistol Range (east), Pistol Range (west), Rifle Range, and Trap and Skeet Ranges. Sediment (wet) and surface water were evaluated from the Ponds only. The following sections present the methodology utilized for the ecological and human health risk screening. Subsequent sections present the results and findings of the screening and assessment for ECCL Firing Range.

5.1 METHODOLOGY

5.1.1 Ecological Risk Screening

Leidos utilized the results of the surface soil, sediment, and surface water samples to conduct ecological risk screening. Surface soil (0 to 0.5, 0 to 1, or 0 to 3feet BGS) samples were evaluated for potential risk to ecological receptors instead of subsurface soil samples because that interval contains the most active biological zone (USEPA 2015a). Maximum detected concentrations (MDCs) for each medium were compared to ESVs. Comparing detected media concentrations to ESVs is the primary method of determining if there are any COPECs present or if detected chemicals can be eliminated from further ecological evaluation. MDCs of metals also were compared to background concentrations (IT 1998) for soil and sediment to determine if site concentrations were above naturally occurring concentrations of metals. For sediment, background values are SRVs; SRVs for the Huron/Erie Lake Plain region were used for this comparison (Ohio EPA 2008). A PBT chemical screen also was applied to soil, sediment, and surface water to determine if detected analytes would accumulate through the food chain. Calcium, magnesium, potassium, and sodium are considered essential nutrients and are not expected to be toxic (USEPA 1989). As a result, the essential nutrients were eliminated from consideration as COPECs in the environmental media.

ESVs were selected according to the latest version of the *Guidance for Conducting Ecological Risk Assessments* (Ohio EPA 2008). The hierarchy of preferred sources for soil ESVs in Ohio EPA (2008) is USEPA's Ecological Soil Screening Levels (EcoSSLs) [USEPA 2015b], followed by *Preliminary Remediation Goals for Ecological Endpoints* (Efroymson et al. 1997), and then USEPA Region 5 ESLs, (USEPA 2003). The EcoSSLs are available mostly for metals and each has its own document, and each EcoSSL document has up to four values protective of different types of ecological receptors. In the case of multiple EcoSSLs, the most conservative (lowest) value above background was chosen.

For sediment, the hierarchy of preferred ESV sources is the freshwater threshold effect concentration from MacDonald et al. (2000), followed by USEPA Region 5 ESLs (USEPA 2003). For surface water, the ESVs are from Ohio EPA Water Quality Criteria (WQC) for the Ohio River Basin (Ohio EPA Outside Mixing Zone Maximum), chronic National Ambient Water Quality Criteria, Tier II secondary chronic values (Suter & Tsao 1996), and USEPA Region 5 ESLs (USEPA 2003). ESVs, background values, and PBT information for detected analytes are listed in the analytical detection tables presented in Section 4.

5.1.2 Human Health Risk Screening

Potential COPCs are identified by comparing measured media-specific concentrations to risk-based screening levels. This section presents the methodology and references utilized to determine the risk-based screening levels for each medium of concern.

For the soil media, USEPA RSLs for residential exposure to soil were used as conservative screening levels (USEPA 2016). The MDC of each detected chemical was compared to the RSL at a target risk of 1E-06 and target hazard quotient (HQ) of 1. In addition, a sum-of-ratios (SOR) was calculated as the sum of the MDC/RSL for all carcinogenic chemicals (at a target risk of 1E-05) and for all non-carcinogenic chemicals (at a target HQ of 1) to evaluate the potential for exposure to multiple chemicals. Special circumstances apply to some chemicals, as described below:

- The residential soil RSLs for arsenic and iron are less than the naturally occurring background concentrations of these metals in soil at NASA PBS; therefore, the MDCs of these chemicals are compared to background concentrations to identify COPCs. Since the background concentration is not risk-based, these six metals are not included in the SOR.

- The RSLs for lead are based on an acceptable blood-lead concentration rather than a specific toxic endpoint; therefore, it is not appropriate to include a ratio for lead exposure in the SOR.

- 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).

Lead is of particular concern at the ECCL Firing Range. In addition to screening against residential RSLs, the USEPA Adult Lead Model (ALM) was used to evaluate the potential for unacceptable occupational exposure to lead by workers in this area.

No human health screening values are available for sediment. USEPA RSLs for residential exposure to soil were used as conservative screening levels for sediment. The MDC of each detected chemical was compared to the RSL at a target risk of 1E-06 and target HQ of 1. In addition, an SOR was calculated as the sum of the MDC/RSL for all carcinogenic chemicals (at a target risk of 1E-05) and for all non-carcinogenic chemicals (at a target HQ of 1) to evaluate the potential for exposure to multiple chemicals. Special circumstances apply to some chemicals, as described below:

- The residential soil RSL for arsenic is less than the naturally occurring background concentration in sediment as represented by the Ohio SRVs; therefore, the MDCs of arsenic are compared to the Ohio SRV to identify COPCs. Since the background concentration is not risk-based, arsenic is not included in the SOR.

- No RSLs are available for 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).

Surface water at NASA GRC 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 include ingestion of fish from contaminated surface water. Because Ohio EPA WQC are only available for a limited number of chemicals, USEPA tap water RSLs and MCLs also are provided.

5.2 ECCL FIRING RANGE

5.2.1 Ecological Risk

The ECCL Firing Range is not within a 100-year floodplain. The site is composed primarily of open field/mowed lawn habitat with some mixed deciduous forest habitat. Dautch Ditch is an ephemeral canal/drainage ditch that runs from south to north through the ECCL Firing Range and flows approximately 2.5 miles northeast before merging with Sawmill Creek. Four ponds are present within the ECCL Firing Range site. Three ponds are shallow wetlands on the western portion of the site classified as palustrine emergent (nontidal wetlands dominated by erect, rooted, herbaceous vegetation). One deeper pond is located south-southwest of the trap and skeet ranges and is classified as pond habitat. Rare species have not been observed in the vicinity of the ECCL Firing Range. A total of 195 surface soil, 10 sediment, and 10 surface water samples were collected at ECCL Firing Range and used in the ecological evaluation as described below.

5.2.1.1 Soil

The MDC for each of the chemicals detected in soil is compared to background and ESVs in **Table 5-1**. The results are summarized below.

Ditches

Ten soil samples were collected at the Ditches. Surface soil samples were collected from the drainage ditch south of the pond and the Dautch Ditch while the ditches were dry. Twenty-seven analytes were considered Site-Related Chemicals (SRCs) as the MDCs exceeded the soil background values. The MDCs for seven of 27 site-related surface soil analytes exceeded ESVs. These exceedances included metals and PAHs. The magnitudes of exceedance ranged from approximately two to 160 times the screening values. The highest exceedance was associated with lead (the MDC of 1,600 mg/kg was 160 times the ESV of 11 mg/kg). Two organic SRCs (benzaldehyde and dibenzofuran) lacked soil screening values. Two PBT chemicals—lead and benzo(*g,h,i*)perylene—were detected in surface soil; lead was among the analytes that exceeded the ESVs. A total of 10 COPECs (SRCs whose MDC exceeded ESVs, SRCs with no ESV, and PBT chemicals) were identified for surface soil at the Ditches within the ECCL Firing Range.

Pistol Range (East)

Twenty-nine soil samples were collected at the Pistol Range (East). Thirty analytes were considered SRCs as the MDCs exceeded the soil background values. The MDCs for five of 30 site-related surface soil analytes exceeded ESVs. These exceedances included metals and a PAH. The largest magnitudes of ESV exceedances were from lead and antimony (the antimony MDC of 460 was 1,704 times the ESV of 0.27 mg/kg and the lead MDC of 35,000 mg/kg was 3,182 times the ESV of 11 mg/kg). Three organic SRCs (benzaldehyde, caprolactam, and dibenzofuran) lacked soil screening values. Two PBT chemicals—lead and benzo(*g,h,i*)perylene—were detected in surface soil; lead was among the analytes that exceeded the ESVs. A total of nine COPECs (SRCs whose MDC exceeded ESVs, SRCs with no ESV, and PBT chemicals) were identified for surface soil at the East Pistol Range within the ECCL Firing Range.

Pistol Range (West)

Thirty soil samples were collected at the Pistol Range (West). Thirty-two analytes were considered SRCs as the MDCs exceeded the soil background values. The MDCs for seven of 32 site-related surface soil analytes exceeded ESVs. These exceedances included metals and SVOCs. The magnitudes of exceedance ranged from approximately two to 1,182 times screening values. The highest exceedances were associated with lead and copper (the lead MDC of 13,000 mg/kg was 1,182 times the ESV of 11 mg/kg and the copper MDC of 8,700 mg/kg was 311 times the ESV of 28 mg/kg). Three organic SRCs (benzaldehyde, carbazole, and dibenzofuran) lacked soil screening values. Two PBT chemicals—lead and benzo(*g,h,i*)perylene—were detected in surface soil; lead was among the analytes that exceeded the ESVs. A total of 11 COPECs (SRCs whose MDC exceeded ESVs, SRCs with no ESV, and PBT chemicals) were identified for surface soil at the West Pistol Range within the ECCL Firing Range.

Rifle Range

Thirty-seven soil samples were collected at the Rifle Range. Twenty-six analytes were considered SRCs as the MDCs exceeded the soil background values. The MDCs for eight of 26 site-related surface soil analytes exceeded ESVs. These exceedances included metals and SVOCs. The largest magnitudes of ESV exceedances were from lead and antimony (the antimony MDC of 160 was 593 times the ESV of 0.27 mg/kg and the lead MDC of 28,000 mg/kg was 2,545 times the ESV of 11 mg/kg). Two organic SRCs (benzaldehyde and dibenzofuran) lacked soil screening values. Two PBT chemicals—lead and benzo(*g,h,i*)perylene—were detected in surface soil; lead was among the analytes that exceeded the ESVs. A total of nine COPECs (SRCs whose MDC exceeded ESVs, SRCs with no ESV, and PBT chemicals) were identified for surface soil at the Rifle Range within the ECCL Firing Range.

Trap and Skeet Ranges

Eighty-nine soil samples were collected at the Trap and Skeet Ranges. Thirty-four analytes were considered SRCs as the MDCs exceeded the soil background values. The MDCs for 18 of 34 site-related surface soil analytes exceeded ESVs. These exceedances included metals and SVOCs. The largest magnitudes of ESV exceedances were from lead and antimony (the antimony MDC of 10,000 was 37,037 times the ESV of 0.27 mg/kg and the lead MDC of 100,000 mg/kg was 9,091 times the ESV of 11 mg/kg). Three organic SRCs (benzaldehyde, carbazole, and dibenzofuran) lacked soil screening values. Two PBT chemicals—lead and benzo(*g,h,i*)perylene—were detected in surface soil; lead was among the analytes that exceeded the ESVs. A total of 21 COPECs (SRCs whose MDC exceeded ESVs, SRCs with no ESV, and PBT chemicals) were identified for surface soil at the Trap and Skeet Ranges within the ECCL Firing Range.

5.2.1.2 Sediment

Ten sediment samples were collected at the four ponds at the ECCL Firing Range. The MDC of each of the chemicals detected in sediment is compared to background and sediment ESVs in **Table 5-2**. Twenty-four sediment analytes were considered site-related as the MDC exceeded the SRV. The MDCs of five site-related sediment analytes exceeded ESVs. These exceedances included metals and an SVOC. The magnitudes of exceedance ranged from approximately three to 98 times the screening values. The highest exceedance was associated with lead (the MDC of 3,500 mg/kg was 98 times the ESV of 35.8 mg/kg). Two inorganic (antimony and iron) and two organic SRCs (1,1'-Biphenyl and caprolactam) did not have screening values. Two PBT chemicals—lead and benzo(*g,h,i*)perylene—were detected in the sediment; lead was among the analytes that exceeded ESVs. A total of 10 sediment COPECs were identified at the ECCL Firing Range.

5.2.1.3 Surface Water

Ten surface water samples were collected at the four ponds at the ECCL Firing Range. The MDC of each of the chemicals detected in surface water is compared to surface water ESVs in **Table 5-3**. The MDC for copper exceeded the surface water ESV. The magnitude of exceedance was two. One detected organic (caprolactam) did not have a screening value. One PBT chemical (lead) was detected at a concentration below its ESV. A total of three surface water COPECs were identified at the ECCL Firing Range.

Based on the results of the ecological screening, further evaluation is recommended to determine if the COPECS identified in surface soil, sediment, and surface water pose a threat of harm to ecological receptors.

5.2.2 Human Health Risk

5.2.2.1 Soil

The MDC for each of the chemicals detected in soil is compared to background and residential RSLs in **Table 5-4**. The results are summarized below.

Ditches

Ten soil samples were collected at the Ditches. The MDC for lead exceeds the background concentration and residential RSL. Reported concentrations of six SVOCs—benz(*a*)anthracene; benzo(*a*)pyrene; benzo(*b*)fluoranthene; chrysene; dibenz(*a*,*h*)anthracene; and indeno(1,2,3-*cd*)pyrene—exceed residential RSLs at a target risk of 1E-06. These chemicals are COPCs in soil.

The SOR for non-carcinogens in soil is 0.6; therefore, no additional non-carcinogenic chemicals are identified as COPCs based on the SOR. The SOR for carcinogens is 162, indicating a total cancer risk greater than 1E-04. The primary contributors to this SOR are the SVOCs identified as COPCs based on comparison to RSLs. Therefore, further evaluation of lead and SVOCs is recommended for soil at the Ditches.

Pistol Range (East)

Twenty-nine soil samples were collected at the Pistol Range (East). The MDCs for antimony and lead exceed the background concentrations and residential RSLs at a target HQ of 1. Reported concentrations of two SVOCs—benzo(*a*)pyrene and benzo(*b*)fluoranthene—exceed residential RSLs at a target risk of 1E-06. These chemicals are COPCs in soil.

The SOR for non-carcinogens in soil is 15. The primary contributor to this SOR is antimony which was identified as a COPC based on comparison to the RSL; therefore, no additional non-carcinogenic chemicals are identified as COPCs based on the SOR. The SOR for carcinogens is 1, indicating a total cancer risk of approximately 1E-05. The primary contributors to this SOR are the SVOCs identified as COPCs based on comparison to RSLs. Therefore, further evaluation of antimony, lead, and SVOCs is recommended for soil at Pistol Range (East).

Pistol Range (West)

Thirty soil samples were collected at the Pistol Range (West). The MDCs for antimony, copper, and lead exceed the background concentrations and residential RSLs at a target HQ of 1. Reported concentrations of five SVOCs—benz(*a*)anthracene; benzo(*a*)pyrene; benzo(*b*)fluoranthene; dibenz(*a,h*)anthracene; and indeno(1,2,3-*cd*)pyrene—exceed residential RSLs at a target risk of 1E-06. These chemicals are COPCs in soil.

The SOR for non-carcinogens in soil is 5. The primary contributors to this SOR are antimony and copper which were identified as COPCs based on comparison to the RSL; therefore, no additional non-carcinogenic chemicals are identified as COPCs based on the SOR. The SOR for carcinogens is 5, indicating a total cancer risk greater than 1E-05. The primary contributors to this SOR are the SVOCs identified as COPCs based on comparison to RSLs. Therefore, further evaluation of antimony, copper, lead and SVOCs is recommended for soil at the Pistol Range (West).

Carbazole was detected in soil but has no RSLs for comparison. Carbazole was detected in one soil sample at a concentration of 0.084 mg/kg. The Ohio EPA Voluntary Action Program (VAP) has a generic direct-contact soil standard for carbazole of 430 mg/kg for residential use [http://epa.ohio.gov/Portals/30/rules/2012/Rule%203745-300-08.pdf]. Therefore, uncertainty associated with the lack of an RSL for this chemical does not have a significant impact on conclusions for the site.

Rifle Range

Thirty-seven soil samples were collected at the Rifle Range. The MDCs for antimony and lead exceed the background concentrations and residential RSLs at a target HQ of 1. Reported concentrations of five SVOCs—benz(*a*)anthracene; benzo(*a*)pyrene; benzo(*b*)fluoranthene; dibenz(*a,h*)anthracene; and indeno(1,2,3-*cd*)pyrene—exceed residential RSLs at a target risk of 1E-06. These chemicals are COPCs in soil.

The SOR for non-carcinogens in soil is 5. The primary contributor to this SOR is antimony which was identified as a COPC based on comparison to the RSL; therefore, no additional non-carcinogenic chemicals are identified as COPCs based on the SOR. The SOR for carcinogens is 40, indicating a total cancer risk greater than 1E-05. The primary contributors to this SOR are the SVOCs identified as COPCs based on comparison to RSLs. Therefore, further evaluation of antimony, lead, and SVOCs is recommended for soil at the Rifle Range.

Trap and Skeet Ranges

Eighty-nine soil samples were collected at the Trap and Skeet Ranges. The MDCs for antimony, arsenic, and lead exceed the background concentrations and residential RSLs at a target risk of 1E-06 and target HQ of 1. Reported concentrations of seven SVOCs—benz(*a*)anthracene; benzo(*a*)pyrene; benzo(*b*)fluoranthene; benzo(*k*)fluoranthene; chrysene; dibenz(*a,h*)anthracene; and indeno(1,2,3-*cd*)pyrene—exceed residential RSLs at a target risk of 1E-06. These chemicals are COPCs in soil.

The SOR for non-carcinogens in soil is 323. The primary contributor to this SOR is antimony which was identified as a COPC based on comparison to the RSL; therefore, no additional non-carcinogenic chemicals are identified as COPCs based on the SOR. The SOR for carcinogens is 1,956, indicating a total cancer risk greater than 1E-04. The primary contributors to this SOR are the SVOCs identified as COPCs based on comparison to RSLs. Therefore, further evaluation of antimony, arsenic, lead, and SVOCs is recommended for soil at the Trap and Skeet Ranges.

Carbazole was detected in soil but has no RSLs for comparison. Carbazole was detected in 10 soil samples with an MDC of 10 mg/kg. The Ohio EPA VAP has a generic direct-contact soil standard for carbazole of 430 mg/kg for residential use [http://epa.ohio.gov/Portals/30/rules/2012/Rule%203745-300-08.pdf]. Therefore, uncertainty associated with the lack of an RSL for this chemical does not have a significant impact on conclusions for the site.

Evaluation of Potential Occupational Exposure to Lead

Lead is of particular concern at the ECCL Firing Range. In addition to screening against residential RSLs, the USEPA ALM was used to evaluate the potential for unacceptable occupational exposure to lead by workers in this area. The average soil lead concentration in soil was input into the ALM along with default occupational exposure assumption of 219 days/year as well as an assumption of exposure 125 days/year to account for the portion of the year when the ground is frozen, covered in snow, or otherwise inaccessible due to Northeast Ohio weather. The complete ALM input/output file is included as **Appendix E**. Results are summarized in **Table 5-5**.

The target for the ALM is to have a less than 5 percent chance of exceeding a blood lead level of 10 µg/dL in the fetus of a pregnant worker. Based on a default worker exposure of 219 days per year, all locations except the Ditches have more than a 5 percent chance of exceeding the target blood lead level. Using a more realistic, but still conservative, assumption of 125 days/year exposure, the probability of exceeding a the target blood lead level is close to 5% at all but the Trap and Skeet Range. Based on these results evaluation of an interim removal action for lead at the Trap and Skeet Range may be warranted.

5.2.2.2 Sediment

Ten sediment samples were collected at the Pond at the ECCL Firing Range. The MDC of each of the chemicals detected in sediment is compared to background and residential RSLs in **Table 5-6**. The MDCs for arsenic and lead exceed the background concentrations and residential RSLs. Therefore, further evaluation of arsenic and lead is recommended for sediment at the Pond. Reported concentrations of benzo(*a*)pyrene exceed residential soil RSLs at a target risk of 1E-06. The SOR for carcinogens is 0.7, indicating a total cancer risk less than 1E-05; therefore, further evaluation of SVOCs in sediment is not recommended.

5.2.2.3 Surface Water

Ten surface water samples were collected at the Pond at the ECCL Firing Range. The MDC of each of the chemicals detected in surface water is compared to various WQC in **Table 5-7**. The MDC for arsenic exceeds the tap water RSL but is below the Ohio WQC for non-drinking water as well as the Ohio WQC for drinking water and the MCL. No Ohio non-drinking WQC is available for iron, and the MDC of this metal exceeds the Ohio WQC for drinking water but is less than the residential tap water RSL. The MDC for lead exceeds the tap water RSL and MCL, and no Ohio WQC for non-drinking water is available for lead. Further evaluation of lead in surface water is recommended.

5.3 ENVIRONMENTAL HAZARD ASSESSMENT SUMMARY

Ecological risk screening identified a total of 6 metals and 17 SVOCs as COPECs in surface soil at ECCL Firing Range. The magnitude of ESV exceedances of the metals antimony, arsenic, copper, and lead, and the PAH benzo(*a*)pyrene, were the most elevated. Further evaluation is recommended to determine whether the COPECs pose a threat of harm to ecological receptors.

Ten COPECs were identified in sediment including four metals and six SVOCs. The magnitude of the ESV exceedance of lead was the most elevated in sediment. Further evaluation is recommended to determine whether the COPECs pose a threat of harm to ecological receptors.

Three COPECs were identified in surface water samples, including two metals and one SVOC. Although the magnitudes of the ESV exceedances are low, the metals lead and copper were COPECs in surface soil and sediment. Further evaluation is recommended to determine whether the COPECs pose a threat of harm to ecological receptors.

Human health risk screening identified antimony, arsenic, copper, lead, and several SVOCs as COPCs in soil. Further evaluation is recommended to determine the risk to human health presented by these COPCs. Based on the ALM results, evaluation of an IRA for lead at the Trap and Skeet Range is warranted.

Arsenic and lead were identified as COPCs in sediment, and further evaluation is recommended to determine the risk to human health presented by these COPCs.

Lead was identified as a COPC in surface water, and further evaluation is recommended to determine the risk to human health presented by lead.

Table 5-1. Surface Soil Screening – ECCL Firing Range: Ecological

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	PBT Chemical?[c]	ESV[d] (mg/kg)	MDC exceeds ESV?	COPEC?	Ratio of MDC to ESV
			Minimum	Maximum								
DITCHES												
Metals												
Antimony	**7440-36-0**	**9/ 10**	**1**	**14**	**5.21**	**9.3**	**Yes**	**No**	**0.27**	**Yes**	**Yes**	**52**
Arsenic	7440-38-2	10/ 10	9.3	35	21.2	36.5	No	No	18	Yes	No	2
Copper	**7440-50-8**	**10/ 10**	**44**	**230**	**105**	**56.2**	**Yes**	**No**	**28**	**Yes**	**Yes**	**8**
Iron	7439-89-6	10/ 10	9500	70000	25900	234000	No	No	--	--	No	No ESV
Lead	**7439-92-1**	**10/ 10**	**100**	**1600**	**573**	**48.6**	**Yes**	**Yes**	**11**	**Yes**	**Yes**	**145**
Zinc	**7440-66-6**	**10/ 10**	**36**	**690**	**227**	**322**	**Yes**	**No**	**46**	**Yes**	**Yes**	**15**
Organics-Semivolatile												
1,1'-Biphenyl	92-52-4	1/ 10	0.0089	0.0089	0.255	--	--	No	60	No	No	0.0001
2-Methylnaphthalene	91-57-6	4/ 10	0.0063	0.094	0.0472	--	--	No	3.24	No	No	0.03
Acenaphthene	83-32-9	1/ 10	0.015	0.015	0.0352	--	--	No	20	No	No	0.0008
Acenaphthylene	208-96-8	4/ 10	0.0074	0.022	0.0376	--	--	No	682	No	No	0.00003
Anthracene	120-12-7	4/ 10	0.0098	0.56	0.0678	--	--	No	1480	No	No	0.0004
Benz(*a*)anthracene	**56-55-3**	**8/ 10**	**0.0094**	**20**	**2.06**	**--**	**--**	**No**	**5.21**	**Yes**	**Yes**	**4**
Benzaldehyde	**100-52-7**	**2/ 10**	**0.029**	**0.079**	**0.506**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Benzo(*a*)pyrene	**50-32-8**	**9/ 10**	**0.0077**	**19**	**1.97**	**--**	**--**	**No**	**1.52**	**Yes**	**Yes**	**13**
Benzo(*b*)fluoranthene	205-99-2	9/ 10	0.0097	11	1.2	--	--	No	59.8	No	No	0.18
Benzo(*g,h,i*)perylene	**191-24-2**	**6/ 10**	**0.018**	**7.1**	**0.75**	**--**	**--**	**Yes**	**119**	**No**	**Yes**	**0.06**
Benzo(*k*)fluoranthene	207-08-9	5/ 10	0.011	0.27	0.0811	--	--	No	148	No	No	0.002
Bis(2-ethylhexyl)phthalate	117-81-7	5/ 10	0.036	0.087	0.359	--	--	No	0.925	No	No	0.09
Chrysene	**218-01-9**	**8/ 10**	**0.016**	**41**	**4.19**	**--**	**--**	**No**	**4.73**	**Yes**	**Yes**	**9**
Di-n-butyl phthalate	84-74-2	4/ 10	0.033	0.052	0.351	--	--	No	200	No	No	0.0003
Dibenz(*a,h*)anthracene	53-70-3	1/ 10	3.5	3.5	0.356	--	--	No	18.4	No	No	0.19
Dibenzofuran	**132-64-9**	**3/ 10**	**0.015**	**0.057**	**0.257**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Fluoranthene	206-44-0	9/ 10	0.012	2.5	0.382	--	--	No	122	No	No	0.02
Fluorene	86-73-7	2/ 10	0.019	0.019	0.0369	--	--	No	30	No	No	0.0006
Indeno(1,2,3-*cd*)pyrene	193-39-5	6/ 10	0.011	2.5	0.286	--	--	No	109	No	No	0.023
Naphthalene	91-20-3	2/ 10	0.013	0.02	0.0364	--	--	No	0.0994	No	No	0.20
Phenanthrene	85-01-8	10/ 10	0.0063	2.8	0.363	--	--	No	45.7	No	No	0.061
Phenol	108-95-2	2/ 10	0.041	0.069	0.262	--	--	No	30	No	No	0.0023
Pyrene	129-00-0	10/ 10	0.01	11	1.2	--	--	No	78.5	No	No	0.14
PISTOL RANGE (EAST)												
Metals												
Antimony	**7440-36-0**	**28/ 29**	**0.55**	**460**	**20.4**	**9.3**	**Yes**	**No**	**0.27**	**Yes**	**Yes**	**1704**
Arsenic	7440-38-2	29/ 29	4.4	30	18	36.5	No	No	18	Yes	No	1.7
Copper	**7440-50-8**	**29/ 29**	**33**	**580**	**121**	**56.2**	**Yes**	**No**	**28**	**Yes**	**Yes**	**21**
Iron	7439-89-6	29/ 29	10000	29000	20700	234000	No	No	--	--	No	No ESV
Lead	**7439-92-1**	**29/ 29**	**13**	**35000**	**2580**	**48.6**	**Yes**	**Yes**	**11**	**Yes**	**Yes**	**3182**
Tin	**7440-31-5**	**10/ 29**	**3.4**	**320**	**15.8**	**--**	**--**	**No**	**50**	**Yes**	**Yes**	**6**
Zinc	7440-66-6	29/ 29	12	250	61.1	322	No	No	46	Yes	No	5
Organics-Semivolatile												
1,1'-Biphenyl	92-52-4	3/ 29	0.0042	0.0079	0.0357	--	--	No	60	No	No	0.0001
2,4-Dinitrotoluene	121-14-2	1/ 29	0.034	0.034	0.148	--	--	No	1.28	No	No	0.027
2-Methylnaphthalene	91-57-6	25/ 29	0.0055	0.45	0.104	--	--	No	3.24	No	No	0.14
Acenaphthylene	208-96-8	5/ 29	0.012	0.041	0.00905	--	--	No	682	No	No	0.0001
Acetophenone	98-86-2	4/ 29	0.011	0.013	0.0684	--	--	No	300	No	No	0.00004
Anthracene	120-12-7	6/ 29	0.0056	0.02	0.00683	--	--	No	1480	No	No	0.00001
Benz(*a*)anthracene	56-55-3	25/ 29	0.0059	0.16	0.0297	--	--	No	5.21	No	No	0.031
Benzaldehyde	**100-52-7**	**16/ 29**	**0.015**	**0.47**	**0.0911**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Benzo(*a*)pyrene	50-32-8	24/ 29	0.0064	0.18	0.0363	--	--	No	1.52	No	No	0.12
Benzo(*b*)fluoranthene	205-99-2	24/ 29	0.0099	0.25	0.0521	--	--	No	59.8	No	No	0.0042
Benzo(*g,h,i*)perylene	**191-24-2**	**19/ 29**	**0.0083**	**0.11**	**0.0221**	**--**	**--**	**Yes**	**119**	**No**	**Yes**	**0.0009**

Table 5-1. Surface Soil Screening – ECCL Firing Range: Ecological (continued)

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	PBT Chemical?[c]	ESV[d] (mg/kg)	MDC exceeds ESV?	COPEC?	Ratio of MDC to ESV
			Minimum	Maximum								
Benzo(*k*)fluoranthene	207-08-9	23/ 29	0.0044	0.091	0.0199	--	--	No	148	No	No	0.0006
Bis(2-ethylhexyl)phthalate	117-81-7	13/ 29	0.023	0.65	0.0694	--	--	No	0.925	No	No	0.70
Caprolactam	**105-60-2**	**1/ 29**	**0.059**	**0.059**	**0.245**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Chrysene	218-01-9	25/ 29	0.0077	0.3	0.0541	--	--	No	4.73	No	No	0.063
Di-n-butyl phthalate	84-74-2	7/ 29	0.018	0.44	0.0712	--	--	No	200	No	No	0.0022
Dibenz(*a*,*h*)anthracene	53-70-3	1/ 29	0.0063	0.0063	0.00513	--	--	No	18.4	No	No	0.0003
Dibenzofuran	**132-64-9**	**6/ 29**	**0.012**	**0.024**	**0.0356**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Diethyl phthalate	84-66-2	2/ 29	0.032	0.044	0.0527	--	--	No	100	No	No	0.0004
Fluoranthene	206-44-0	24/ 29	0.0083	0.17	0.0385	--	--	No	122	No	No	0.0014
Indeno(1,2,3-*cd*)pyrene	193-39-5	15/ 29	0.0067	0.06	0.0151	--	--	No	109	No	No	0.0006
Isophorone	78-59-1	1/ 29	0.03	0.03	0.0381	--	--	No	139	No	No	0.0002
N-Nitrosodiphenylamine	86-30-6	6/ 29	0.054	0.67	0.102	--	--	No	20	No	No	0.034
Naphthalene	**91-20-3**	**19/ 29**	**0.0081**	**0.16**	**0.0359**	**--**	**--**	**No**	**0.0994**	**Yes**	**Yes**	**2**
Phenanthrene	85-01-8	26/ 29	0.0069	0.17	0.0526	--	--	No	45.7	No	No	0.0037
Pyrene	129-00-0	26/ 29	0.0085	0.16	0.045	--	--	No	78.5	No	No	0.0020
PISTOL RANGE (WEST)												
Metals												
Antimony	**7440-36-0**	**28/ 30**	**0.58**	**53**	**10.9**	**9.3**	**Yes**	**No**	**0.27**	**Yes**	**Yes**	**196**
Arsenic	7440-38-2	30/ 30	6	29	14.6	36.5	No	No	18	Yes	No	2
Copper	**7440-50-8**	**30/ 30**	**32**	**8700**	**542**	**56.2**	**Yes**	**No**	**28**	**Yes**	**Yes**	**311**
Iron	7439-89-6	30/ 30	8300	28000	18600	234000	No	No	--	--	No	No ESV
Lead	**7439-92-1**	**30/ 30**	**27**	**13000**	**2530**	**48.6**	**Yes**	**Yes**	**11**	**Yes**	**Yes**	**1182**
Tin	7440-31-5	5/ 30	4.3	35	6.53	--	--	No	50	No	No	0.70
Zinc	**7440-66-6**	**30/ 30**	**13**	**1300**	**138**	**322**	**Yes**	**No**	**46**	**Yes**	**Yes**	**28**
Organics-Semivolatile												
1,1'-Biphenyl	92-52-4	3/ 30	0.0072	0.014	0.0331	--	--	No	60	No	No	0.0002
2-Methylnaphthalene	91-57-6	25/ 30	0.0099	0.53	0.152	--	--	No	3.24	No	No	0.16
Acenaphthene	83-32-9	2/ 30	0.043	0.045	0.00715	--	--	No	20	No	No	0.0023
Acenaphthylene	208-96-8	5/ 30	0.013	0.08	0.0103	--	--	No	682	No	No	0.0001
Acetophenone	98-86-2	1/ 30	0.013	0.013	0.0681	--	--	No	300	No	No	0.00004
Anthracene	120-12-7	8/ 30	0.0068	0.17	0.0176	--	--	No	1480	No	No	0.0001
Benz(*a*)anthracene	56-55-3	25/ 30	0.0055	0.68	0.0767	--	--	No	5.21	No	No	0.13
Benzaldehyde	**100-52-7**	**11/ 30**	**0.015**	**0.66**	**0.104**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Benzo(*a*)pyrene	50-32-8	26/ 30	0.0074	0.57	0.083	--	--	No	1.52	No	No	0.38
Benzo(*b*)fluoranthene	205-99-2	30/ 30	0.011	1.4	0.151	--	--	No	59.8	No	No	0.023
Benzo(*g,h,i*)perylene	**191-24-2**	**21/ 30**	**0.011**	**0.2**	**0.0371**	**--**	**--**	**Yes**	**119**	**No**	**Yes**	0.0017
Benzo(*k*)fluoranthene	207-08-9	24/ 30	0.0051	0.6	0.0574	--	--	No	148	No	No	0.0041
Bis(2-ethylhexyl)phthalate	**117-81-7**	**1/ 30**	**2.2**	**2.2**	**0.131**	**--**	**--**	**No**	**0.925**	**Yes**	**Yes**	**2**
Butyl benzyl phthalate	**85-68-7**	**2/ 30**	**0.024**	**0.81**	**0.0738**	**--**	**--**	**No**	**0.239**	**Yes**	**Yes**	**3**
Carbazole	**86-74-8**	**1/ 30**	**0.084**	**0.084**	**0.0356**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Chrysene	218-01-9	28/ 30	0.012	3.9	0.227	--	--	No	4.73	No	No	0.82
Di-n-butyl phthalate	84-74-2	17/ 30	0.017	0.25	0.0535	--	--	No	200	No	No	0.0013
Dibenz(*a*,*h*)anthracene	53-70-3	2/ 30	0.023	0.04	0.00644	--	--	No	18.4	No	No	0.0022
Dibenzofuran	**132-64-9**	**5/ 30**	**0.0061**	**0.053**	**0.0335**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Diethyl phthalate	84-66-2	2/ 30	0.042	0.046	0.0489	--	--	No	100	No	No	0.0005
Fluoranthene	206-44-0	29/ 30	0.0091	2.1	0.167	--	--	No	122	No	No	0.017
Fluorene	86-73-7	1/ 30	0.073	0.073	0.00678	--	--	No	30	No	No	0.0024
Indeno(1,2,3-*cd*)pyrene	193-39-5	17/ 30	0.002	0.21	0.0274	--	--	No	109	No	No	0.0019
N-Nitrosodiphenylamine	86-30-6	8/ 30	0.042	0.28	0.0612	--	--	No	20	No	No	0.014
Naphthalene	**91-20-3**	**25/ 30**	**0.0049**	**0.18**	**0.0476**	**--**	**--**	**No**	**0.0994**	**Yes**	**Yes**	**2**
Phenanthrene	85-01-8	29/ 30	0.0078	0.88	0.106	--	--	No	45.7	No	No	0.019
Pyrene	129-00-0	30/ 30	0.0099	1.6	0.156	--	--	No	78.5	No	No	0.020

Table 5-1. Surface Soil Screening – ECCL Firing Range: Ecological (continued)

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg) Minimum	Detected Concentration (mg/kg) Maximum	Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	PBT Chemical?[c]	ESV[d] (mg/kg)	MDC exceeds ESV?	COPEC?	Ratio of MDC to ESV
RIFLE RANGE												
Metals												
Antimony	**7440-36-0**	**34/ 37**	**0.53**	**160**	**18.7**	**9.3**	**Yes**	**No**	**0.27**	**Yes**	**Yes**	**593**
Arsenic	7440-38-2	37/ 37	6.1	34	19.7	36.5	No	No	18	Yes	No	2
Copper	**7440-50-8**	**37/ 37**	**15**	**840**	**194**	**56.2**	**Yes**	**No**	**28**	**Yes**	**Yes**	**30**
Iron	7439-89-6	37/ 37	14000	34000	24100	234000	No	No	--	--	No	No ESV
Lead	**7439-92-1**	**37/ 37**	**22**	**28000**	**3370**	**48.6**	**Yes**	**Yes**	**11**	**Yes**	**Yes**	**2545**
Zinc	7440-66-6	37/ 37	14	170	46.4	322	No	No	46	Yes	No	4
Organics-Semivolatile												
1,1'-Biphenyl	92-52-4	20/ 37	0.0038	0.034	0.0569	--	--	No	60	No	No	0.0006
2-Methylnaphthalene	91-57-6	36/ 37	0.019	1.3	0.473	--	--	No	3.24	No	No	0.40
Acenaphthene	83-32-9	6/ 37	0.0093	0.045	0.0119	--	--	No	20	No	No	0.0023
Acenaphthylene	208-96-8	13/ 37	0.0082	0.043	0.0142	--	--	No	682	No	No	0.0001
Anthracene	120-12-7	17/ 37	0.0052	0.17	0.02	--	--	No	1480	No	No	0.0001
Benz(*a*)anthracene	56-55-3	27/ 37	0.006	4.5	0.18	--	--	No	5.21	No	No	0.86
Benzaldehyde	**100-52-7**	**18/ 37**	**0.015**	**0.99**	**0.185**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Benzo(*a*)pyrene	**50-32-8**	**26/ 37**	**0.0076**	**4.9**	**0.196**	**--**	**--**	**No**	**1.52**	**Yes**	**Yes**	**3**
Benzo(*b*)fluoranthene	205-99-2	29/ 37	0.011	2.8	0.182	--	--	No	59.8	No	No	0.047
Benzo(*g,h,i*)perylene	**191-24-2**	**22/ 37**	**0.0073**	**1.7**	**0.0759**	**--**	**--**	**Yes**	**119**	**No**	**Yes**	**0.014**
Benzo(*k*)fluoranthene	207-08-9	23/ 37	0.004	0.3	0.0437	--	--	No	148	No	No	0.0020
Bis(2-ethylhexyl)phthalate	117-81-7	3/ 37	0.026	0.037	0.106	--	--	No	0.925	No	No	0.040
Chrysene	**218-01-9**	**31/ 37**	**0.011**	**11**	**0.409**	**--**	**--**	**No**	**4.73**	**Yes**	**Yes**	**2**
Di-n-butyl phthalate	84-74-2	1/ 37	0.22	0.22	0.103	--	--	No	200	No	No	0.0011
Dibenz(*a,h*)anthracene	53-70-3	4/ 37	0.034	0.71	0.0315	--	--	No	18.4	No	No	0.039
Dibenzofuran	**132-64-9**	**21/ 37**	**0.013**	**0.065**	**0.0643**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Fluoranthene	206-44-0	30/ 37	0.01	0.68	0.108	--	--	No	122	No	No	0.0056
Fluorene	86-73-7	6/ 37	0.011	0.043	0.0126	--	--	No	30	No	No	0.0014
Indeno(1,2,3-*cd*)pyrene	193-39-5	17/ 37	0.0048	0.58	0.0414	--	--	No	109	No	No	0.0053
N-Nitrosodiphenylamine	86-30-6	4/ 37	0.025	0.18	0.0813	--	--	No	20	No	No	0.0090
Naphthalene	**91-20-3**	**36/ 37**	**0.0068**	**0.38**	**0.136**	**--**	**--**	**No**	**0.0994**	**Yes**	**Yes**	**4**
Phenanthrene	85-01-8	37/ 37	0.0071	0.54	0.237	--	--	No	45.7	No	No	0.012
Pyrene	129-00-0	36/ 37	0.0077	1.8	0.153	--	--	No	78.5	No	No	0.023
TRAP AND SKEET RANGE												
Metals												
Antimony	**7440-36-0**	**79/ 89**	**0.54**	**10000**	**393**	**9.3**	**Yes**	**No**	**0.27**	**Yes**	**Yes**	**37037**
Arsenic	**7440-38-2**	**89/ 89**	**3.7**	**2200**	**114**	**36.5**	**Yes**	**No**	**18**	**Yes**	**Yes**	**122**
Copper	**7440-50-8**	**89/ 89**	**4.2**	**83**	**17.3**	**56.2**	**Yes**	**No**	**28**	**Yes**	**Yes**	**3**
Iron	7439-89-6	89/ 89	5200	59000	14600	234000	No	No	--	--	No	No ESV
Lead	**7439-92-1**	**89/ 89**	**30**	**100000**	**9000**	**48.6**	**Yes**	**Yes**	**11**	**Yes**	**Yes**	**9091**
Tin	**7440-31-5**	**2/ 89**	**190**	**300**	**10.7**	**--**	**--**	**No**	**50**	**Yes**	**Yes**	**6**
Zinc	**7440-66-6**	**89/ 89**	**14**	**360**	**45.1**	**322**	**Yes**	**No**	**46**	**Yes**	**Yes**	**8**
Organics-Semivolatile												
1,1'-Biphenyl	92-52-4	2/ 89	0.016	0.044	0.632	--	--	No	60	No	No	0.001
2-Methylnaphthalene	**91-57-6**	**35/ 89**	**0.0039**	**8.7**	**0.43**	**--**	**--**	**No**	**3.24**	**Yes**	**Yes**	**3**
2-Methylphenol	95-48-7	1/ 89	0.014	0.014	2.5	--	--	No	40.4	No	No	0.0003
Acenaphthene	83-32-9	23/ 89	0.0098	9.6	0.649	--	--	No	20	No	No	0.48
Acenaphthylene	208-96-8	5/ 89	0.0056	0.1	0.0846	--	--	No	682	No	No	0.0001
Acetophenone	98-86-2	1/ 89	0.014	0.014	1.25	--	--	No	300	No	No	0.00005
Anthracene	120-12-7	32/ 89	0.0019	9.6	0.672	--	--	No	1480	No	No	0.006
Benz(*a*)anthracene	**56-55-3**	**88/ 89**	**0.0043**	**200**	**14.5**	**--**	**--**	**No**	**5.21**	**Yes**	**Yes**	**38**
Benzaldehyde	**100-52-7**	**27/ 89**	**0.014**	**2.8**	**1.24**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Benzo(*a*)pyrene	**50-32-8**	**89/ 89**	**0.0051**	**220**	**18.1**	**--**	**--**	**No**	**1.52**	**Yes**	**Yes**	**145**
Benzo(*b*)fluoranthene	**205-99-2**	**86/ 89**	**0.0075**	**210**	**16.1**	**--**	**--**	**No**	**59.8**	**Yes**	**Yes**	**4**

Table 5-1. Surface Soil Screening – ECCL Firing Range: Ecological (continued)

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	PBT Chemical?[c]	ESV[d] (mg/kg)	MDC exceeds ESV?	COPEC?	Ratio of MDC to ESV
			Minimum	Maximum								
Benzo(*g,h,i*)perylene	**191-24-2**	**66/ 89**	**0.0041**	**140**	**8.91**	**--**	**--**	**Yes**	**119**	**Yes**	**Yes**	**1**
Benzo(*k*)fluoranthene	207-08-9	79/ 89	0.004	77	4.97	--	--	No	148	No	No	0.52
Bis(2-ethylhexyl)phthalate	**117-81-7**	**16/ 89**	**0.025**	**1.5**	**0.897**	**--**	**--**	**No**	**0.925**	**Yes**	**Yes**	**2**
Carbazole	**86-74-8**	**10/ 89**	**0.035**	**10**	**0.785**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Chrysene	**218-01-9**	**88/ 89**	**0.0068**	**370**	**24.1**	**--**	**--**	**No**	**4.73**	**Yes**	**Yes**	**78**
Di-n-butyl phthalate	84-74-2	22/ 89	0.017	0.16	0.879	--	--	No	200	No	No	0.001
Dibenz(*a,h*)anthracene	**53-70-3**	**32/ 89**	**0.0094**	**42**	**2.95**	**--**	**--**	**No**	**18.4**	**Yes**	**Yes**	**2**
Dibenzofuran	**132-64-9**	**19/ 89**	**0.0036**	**1.6**	**0.55**	**--**	**--**	**No**	**--**	**--**	**Yes**	**No ESV**
Fluoranthene	**206-44-0**	**83/ 89**	**0.01**	**130**	**9**	**--**	**--**	**No**	**122**	**Yes**	**Yes**	**1**
Fluorene	86-73-7	23/ 89	0.0052	3.2	0.235	--	--	No	30	No	No	0.11
Indeno(1,2,3-*cd*)pyrene	193-39-5	58/ 89	0.0043	88	5.56	--	--	No	109	No	No	0.81
N-Nitrosodiphenylamine	86-30-6	4/ 89	0.079	0.45	0.642	--	--	No	20	No	No	0.023
Naphthalene	**91-20-3**	**21/ 89**	**0.0044**	**2**	**0.146**	**--**	**--**	**No**	**0.0994**	**Yes**	**Yes**	**20**
Pentachlorophenol	87-86-5	4/ 88	0.048	0.12	1.9	--	--	No	2.1	No	No	0.057
Phenanthrene	**85-01-8**	**80/ 89**	**0.0052**	**54**	**3.55**	**--**	**--**	**No**	**45.7**	**Yes**	**Yes**	**1**
Phenol	108-95-2	5/ 89	0.015	0.027	0.632	--	--	No	30	No	No	0.0009
Pyrene	**129-00-0**	**89/ 89**	**0.007**	**200**	**13**	**--**	**--**	**No**	**78.5**	**Yes**	**Yes**	**3**

[a] Average concentration for all samples using 1/2 detection limit for non-detects.
[b] Naturally occurring background concentration.
[c] PBT compounds are defined by the Ohio Environmental Protection Agency (Ohio EPA 2008) as: aldrin/dieldrin; chlordane; 1,1'-(2,2,2trichloroethylidene)bis[4-chlorobenzene] (DDT) and metabolites (DDD+DDE); hexachlorobenzene; hexachlorobutadiene (hexachloro-1,3-butadiene); hexachlorocyclohexanes (BHCs, alpha-BHC, beta-BHC, delta-BHC); lindane (gamma-hexachlorocyclohexane); alkyl-lead; mercury and its compounds; mirex; photomirex; octachlorostyrene; polychlorinated biphenyls; 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD); dioxin; PCDF (furans); 1,2,3,4-tetrachlorobenzene; 1,2,4,5-tetrachlorobenzene; toxaphene; and other chemicals that are reasonably anticipated to bioaccumulate in animal tissues. The United States Environmental Protection Agency (USEPA 2015a) also includes benzo(*g,h,i*)perylene and lead.
[d] ESVs were selected from the following hierarchy of sources: USEPA Ecological Soil Screening Levels (EcoSSLs) [USEPA 2015b], followed by Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al. 1997), and then USEPA Region 5 ESLs (USEPA 2003).
-- = no value available.
CAS = Chemical Abstracts Service.
COPEC = Chemical of Potential Ecological Concern.
ESV = Ecological Screening Value.
HQ = Hazard Quotient.
MDC = Maximum Detected Concentration.
mg/kg = Milligrams per Kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
Bold = detected chemical is a COPEC. COPECs are site-related chemicals with MDCs that exceed the ESV, site-related chemicals with no ESV, and PBT chemicals.

Table 5-2. Sediment Screening – ECCL Firing Range Pond: Ecological

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Ohio SRV[b] (mg/kg)	MDC exceeds Ohio SRV?	PBT Chemical?[c]	ESV[d] (mg/kg)	MDC exceeds ESV?	COPEC?	Ratio of MDC to ESV
			Minimum	Maximum								
Metals												
Antimony	**7440-36-0**	**5/ 10**	**0.93**	**2.2**	**3**	**0.84**	Yes	**No**	**--**	**--**	**Yes**	**--**
Arsenic	**7440-38-2**	**10/ 10**	**8.2**	**31**	**15.9**	**11**	**Yes**	**No**	**9.79**	**Yes**	**Yes**	**3**
Copper	**7440-50-8**	**10/ 10**	**35**	**540**	**197**	**42**	Yes	**No**	**31.6**	**Yes**	**Yes**	**17**
Iron	**7439-89-6**	**10/ 10**	**8800**	**53000**	**26700**	**44000**	Yes	**No**	**--**	**--**	**Yes**	**--**
Lead	**7439-92-1**	**10/ 10**	**20**	**3500**	**754**	**47**	**Yes**	**Yes**	**35.8**	**Yes**	**Yes**	**98**
Zinc	**7440-66-6**	**10/ 10**	**22**	**480**	**214**	**190**	Yes	**No**	**121**	**Yes**	**Yes**	**4**
Organics-Semivolatile												
1,1'-Biphenyl	**92-52-4**	**2/ 10**	**0.013**	**0.018**	**0.107**	**--**	**--**	**No**	**--**	**--**	**Yes**	**--**
2-Methylnaphthalene	**91-57-6**	**5/ 10**	**0.019**	**0.38**	**0.101**	**--**	**--**	**No**	**0.0202**	**Yes**	**Yes**	**19**
Anthracene	120-12-7	1/ 10	0.012	0.012	0.0155	--	--	No	0.0572	No	No	0.2
Benz(*a*)anthracene	56-55-3	3/ 10	0.026	0.061	0.0248	--	--	No	0.108	No	No	0.6
Benzo(*a*)pyrene	50-32-8	4/ 10	0.012	0.084	0.0301	--	--	No	0.15	No	No	0.6
Benzo(*b*)fluoranthene	205-99-2	4/ 10	0.015	0.09	0.0298	--	--	No	10.4	No	No	0.01
Benzo(*g,h,i*)perylene	**191-24-2**	**3/ 10**	**0.031**	**0.055**	**0.0251**	**--**	**--**	**Yes**	**0.17**	**No**	**Yes**	0.3
Benzo(*k*)fluoranthene	207-08-9	3/ 10	0.012	0.034	0.019	--	--	No	0.24	No	No	0.1
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 10	0.12	0.12	0.151	--	--	No	0.182	No	No	0.7
Caprolactam	**105-60-2**	**1/ 10**	**0.31**	**0.31**	**0.69**	**--**	**--**	**No**	**--**	**--**	**Yes**	**--**
Chrysene	218-01-9	5/ 10	0.012	0.098	0.0367	--	--	No	0.166	No	No	0.6
Di-n-butyl phthalate	84-74-2	1/ 10	0.1	0.1	0.149	--	--	No	1.114	No	No	0.1
Dibenzofuran	132-64-9	1/ 10	0.019	0.019	0.11	--	--	No	0.449	No	No	0.04
Fluoranthene	206-44-0	8/ 10	0.011	0.12	0.0341	--	--	No	0.423	No	No	0.3
Indeno(1,2,3-*cd*)pyrene	193-39-5	3/ 10	0.016	0.04	0.0204	--	--	No	0.2	No	No	0.2
Naphthalene	91-20-3	4/ 10	0.021	0.12	0.0407	--	--	No	0.176	No	No	0.7
Phenanthrene	85-01-8	4/ 10	0.016	0.16	0.0481	--	--	No	0.204	No	No	0.8
Pyrene	129-00-0	7/ 10	0.016	0.12	0.0402	--	--	No	0.195	No	No	0.6

[a] Average concentration for all samples using 1/2 detection limit for non-detects.
[b] Ohio SRVs represent naturally occurring background levels of metals in unimpacted sediments.
[c] PBT compounds are defined by the Ohio Environmental Protection Agency (Ohio EPA 2008) as: aldrin/dieldrin; chlordane; 1,1'-(2,2,2trichloroethylidene)bis[4-chlorobenzene] (DDT) and metabolites (DDD+DDE); hexachlorobenzene; hexachlorobutadiene (hexachloro-1,3-butadiene); hexachlorocyclohexanes (BHCs, alpha-BHC, beta-BHC, delta-BHC); lindane (gamma-hexachlorocyclohexane); alkyl-lead; mercury and its compounds; mirex; photomirex; octachlorostyrene; polychlorinated biphenyls; 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD); dioxin; PCDF (furans); 1,2,3,4-tetrachlorobenzene; 1,2,4,5-tetrachlorobenzene; toxaphene; and other chemicals that are reasonably anticipated to bioaccumulate in animal tissues. The USEPA (2015a) also includes benzo(*g,h,i*)perylene and lead.
[d] ESVs were selected from the following hierarchy of sources: freshwater threshold effect concentration from MacDonald et al. (2000), followed by USEPA Region 5 ecological screening levels (ESLs) [USEPA 2003].
-- = no value available.
CAS = Chemical Abstracts Service.
COPEC = Chemical of Potential Ecological Concern.
ESV = Ecological Screening Value.
HQ = Hazard Quotient.
MDC = Maximum Detected Concentration.
mg/kg = Milligrams per Kilogram.
PBT = Persistent, Bioaccumulative, and Toxic.
SRV = Sediment Reference Value.
Bold = detected chemical is a COPEC. COPECs are site-related chemicals with MDCs that exceed the ESV, site-related chemicals with no ESV, and PBT chemicals.

Table 5-3. Surface Water Screening – ECCL Firing Range Pond: Ecological

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (µg/L)		Average Concentration[a] (µg/L)	PBT Chemical?[b]	ESV[c] (µg/L)	MDC Exceeds ESV?	COPEC?	Ratio of MDC to ESV
			Minimum	Maximum						
Metals										
Antimony	7440-36-0	5/ 10	0.24	0.52	0.669	No	900	No	No	0.0006
Arsenic	7440-38-2	10/ 10	0.62	1	0.822	No	340	No	No	0.0029
Copper	**7440-50-8**	**8/ 10**	**3.9**	**24**	**8.94**	**No**	**13**	**Yes**	**Yes**	**2**
Iron	7439-89-6	10/ 10	250	870	409	No	1000	No	No	0.9
Lead	**7439-92-1**	**10/ 10**	**2.4**	**28**	**15.6**	**Yes**	**97**	**No**	**Yes**	0.29
Tin	7440-31-5	1/ 10	2.3	2.3	4.73	No	1600	No	No	0.0014
Zinc	7440-66-6	10/ 10	44	67	59.1	No	120	No	No	0.56
Organics-Semivolatile										
Caprolactam	**105-60-2**	**3/ 9**	**0.32**	**0.37**	**1.83**	**No**	**--**	**--**	**Yes**	**--**
Isophorone	78-59-1	1/ 10	0.35	0.35	0.49	No	7500	No	No	0.00005

[a] Average concentration for all samples using 1/2 detection limit for non-detects.
[b] PBT compounds are defined by the Ohio Environmental Protection Agency (Ohio EPA 2008) as: aldrin/dieldrin; chlordane; 1,1'-(2,2,2trichloroethylidene)bis[4-chlorobenzene] (DDT) and metabolites (DDD+DDE); hexachlorobenzene; hexachlorobutadiene (hexachloro-1,3-butadiene); hexachlorocyclohexanes (BHCs, alpha-BHC, beta-BHC, delta-BHC); lindane (gamma-hexachlorocyclohexane); alkyl-lead; mercury and its compounds; mirex; photomirex; octachlorostyrene; polychlorinated biphenyls; 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD); dioxin; PCDF (furans); 1,2,3,4-tetrachlorobenzene; 1,2,4,5-tetrachlorobenzene; toxaphene; and other chemicals that are reasonably anticipated to bioaccumulate in animal tissues. The USEPA (2015a) also includes benzo(*g,h,i*)perylene and lead.
[c] ESVs are from Ohio EPA Water Quality Criteria for the Ohio River Basin (Ohio EPA Outside Mixing Zone Maximum), chronic National Ambient Water Quality Criteria, Tier II secondary chronic values (Suter & Tsao 1996), and United States Environmental Protection Agency Region 5 ecological screening levels (ESLs) [USEPA 2003].
-- = No Value Available.
µg/L = Micrograms per Liter.
CAS = Chemical Abstracts Service.
COPEC = Chemical of Potential Ecological Concern.
ESV = Ecological Screening Value.
MDC = Maximum Detected Concentration.
PBT = Persistent, Bioaccumulative, and Toxic.
Bold = detected chemical is a COPEC. COPECs are site-related chemicals with MDCs that exceed the ESV, site-related chemicals with no ESV, and PBT chemicals.

Table 5-4. Surface Soil Screening – ECCL Firing Range: Human Health

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	Screening Level[c] (HQ = 1, Risk = 1E-6) (mg/kg)		MDC exceeds Screening Level?	Ratio[d] MDC/SL (HQ = 1, Risk = 1E-05)
			Minimum	Maximum							
DITCHES											
Metals											
Antimony	7440-36-0	9/ 10	1	14	5.21	9.3	Yes	31	(n)	No	0.5
Arsenic	7440-38-2	10/ 10	9.3	35	21.2	36.5	No	0.68	(c)	No	NA
Copper	7440-50-8	10/ 10	44	230	105	56.2	Yes	3100	(n)	No	0.07
Iron	7439-89-6	10/ 10	9500	70000	25900	234000	No	55000	(n)	No	NA
Lead	**7439-92-1**	**10/ 10**	**100**	**1600**	**573**	**48.6**	**Yes**	**400**		**Yes**	**NA**
Zinc	7440-66-6	10/ 10	36	690	227	322	Yes	23000	(n)	No	0.03
Organics – Semivolatile											
1,1'-Biphenyl	92-52-4	1/ 10	0.0089	0.0089	0.255	--	--	47	(n)	No	0.0002
2-Methylnaphthalene	91-57-6	4/ 10	0.0063	0.094	0.0472	--	--	240	(n)	No	0.0004
Acenaphthene	83-32-9	1/ 10	0.015	0.015	0.0352	--	--	3600	(n)	No	0.000004
Acenaphthylene[e]	208-96-8	4/ 10	0.0074	0.022	0.0376	--	--	1800	(n)	No	0.00001
Anthracene	120-12-7	4/ 10	0.0098	0.56	0.0678	--	--	18000	(n)	No	0.00003
Benz(*a*)anthracene	**56-55-3**	**8/ 10**	**0.0094**	**20**	**2.06**	**--**	**--**	**0.16**	**(c)**	**Yes**	**13**
Benzaldehyde	100-52-7	2/ 10	0.029	0.079	0.506	--	--	170	(c)	No	0.00005
Benzo(*a*)pyrene	**50-32-8**	**9/ 10**	**0.0077**	**19**	**1.97**	**--**	**--**	**0.016**	**(c)**	**Yes**	**119**
Benzo(*b*)fluoranthene	**205-99-2**	**9/ 10**	**0.0097**	**11**	**1.2**	**--**	**--**	**0.16**	**(c)**	**Yes**	**7**
Benzo(*g,h,i*)perylene[e]	191-24-2	6/ 10	0.018	7.1	0.75	--	--	1800	(n)	No	0.004
Benzo(k)fluoranthene	207-08-9	5/ 10	0.011	0.27	0.0811	--	--	1.6	(c)	No	0.02
Bis(2-ethylhexyl)phthalate	117-81-7	5/ 10	0.036	0.087	0.359	--	--	39	(c)	No	0.0002
Chrysene	218-01-9	8/ 10	0.016	41	4.19	--	--	16	(c)	Yes	0.3
Di-n-butyl phthalate	84-74-2	4/ 10	0.033	0.052	0.351	--	--	6300	(n)	No	0.000008
Dibenz(*a,h*)anthracene	**53-70-3**	**1/ 10**	**3.5**	**3.5**	**0.356**	**--**	**--**	**0.016**	**(c)**	**Yes**	**22**
Dibenzofuran	132-64-9	3/ 10	0.015	0.057	0.257	--	--	73	(n)	No	0.0008
Fluoranthene	206-44-0	9/ 10	0.012	2.5	0.382	--	--	2400	(n)	No	0.001
Fluorene	86-73-7	2/ 10	0.019	0.019	0.0369	--	--	2400	(n)	No	0.000008
Indeno(1,2,3-*cd*)pyrene	**193-39-5**	**6/ 10**	**0.011**	**2.5**	**0.286**	**--**	**--**	**0.16**	**(c)**	**Yes**	**2**
Naphthalene	91-20-3	2/ 10	0.013	0.02	0.0364	--	--	3.8	(c)	No	0.0005
Phenanthrene[e]	85-01-8	10/ 10	0.0063	2.8	0.363	--	--	1800	(n)	No	0.002
Phenol	108-95-2	2/ 10	0.041	0.069	0.262	--	--	19000	(n)	No	0.000004
Pyrene	129-00-0	10/ 10	0.01	11	1.2	--	--	1800	(n)	No	0.006
Sum-of-Ratios											
Carcinogens											162
Non-carcinogens											0.6

Table 5-4. Surface Soil Screening – ECCL Firing Range: Human Health (continued)

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg) Minimum	Detected Concentration (mg/kg) Maximum	Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	Screening Level[c] (HQ=1, Risk=1E-6) (mg/kg)		MDC exceeds Screening Level?	Ratio[d] MDC/SL (HQ=1, Risk=1E-05)
PISTOL RANGE (EAST)											
Metals											
Antimony	**7440-36-0**	**28/ 29**	**0.55**	**460**	**20.4**	**9.3**	**Yes**	**31**	**(n)**	**Yes**	**15**
Arsenic	7440-38-2	29/ 29	4.4	30	18	36.5	No	0.68	(c)	No	NA
Copper	7440-50-8	29/ 29	33	580	121	56.2	Yes	3100	(n)	No	0.2
Iron	7439-89-6	29/ 29	10000	29000	20700	234000	No	55000	(n)	No	NA
Lead	**7439-92-1**	**29/ 29**	**13**	**35000**	**2580**	**48.6**	**Yes**	**400**		**Yes**	**NA**
Tin	7440-31-5	10/ 29	3.4	320	15.8	--	--	47000	(n)	No	0.007
Zinc	7440-66-6	29/ 29	12	250	61.1	322	No	23000	(n)	No	0.01
Organics – Semivolatile											
1,1'-Biphenyl	92-52-4	3/ 29	0.0042	0.0079	0.0357	--	--	47	(n)	No	0.0002
2,4-Dinitrotoluene	121-14-2	1/ 29	0.034	0.034	0.148	--	--	1.7	(c)	No	0.002
2-Methylnaphthalene	91-57-6	25/ 29	0.0055	0.45	0.104	--	--	240	(n)	No	0.002
Acenaphthylene[e]	208-96-8	5/ 29	0.012	0.041	0.00905	--	--	1800	(n)	No	0.00002
Acetophenone	98-86-2	4/ 29	0.011	0.013	0.0684	--	--	7800	(n)	No	0.000002
Anthracene	120-12-7	6/ 29	0.0056	0.02	0.00683	--	--	18000	(n)	No	0.000001
Benz(*a*)anthracene	56-55-3	25/ 29	0.0059	0.16	0.0297	--	--	0.16	(c)	No	0.1
Benzaldehyde	100-52-7	16/ 29	0.015	0.47	0.0911	--	--	170	(c)	No	0.0003
Benzo(*a*)pyrene	**50-32-8**	**24/ 29**	**0.0064**	**0.18**	**0.0363**	**--**	**--**	**0.016**	**(c)**	**Yes**	**1**
Benzo(*b*)fluoranthene	**205-99-2**	**24/ 29**	**0.0099**	**0.25**	**0.0521**	**--**	**--**	**0.16**	**(c)**	**Yes**	**0.2**
Benzo(*g,h,i*)perylene[e]	191-24-2	19/ 29	0.0083	0.11	0.0221	--	--	1800	(n)	No	0.00006
Benzo(*k*)fluoranthene	207-08-9	23/ 29	0.0044	0.091	0.0199	--	--	1.6	(c)	No	0.006
Bis(2-ethylhexyl)phthalate	117-81-7	13/ 29	0.023	0.65	0.0694	--	--	39	(c)	No	0.002
Caprolactam	105-60-2	1/ 29	0.059	0.059	0.245	--	--	31000	(n)	No	0.000002
Chrysene	218-01-9	25/ 29	0.0077	0.3	0.0541	--	--	16	(c)	No	0.002
Di-n-butyl phthalate	84-74-2	7/ 29	0.018	0.44	0.0712	--	--	6300	(n)	No	0.00007
Dibenz(*a,h*)anthracene	53-70-3	1/ 29	0.0063	0.0063	0.00513	--	--	0.016	(c)	No	0.04
Dibenzofuran	132-64-9	6/ 29	0.012	0.024	0.0356	--	--	73	(n)	No	0.0003
Diethyl phthalate	84-66-2	2/ 29	0.032	0.044	0.0527	--	--	51000	(n)	No	0.0000009
Fluoranthene	206-44-0	24/ 29	0.0083	0.17	0.0385	--	--	2400	(n)	No	0.00007
Indeno(1,2,3-*cd*)pyrene	193-39-5	15/ 29	0.0067	0.06	0.0151	--	--	0.16	(c)	No	0.04
Isophorone	78-59-1	1/ 29	0.03	0.03	0.0381	--	--	570	(c)	No	0.000005
N-Nitrosodiphenylamine	86-30-6	6/ 29	0.054	0.67	0.102	--	--	110	(c)	No	0.0006
Naphthalene	91-20-3	19/ 29	0.0081	0.16	0.0359	--	--	3.8	(c)	No	0.004
Phenanthrene[e]	85-01-8	26/ 29	0.0069	0.17	0.0526	--	--	1800	(n)	No	0.00009
Pyrene	129-00-0	26/ 29	0.0085	0.16	0.045	--	--	1800	(n)	No	0.00009
Sum-of-Ratios											
Carcinogens											1
Non-carcinogens											15

Table 5-4. Surface Soil Screening – ECCL Firing Range: Human Health (continued)

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	Screening Level[c] (HQ = 1, Risk = 1E-6) (mg/kg)		MDC exceeds Screening Level?	Ratio[d] MDC/SL (HQ = 1, Risk = 1E-05)
			Minimum	Maximum							
PISTOL RANGE (WEST)											
Metals											
Antimony	**7440-36-0**	**28/ 30**	**0.58**	**53**	**10.9**	**9.3**	**Yes**	**31**	**(n)**	**Yes**	**2**
Arsenic	7440-38-2	30/ 30	6	29	14.6	36.5	No	0.68	(c)	No	NA
Copper	**7440-50-8**	**30/ 30**	**32**	**8700**	**542**	**56.2**	**Yes**	**3100**	**(n)**	**Yes**	**3**
Iron	7439-89-6	30/ 30	8300	28000	18600	234000	No	55000	(n)	No	NA
Lead	**7439-92-1**	**30/ 30**	**27**	**13000**	**2530**	**48.6**	**Yes**	**400**		**Yes**	**NA**
Tin	7440-31-5	5/ 30	4.3	35	6.53	--	--	47000	(n)	No	0.0007
Zinc	7440-66-6	30/ 30	13	1300	138	322	Yes	23000	(n)	No	0.06
Organics – Semivolatile											
1,1'-Biphenyl	92-52-4	3/ 30	0.0072	0.014	0.0331	--	--	47	(n)	No	0.0003
2-Methylnaphthalene	91-57-6	25/ 30	0.0099	0.53	0.152	--	--	240	(n)	No	0.002
Acenaphthene	83-32-9	2/ 30	0.043	0.045	0.00715	--	--	3600	(n)	No	0.00001
Acenaphthylene[e]	208-96-8	5/ 30	0.013	0.08	0.0103	--	--	1800	(n)	No	0.00004
Acetophenone	98-86-2	1/ 30	0.013	0.013	0.0681	--	--	7800	(n)	No	0.000002
Anthracene	120-12-7	8/ 30	0.0068	0.17	0.0176	--	--	18000	(n)	No	0.000009
Benz(*a*)anthracene	**56-55-3**	**25/ 30**	**0.0055**	**0.68**	**0.0767**	**--**	**--**	**0.16**	**(c)**	**Yes**	**0.4**
Benzaldehyde	100-52-7	11/ 30	0.015	0.66	0.104	--	--	170	(c)	No	0.0004
Benzo(*a*)pyrene	**50-32-8**	**26/ 30**	**0.0074**	**0.57**	**0.083**	**--**	**--**	**0.016**	**(c)**	**Yes**	**4**
Benzo(*b*)fluoranthene	**205-99-2**	**30/ 30**	**0.011**	**1.4**	**0.151**	**--**	**--**	**0.16**	**(c)**	**Yes**	**0.9**
Benzo(*g,h,i*)perylene[e]	191-24-2	21/ 30	0.011	0.2	0.0371	--	--	1800	(n)	No	0.0001
Benzo(*k*)fluoranthene	207-08-9	24/ 30	0.0051	0.6	0.0574	--	--	1.6	(c)	No	0.04
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 30	2.2	2.2	0.131	--	--	39	(c)	No	0.006
Butyl benzyl phthalate	85-68-7	2/ 30	0.024	0.81	0.0738	--	--	290	(c)	No	0.0003
Carbazole	86-74-8	1/ 30	0.084	0.084	0.0356	--	--	--		--	--
Chrysene	218-01-9	28/ 30	0.012	3.9	0.227	--	--	16	(c)	No	0.02
Di-n-butyl phthalate	84-74-2	17/ 30	0.017	0.25	0.0535	--	--	6300	(n)	No	0.00004
Dibenz(*a,h*)anthracene	**53-70-3**	**2/ 30**	**0.023**	**0.04**	**0.00644**	**--**	**--**	**0.016**	**(c)**	**Yes**	**0.3**
Dibenzofuran	132-64-9	5/ 30	0.0061	0.053	0.0335	--	--	73	(n)	No	0.0007
Diethyl phthalate	84-66-2	2/ 30	0.042	0.046	0.0489	--	--	51000	(n)	No	0.0000009
Fluoranthene	206-44-0	29/ 30	0.0091	2.1	0.167	--	--	2400	(n)	No	0.0009
Fluorene	86-73-7	1/ 30	0.073	0.073	0.00678	--	--	2400	(n)	No	0.00003
Indeno(1,2,3-*cd*)pyrene	**193-39-5**	**17/ 30**	**0.002**	**0.21**	**0.0274**	**--**	**--**	**0.16**	**(c)**	**Yes**	**0.1**
N-Nitrosodiphenylamine	86-30-6	8/ 30	0.042	0.28	0.0612	--	--	110	(c)	No	0.0003
Naphthalene	91-20-3	25/ 30	0.0049	0.18	0.0476	--	--	3.8	(c)	No	0.005
Phenanthrene[e]	85-01-8	29/ 30	0.0078	0.88	0.106	--	--	1800	(n)	No	0.0005
Pyrene	129-00-0	30/ 30	0.0099	1.6	0.156	--	--	1800	(n)	No	0.0009
Sum-of-Ratios											
Carcinogens											5
Non-carcinogens											5

Table 5-4. Surface Soil Screening – ECCL Firing Range: Human Health (continued)

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	Screening Level[c] (HQ=1, Risk=1E-6) (mg/kg)		MDC exceeds Screening Level?	Ratio[d] MDC/SL (HQ=1, Risk=1E-05)
			Minimum	Maximum							
RIFLE RANGE											
Metals											
Antimony	**7440-36-0**	**34/ 37**	**0.53**	**160**	**18.7**	**9.3**	**Yes**	**31**	**(n)**	**Yes**	**5**
Arsenic	7440-38-2	37/ 37	6.1	34	19.7	36.5	No	0.68	(c)	No	NA
Copper	7440-50-8	37/ 37	15	840	194	56.2	Yes	3100	(n)	No	0.3
Iron	7439-89-6	37/ 37	14000	34000	24100	234000	No	55000	(n)	No	NA
Lead	**7439-92-1**	**37/ 37**	**22**	**28000**	**3370**	**48.6**	**Yes**	**400**		**Yes**	**NA**
Zinc	7440-66-6	37/ 37	14	170	46.4	322	No	23000	(n)	No	0.007
Organics – Semivolatile											
1,1'-Biphenyl	92-52-4	20/ 37	0.0038	0.034	0.0569	--	--	47	(n)	No	0.0007
2-Methylnaphthalene	91-57-6	36/ 37	0.019	1.3	0.473	--	--	240	(n)	No	0.005
Acenaphthene	83-32-9	6/ 37	0.0093	0.045	0.0119	--	--	3600	(n)	No	0.00001
Acenaphthylene[e]	208-96-8	13/ 37	0.0082	0.043	0.0142	--	--	1800	(n)	No	0.00002
Anthracene	120-12-7	17/ 37	0.0052	0.17	0.02	--	--	18000	(n)	No	0.000009
Benz(*a*)anthracene	**56-55-3**	**27/ 37**	**0.006**	**4.5**	**0.18**	**--**	**--**	**0.16**	**(c)**	**Yes**	**3**
Benzaldehyde	100-52-7	18/ 37	0.015	0.99	0.185	--	--	170	(c)	No	0.0006
Benzo(*a*)pyrene	**50-32-8**	**26/ 37**	**0.0076**	**4.9**	**0.196**	**--**	**--**	**0.016**	**(c)**	**Yes**	**31**
Benzo(*b*)fluoranthene	**205-99-2**	**29/ 37**	**0.011**	**2.8**	**0.182**	**--**	**--**	**0.16**	**(c)**	**Yes**	**2**
Benzo(*g,h,i*)perylene[e]	191-24-2	22/ 37	0.0073	1.7	0.0759	--	--	1800	(n)	No	0.0009
Benzo(*k*)fluoranthene	207-08-9	23/ 37	0.004	0.3	0.0437	--	--	1.6	(c)	No	0.02
Bis(2-ethylhexyl)phthalate	117-81-7	3/ 37	0.026	0.037	0.106	--	--	39	(c)	No	0.00009
Chrysene	218-01-9	31/ 37	0.011	11	0.409	--	--	16	(c)	No	0.07
Di-n-butyl phthalate	84-74-2	1/ 37	0.22	0.22	0.103	--	--	6300	(n)	No	0.00003
Dibenz(*a,h*)anthracene	**53-70-3**	**4/ 37**	**0.034**	**0.71**	**0.0315**	**--**	**--**	**0.016**	**(c)**	**Yes**	**4**
Dibenzofuran	132-64-9	21/ 37	0.013	0.065	0.0643	--	--	73	(n)	No	0.0009
Fluoranthene	206-44-0	30/ 37	0.01	0.68	0.108	--	--	2400	(n)	No	0.0003
Fluorene	86-73-7	6/ 37	0.011	0.043	0.0126	--	--	2400	(n)	No	0.00002
Indeno(1,2,3-*cd*)pyrene	193-39-5	17/ 37	0.0048	0.58	0.0414	--	--	0.16	(c)	Yes	0.4
N-Nitrosodiphenylamine	86-30-6	4/ 37	0.025	0.18	0.0813	--	--	110	(c)	No	0.0002
Naphthalene	91-20-3	36/ 37	0.0068	0.38	0.136	--	--	3.8	(c)	No	0.01
Phenanthrene[e]	85-01-8	37/ 37	0.0071	0.54	0.237	--	--	1800	(n)	No	0.0003
Pyrene	129-00-0	36/ 37	0.0077	1.8	0.153	--	--	1800	(n)	No	0.001
Sum-of-Ratios											
Carcinogens											40
Non-carcinogens											5

Table 5-4. Surface Soil Screening – ECCL Firing Range: Human Health (continued)

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg) Minimum	Detected Concentration (mg/kg) Maximum	Average Concentration[a] (mg/kg)	Background[b] (mg/kg)	MDC exceeds Background?	Screening Level[c] (HQ = 1, Risk = 1E-6) (mg/kg)		MDC exceeds Screening Level?	Ratio[d] MDC/SL (HQ = 1, Risk = 1E-05)
TRAP AND SKEET RANGES											
Metals											
Antimony	**7440-36-0**	**79/ 89**	**0.54**	**10000**	**393**	**9.3**	**Yes**	**31**	**(n)**	**Yes**	**323**
Arsenic	**7440-38-2**	**89/ 89**	**3.7**	**2200**	**114**	**36.5**	**Yes**	**0.68**	**(c)**	**Yes**	**NA**
Copper	7440-50-8	89/ 89	4.2	83	17.3	56.2	Yes	3100	(n)	No	0.03
Iron	7439-89-6	89/ 89	5200	59000	14600	234000	No	55000	(n)	No	NA
Lead	**7439-92-1**	**89/ 89**	**30**	**100000**	**9000**	**48.6**	**Yes**	**400**		**Yes**	**NA**
Tin	7440-31-5	2/ 89	190	300	10.7	--	--	47000	(n)	No	0.006
Zinc	7440-66-6	89/ 89	14	360	45.1	322	Yes	23000	(n)	No	0.02
Organics – Semivolatile											
1,1'-Biphenyl	92-52-4	2/ 89	0.016	0.044	0.632	--	--	47	(n)	No	0.0009
2-Methylnaphthalene	91-57-6	35/ 89	0.0039	8.7	0.43	--	--	240	(n)	No	0.04
2-Methylphenol	95-48-7	1/ 89	0.014	0.014	2.5	--	--	3200	(n)	No	0.000004
Acenaphthene	83-32-9	23/ 89	0.0098	9.6	0.649	--	--	3600	(n)	No	0.003
Acenaphthylene[e]	208-96-8	5/ 89	0.0056	0.1	0.0846	--	--	1800	(n)	No	0.00006
Acetophenone	98-86-2	1/ 89	0.014	0.014	1.25	--	--	7800	(n)	No	0.000002
Anthracene	120-12-7	32/ 89	0.0019	9.6	0.672	--	--	18000	(n)	No	0.0005
Benz(*a*)anthracene	**56-55-3**	**88/ 89**	**0.0043**	**200**	**14.5**	**--**	**--**	**0.16**	**(c)**	**Yes**	**125**
Benzaldehyde	100-52-7	27/ 89	0.014	2.8	1.24	--	--	170	(c)	No	0.002
Benzo(*a*)pyrene	**50-32-8**	**89/ 89**	**0.0051**	**220**	**18.1**	**--**	**--**	**0.016**	**(c)**	**Yes**	**1375**
Benzo(*b*)fluoranthene	**205-99-2**	**86/ 89**	**0.0075**	**210**	**16.1**	**--**	**--**	**0.16**	**(c)**	**Yes**	**131**
Benzo(*g*,*h*,*i*)perylene[e]	191-24-2	66/ 89	0.0041	140	8.91	--	--	1800	(n)	No	0.08
Benzo(*k*)fluoranthene	**207-08-9**	**79/ 89**	**0.004**	**77**	**4.97**	**--**	**--**	**1.6**	**(c)**	**Yes**	**5**
Bis(2-ethylhexyl)phthalate	117-81-7	16/ 89	0.025	1.5	0.897	--	--	39	(c)	No	0.004
Carbazole	86-74-8	10/ 89	0.035	10	0.785	--	--	--		--	--
Chrysene	**218-01-9**	**88/ 89**	**0.0068**	**370**	**24.1**	**--**	**--**	**16**	**(c)**	**Yes**	**2**
Di-n-butyl phthalate	84-74-2	22/ 89	0.017	0.16	0.879	--	--	6300	(n)	No	0.00003
Dibenz(*a*,*h*)anthracene	**53-70-3**	**32/ 89**	**0.0094**	**42**	**2.95**	**--**	**--**	**0.016**	**(c)**	**Yes**	**263**
Dibenzofuran	132-64-9	19/ 89	0.0036	1.6	0.55	--	--	73	(n)	No	0.02
Fluoranthene	206-44-0	83/ 89	0.01	130	9	--	--	2400	(n)	No	0.05
Fluorene	86-73-7	23/ 89	0.0052	3.2	0.235	--	--	2400	(n)	No	0.001
Indeno(1,2,3-*cd*)pyrene	**193-39-5**	**58/ 89**	**0.0043**	**88**	**5.56**	**--**	**--**	**0.16**	**(c)**	**Yes**	**55**
N-Nitrosodiphenylamine	86-30-6	4/ 89	0.079	0.45	0.642	--	--	110	(c)	No	0.0004
Naphthalene	91-20-3	21/ 89	0.0044	2	0.146	--	--	3.8	(c)	No	0.05
Pentachlorophenol	87-86-5	4/ 88	0.048	0.12	1.9	--	--	1	(c)	No	0.01
Phenanthrene[e]	85-01-8	80/ 89	0.0052	54	3.55	--	--	1800	(n)	No	0.03
Phenol	108-95-2	5/ 89	0.015	0.027	0.632	--	--	19000	(n)	No	0.000001
Pyrene	129-00-0	89/ 89	0.007	200	13	--	--	1800	(n)	No	0.1
Sum-of-Ratios											
Carcinogens											1956
Non-carcinogens											323

[a] Average concentration for all samples using 1/2 detection limit for non-detects.
[b] Naturally occurring background concentration.
[c] SLs are United States Environmental Protection Agency residential soil regional screening levels (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 2016.
[d] Sum-of-ratios (SORs) calculated as the SORs of the MDC over the SL at a target risk level of 1E-05 or target HQ of 1 for all carcinogens or non-carcinogens.
[e] No reference dose or cancer potency factors are available for these chemicals; therefore, the SL for pyrene is used.
-- = no value available.
CAS = Chemical Abstracts Service.
HQ = Hazard Quotient.
MDC = Maximum Detected Concentration.
mg/kg = Milligrams per Kilogram.
NA = Not applicable. For arsenic and iron the risk-based SL is less than the background concentration; therefore, the non-risk-based background concentration is used as the point of comparison. The RSL for lead is based on acceptable blood lead concentration rather than a specific toxic endpoint.
SL = Screening Level.
Bold = MDC exceeds SL (or background if SL is less than background).

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Table 5-5. Soil Screening – ECCL Firing Range: Results of Adult Lead Model

Location	Average Lead Concentration (mg/kg)	Probability that fetal PbB > PbB_t	
		Exposure Duration = 219 days/year	Exposure Duration = 125 days/year
Ditches	573	0.10% – 1.80%	0.03% – 1.0%
Pistol Range (East)	2580	7% – 15%	2% – 7%
Pistol Range (West)	2530	7% – 15%	1% – 6%
Rifle Range	3370	14% – 23%	3% – 10%
Trap and Skeet Ranges	9000	65% – 64%	32% – 38%

mg/kg = Milligrams per Kilogram.
PbB = Blood lead level.
PbB_t = Target blood lead level.

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Table 5-6. Sediment Screening – ECCL Firing Range Pond: Human Health

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Ohio SRV[b] (mg/kg)	MDC exceeds Ohio SRV?	Screening Level[c] (HQ = 1, Risk = 1E-6) (mg/kg)		MDC exceeds Screening Level?	Ratio[d] MDC/SL (HQ = 1, Risk = 1E-05)
			Minimum	Maximum							
Metals											
Antimony	7440-36-0	5/ 10	0.93	2.2	3	0.84	Yes	31	(n)	No	0.07
Arsenic	**7440-38-2**	**10/ 10**	**8.2**	**31**	**15.9**	**11**	**Yes**	**0.68**	**(c)**	**Yes**	**NA**
Copper	7440-50-8	10/ 10	35	540	197	42	Yes	3100	(n)	No	0.17
Iron	7439-89-6	10/ 10	8800	53000	26700	44000	Yes	55000	(n)	No	0.96
Lead	**7439-92-1**	**10/ 10**	**20**	**3500**	**754**	**47**	**Yes**	**400**		**Yes**	**NA**
Zinc	7440-66-6	10/ 10	22	480	214	190	Yes	23000	(n)	No	0.02
Organics – Semivolatile											
Anthracene	120-12-7	1/ 10	0.012	0.012	0.0155	--	--	18000	(n)	No	0.000001
Benz(*a*)anthracene	56-55-3	3/ 10	0.026	0.061	0.0248	--	--	0.16	(c)	No	0.04
Benzo(*a*)pyrene	**50-32-8**	**4/ 10**	**0.012**	**0.084**	**0.0301**	**--**	**--**	**0.016**	**(c)**	**Yes**	**0.53**
Benzo(*b*)fluoranthene	205-99-2	4/ 10	0.015	0.09	0.0298	--	--	0.16	(c)	No	0.06
Benzo(*g,h,i*)perylene[e]	191-24-2	3/ 10	0.031	0.055	0.0251	--	--	1800	(n)	No	0.00003
Benzo(*k*)fluoranthene	207-08-9	3/ 10	0.012	0.034	0.019	--	--	1.6	(c)	No	0.002
1,1'-Biphenyl	92-52-4	2/ 10	0.013	0.018	0.107	--	--	47	(n)	No	0.0004
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 10	0.12	0.12	0.151	--	--	39	(c)	No	0.0003
Caprolactam	105-60-2	1/ 10	0.31	0.31	0.69	--	--	31000	(n)	No	0.00001
Chrysene	218-01-9	5/ 10	0.012	0.098	0.0367	--	--	16	(c)	No	0.0006
Dibenzofuran	132-64-9	1/ 10	0.019	0.019	0.11	--	--	73	(n)	No	0.0003
Di-n-butyl phthalate	84-74-2	1/ 10	0.1	0.1	0.149	--	--	6300	(n)	No	0.00002
Fluoranthene	206-44-0	8/ 10	0.011	0.12	0.0341	--	--	2400	(n)	No	0.00005
Indeno(1,2,3-*cd*)pyrene	193-39-5	3/ 10	0.016	0.04	0.0204	--	--	0.16	(c)	No	0.03
2-Methylnaphthalene	91-57-6	5/ 10	0.019	0.38	0.101	--	--	240	(n)	No	0.002
Naphthalene	91-20-3	4/ 10	0.021	0.12	0.0407	--	--	3.8	(c)	No	0.003
Phenanthrene[e]	85-01-8	4/ 10	0.016	0.16	0.0481	--	--	1800	(n)	No	0.00009
Pyrene	129-00-0	7/ 10	0.016	0.12	0.0402	--	--	1800	(n)	No	0.00007
Sum-of-Ratios											
Carcinogens											0.7
Non-carcinogens											1

[a] Average concentration for all samples using 1/2 detection limit for non-detects.
[b] Ohio SRVs represent naturally occurring background levels of metals in unimpacted sediments.
[c] SLs are United States Environmental Protection Agency residential soil regional screening levels (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 2016.
[d] Sum-of-ratios (SORs) calculated as the SORs of the MDC over the SL at a target risk level of 1E-05 or target HQ of 1 for all carcinogens or non-carcinogens.
[e] No reference dose or cancer potency factors are available for these chemicals; therefore, the SL for pyrene is used (NDEP 2006).
-- = no value available.
CAS = Chemical Abstracts Service.
HQ = Hazard Quotient.
MDC = Maximum Detected Concentration.
mg/kg = Milligrams per kilogram.
NA = Not applicable. For arsenic, because the risk-based SL is less than the Ohio SRV (background) concentration, the non-risk-based SRV is used as the point of comparison. The RSL for lead is based on acceptable blood lead concentration rather than a specific toxic endpoint.
SL = Screening Level.
SRV = Sediment Reference Value.
Bold = MDC exceeds SL (or background if SL is less than background).

Table 5-7. Surface Water Screening – ECCL Firing Range Pond: Human Health

Detected Chemical	CAS Number	Frequency of Detection	Detected Concentration (mg/kg)		Average Concentration[a] (mg/kg)	Ohio Water Quality Criteria[b] (µg/L)		USEPA Tap Water RSL[c] (HQ = 1, Risk = 1E-06) (µg/L)		MCL (µg/L)
			Minimum	Maximum		Nondrinking	Drinking			
Metals										
Antimony	7440-36-0	5/ 10	0.24	0.52	0.669	780	9.7	7.8	(n)	6
Arsenic	7440-38-2	10/ 10	0.62	1	0.822	580	10	0.052	(c)	10
Copper	7440-50-8	8/ 10	3.9	24	8.94	64000	790	800	(n)	1300
Iron	7439-89-6	10/ 10	250	870	409	--	300	14000	(n)	--
Lead	7439-92-1	10/ 10	2.4	28	15.6	--	--	15	--	15
Tin	7440-31-5	1/ 10	2.3	2.3	4.73	--	--	12000	(n)	--
Zinc	7440-66-6	10/ 10	44	67	59.1	35000	5000	6000	(n)	--
Organics – Semivolatile										
Caprolactam	105-60-2	3/ 9	0.32	0.37	1.83	--	--	9900	(n)	--
Isophorone	78-59-1	1/ 10	0.35	0.35	0.49	--	--	78	(c)	--

[a] Average concentration for all samples using 1/2 detection limit for non-detects.
[b] Ohio Surface Water Quality Criteria for Lake Erie drainage basin from http://www.epa.state.oh.us/portals/35/rules/01-33.pdf.
[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 2016.
-- = No Value Available.
µg/L = Micrograms per Liter.
CAS = Chemical Abstracts Service.
HQ = Hazard Quotient.
MCL = Federal Maximum Contaminant Level for drinking water.
mg/kg = Milligrams per Kilogram.
RSL = Regional Screening Level.
USEPA = United States Environmental Protection Agency.

6.0 CONCLUSIONS AND RECOMMENDATIONS

SI activities at ECCL included collecting 168 surface soil samples, 10 dry sediment samples, 9 wet sediment samples, and 9 surface water samples. Samples were analyzed for firing range metals and SVOCs. Multiple compounds were detected in each medium sampled. In addition, each medium contained multiple compounds at concentrations greater than relevant screening criteria.

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. Based on the ecological risk screening, further evaluation is recommended for these media and COPECs to fully evaluate the potential risk to ecological receptors.

Human health risk screening identified multiple metals and SVOCs as COPCs in soil. Arsenic and lead were identified as COPCs in sediment and lead was identified as a COPC in surface water. Based on the human health risk screening, further evaluation is recommended for these media and COPCs to fully evaluate the potential risk to human health.

Results of the SI activities indicate that the surface soil, sediment, and surface water at ECCL Firing Range have been impacted by previous site activities. Further evaluation is 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 are recommended to further delineate the vertical and horizontal extent of contamination at the ranges, ditches, and ponds. In addition, an IRA is recommended for the Trap and Skeet Range and the Rifle/Pistol Firing Range Impact Berms with surface soil lead concentrations above the RSL. The IRA may include additional pre-delineation sampling, treatability study, excavation of surface soil (Trap and Skeet Range, 0 to 1 foot 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 IRA will also include the excavation of the clay target and shotgun shell debris areas (including a portion of the drainage ditch), and burned traphouse debris (including ACM survey) within the Trap and Skeet Range.

The primary objective of the SI was to document a site characterization data collection program consistent with CERCLA as presented in the approved SAP (SAIC 2011). However, recent communication with Ohio EPA, including review of the Director's Findings and Orders, has allowed NASA to consider evaluating former Firing Ranges under a different program than CERCLA. Although the scope of this investigation and the presentation of results and recommendations are consistent with *Guidance for Performing Site Inspections Under CERCLA* (USEPA 1992), additional recommendations are included for NASA to consider when deciding future activities at the former firing range.

If NASA does not follow the CERLCA process, future investigations and remedial actions could be completed under Ohio's VAP. Under this program, a Phase II PA would be completed under the guidance of a Certified VAP Professional. The VAP may be done following specific standards developed by Ohio EPA. When cleanup requirements are met under the VAP, the director of Ohio EPA issues a covenant not to sue. This covenant would protect NASA and future owners from being legally responsible to the State of Ohio for further investigation and cleanup.

Regardless of the regulatory program that NASA and Ohio EPA decide to follow for future work at ECCL Firing Range, the results of the data collection program were evaluated and have determined that additional characterization and/or remedial action is necessary.

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FIGURES

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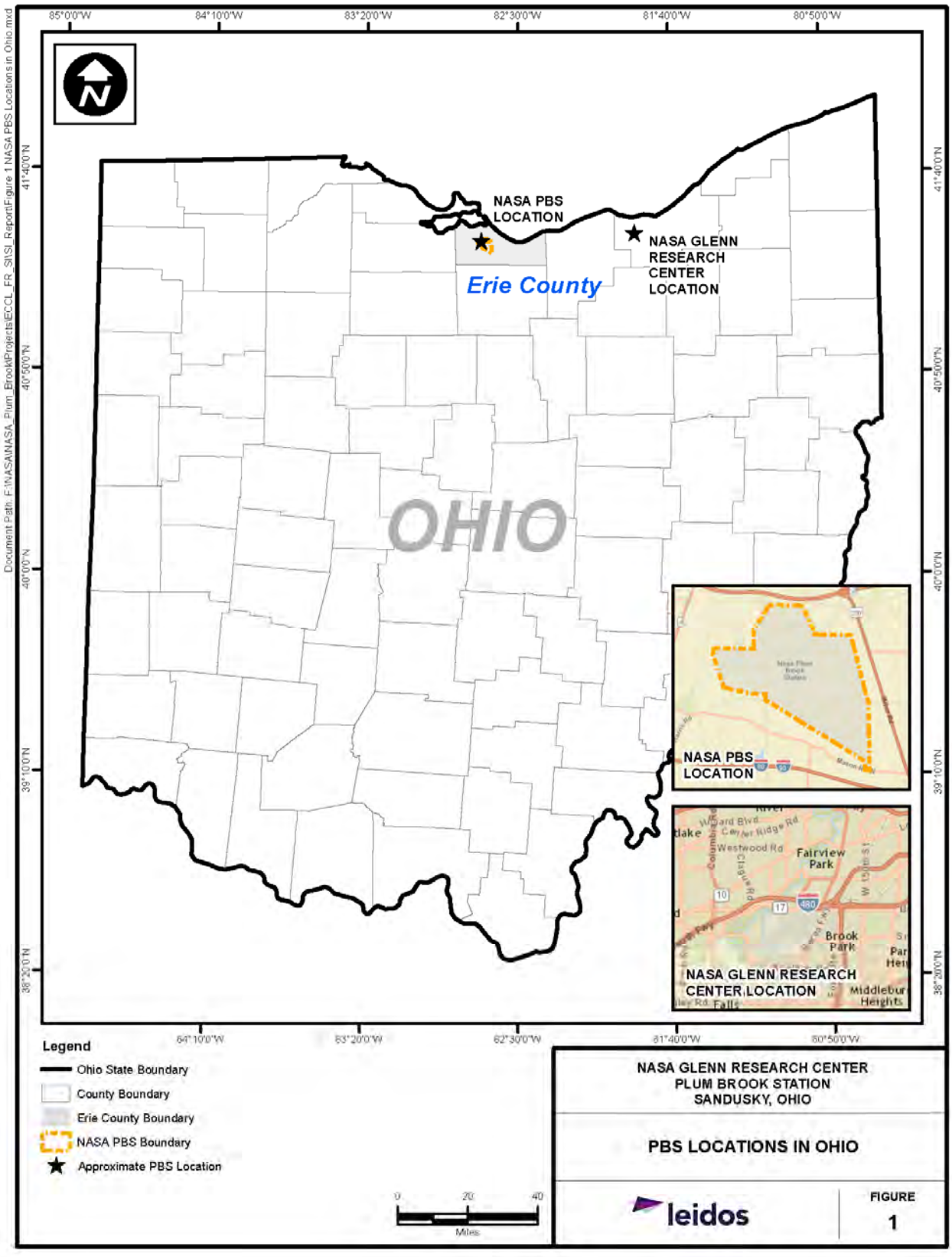

Figure 1. PBS Locations in Ohio

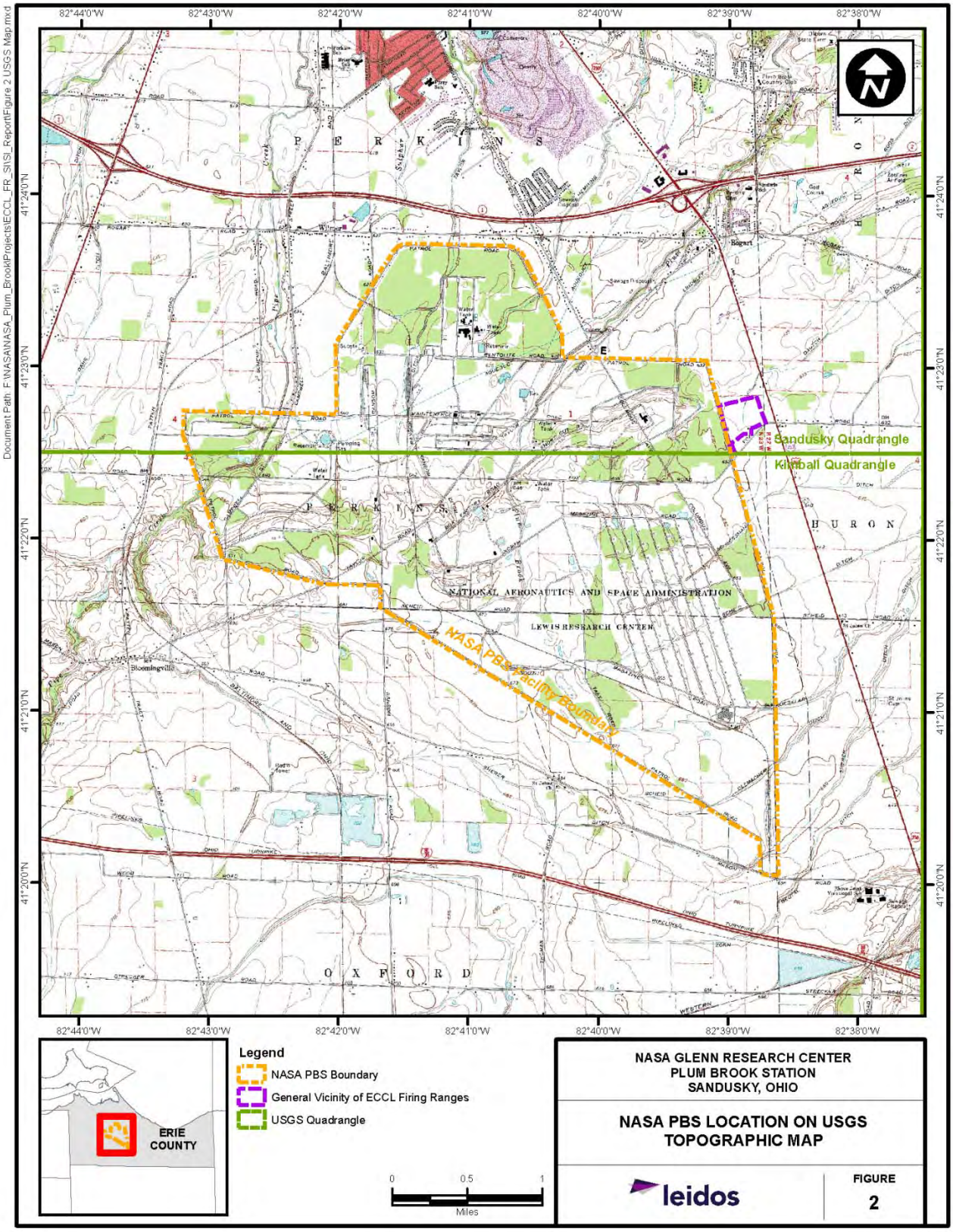

Figure 2. NASA PBS Location on USGS Topographic Map

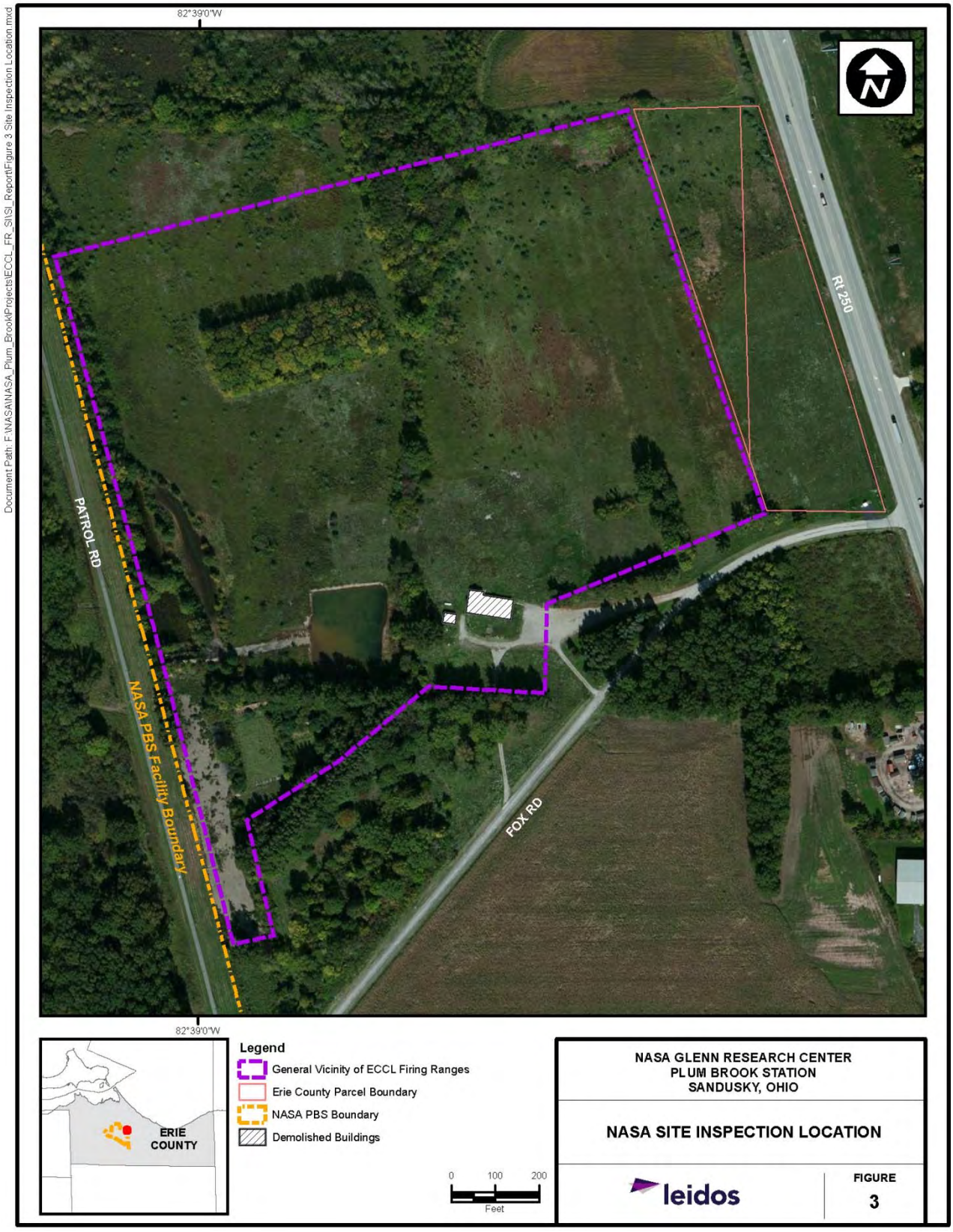

Figure 3. Site Inspection Location

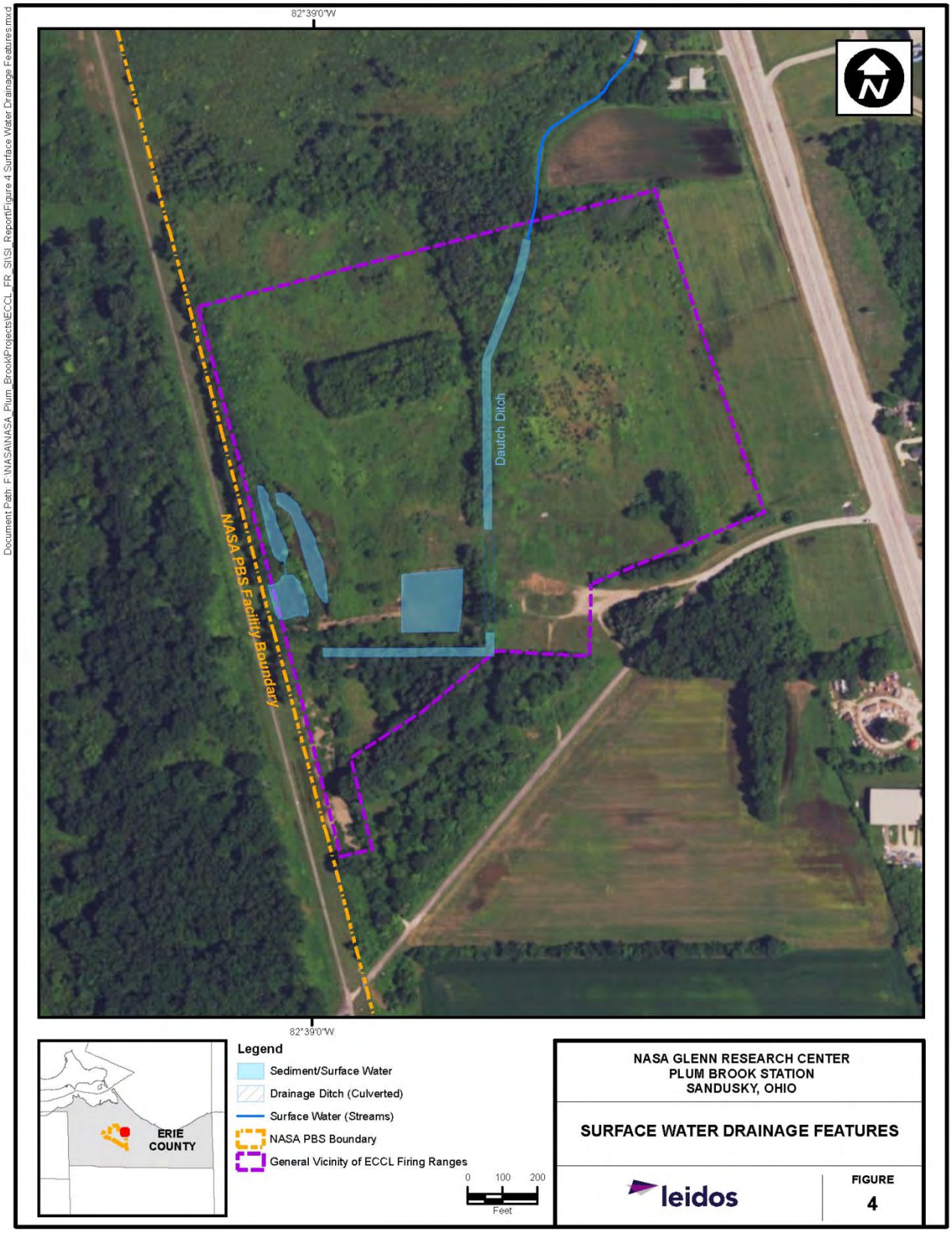

Figure 4. Surface Water Drainage Features

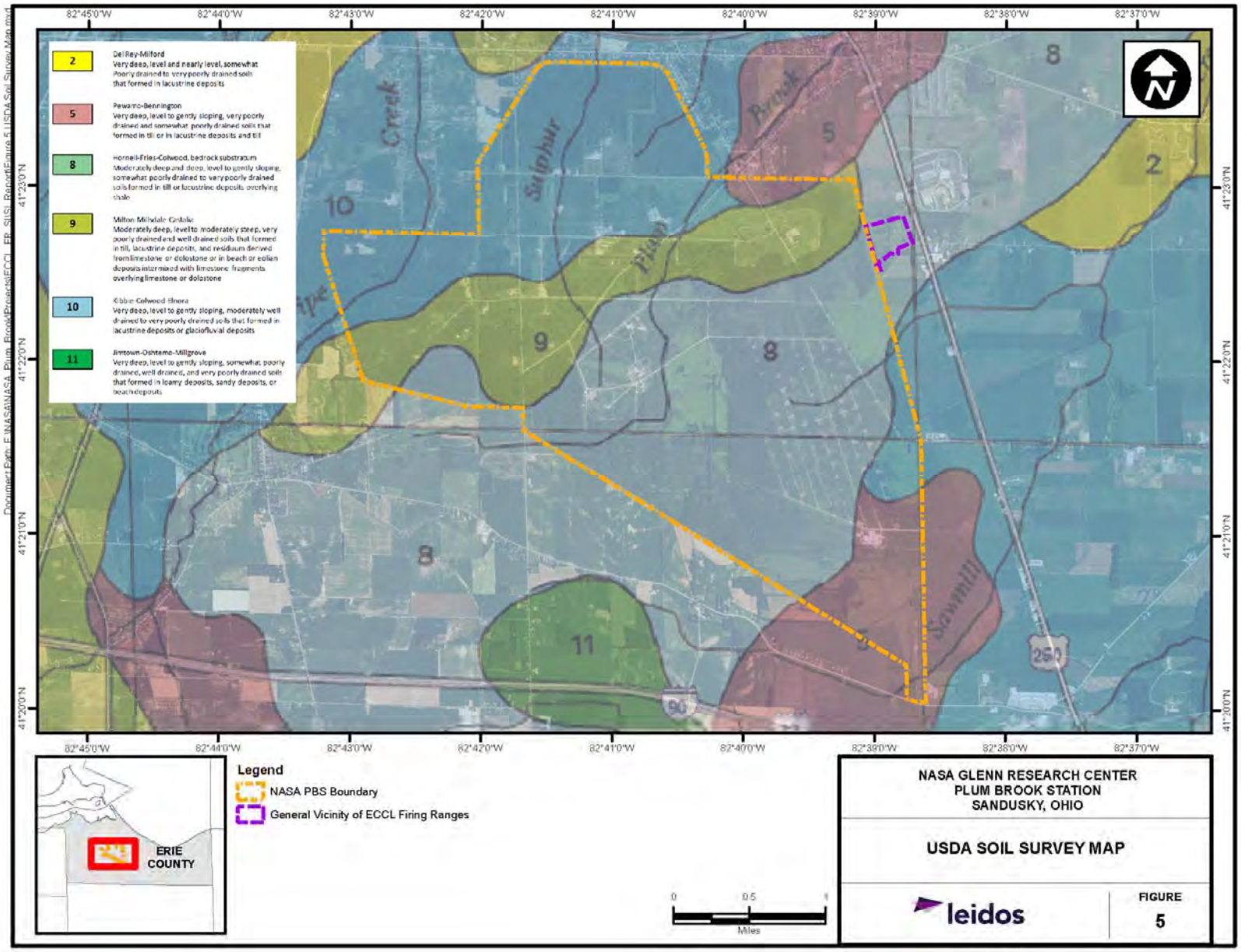

Figure 5. USDA Soil Survey Map

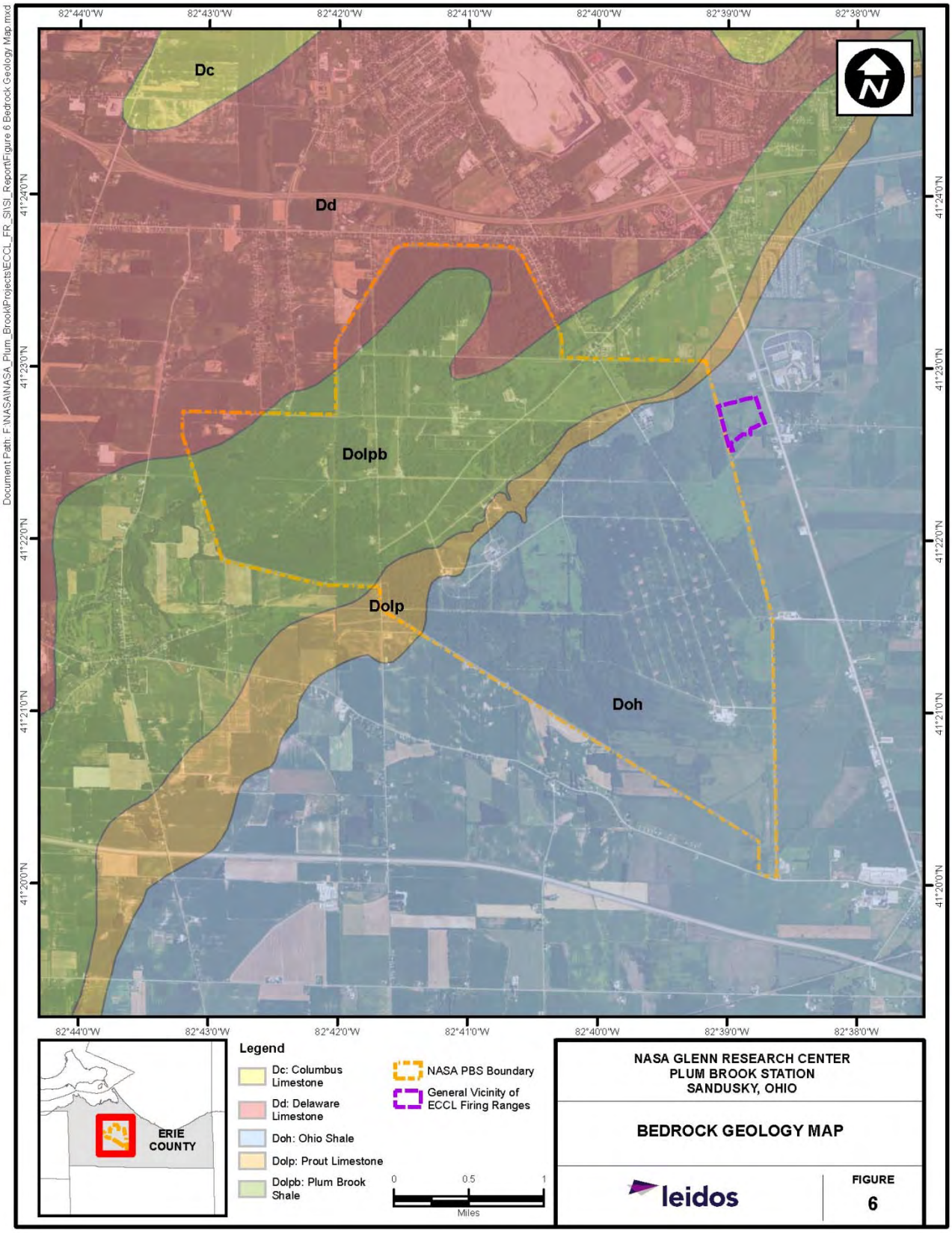

Figure 6. Bedrock Geology Map

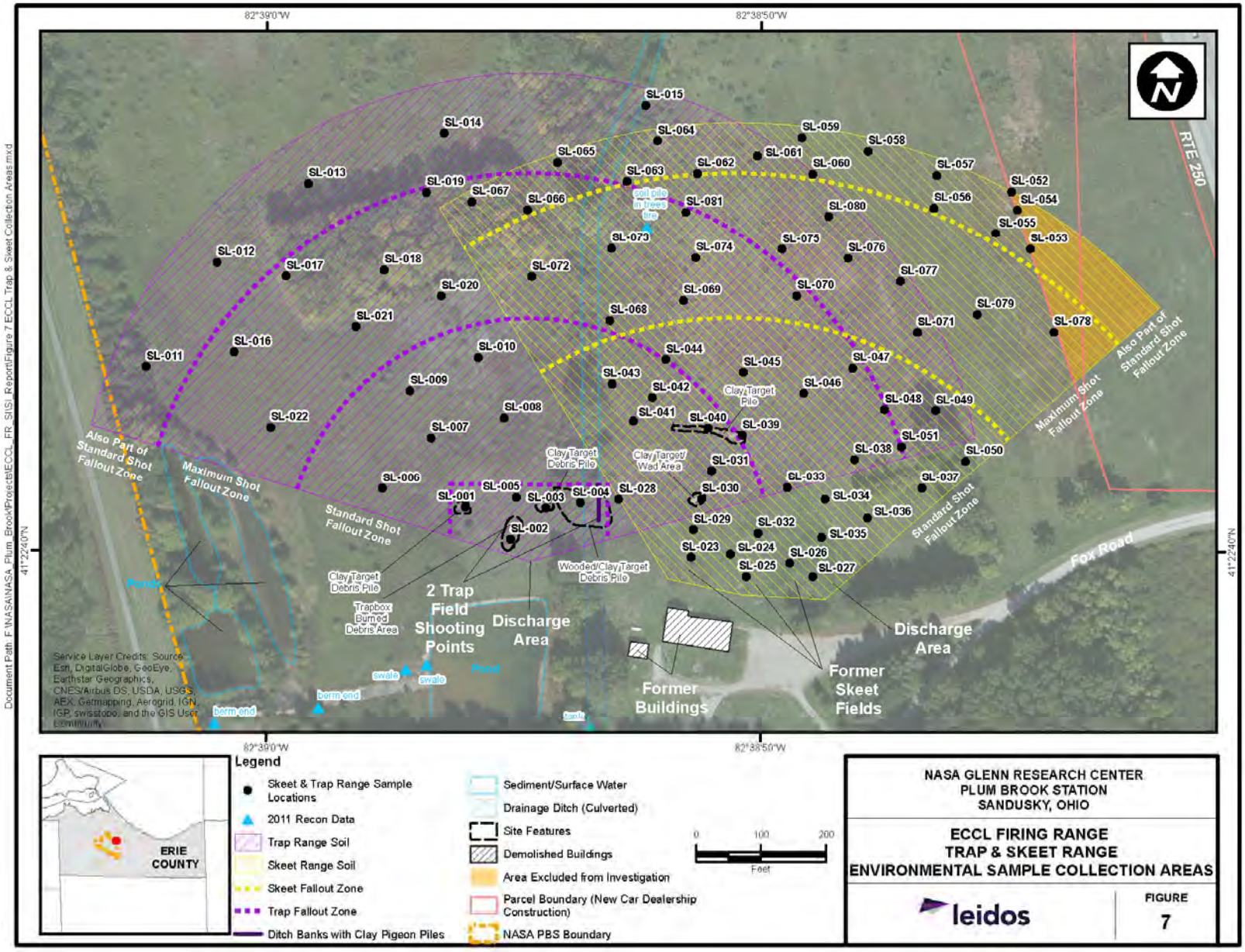

Figure 7. ECCL Firing Range – Trap & Skeet Ranges – Environmental Sample Collection Areas

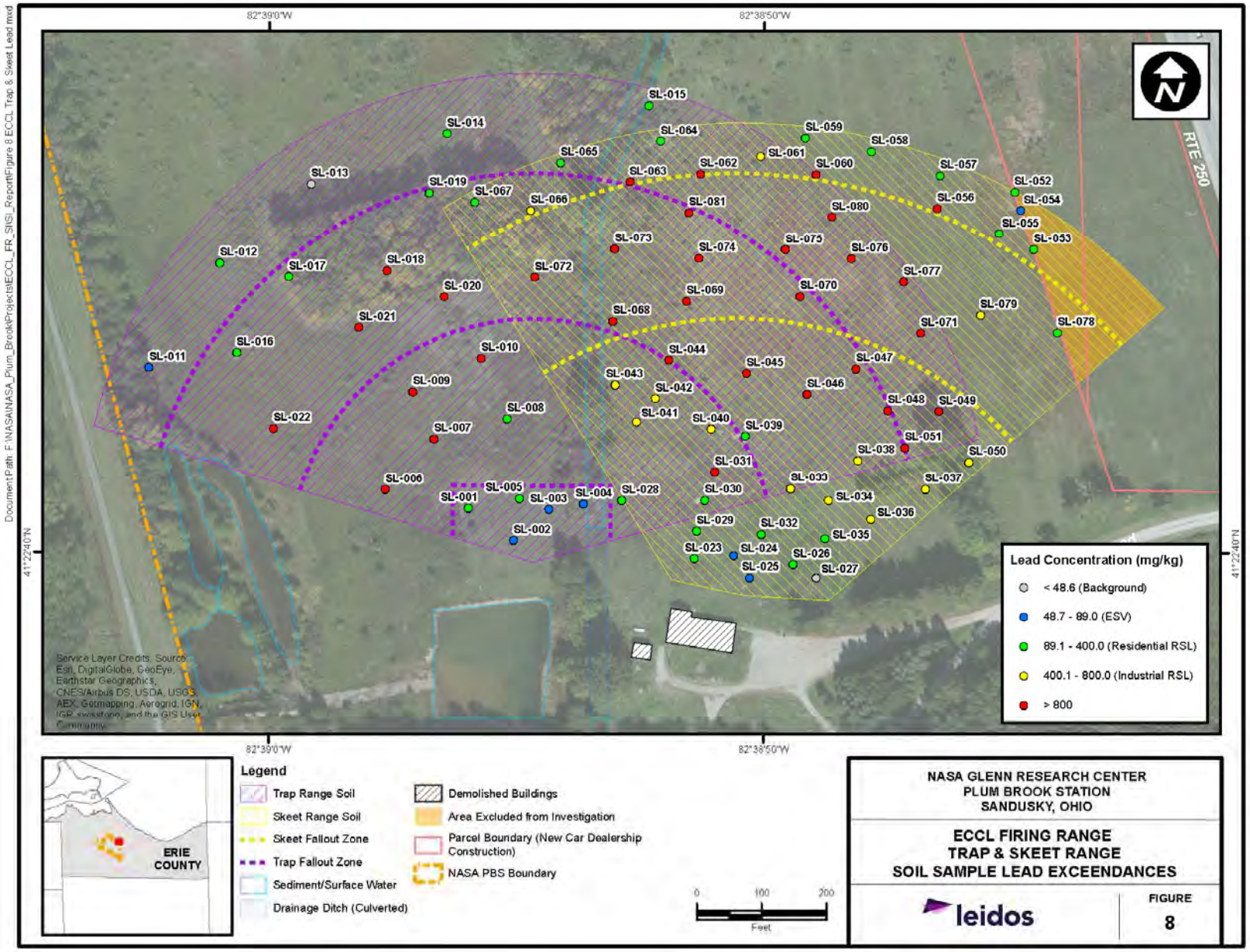

Figure 8. ECCL Firing Range – Trap & Skeet Ranges – Soil Samples Lead Exceedances

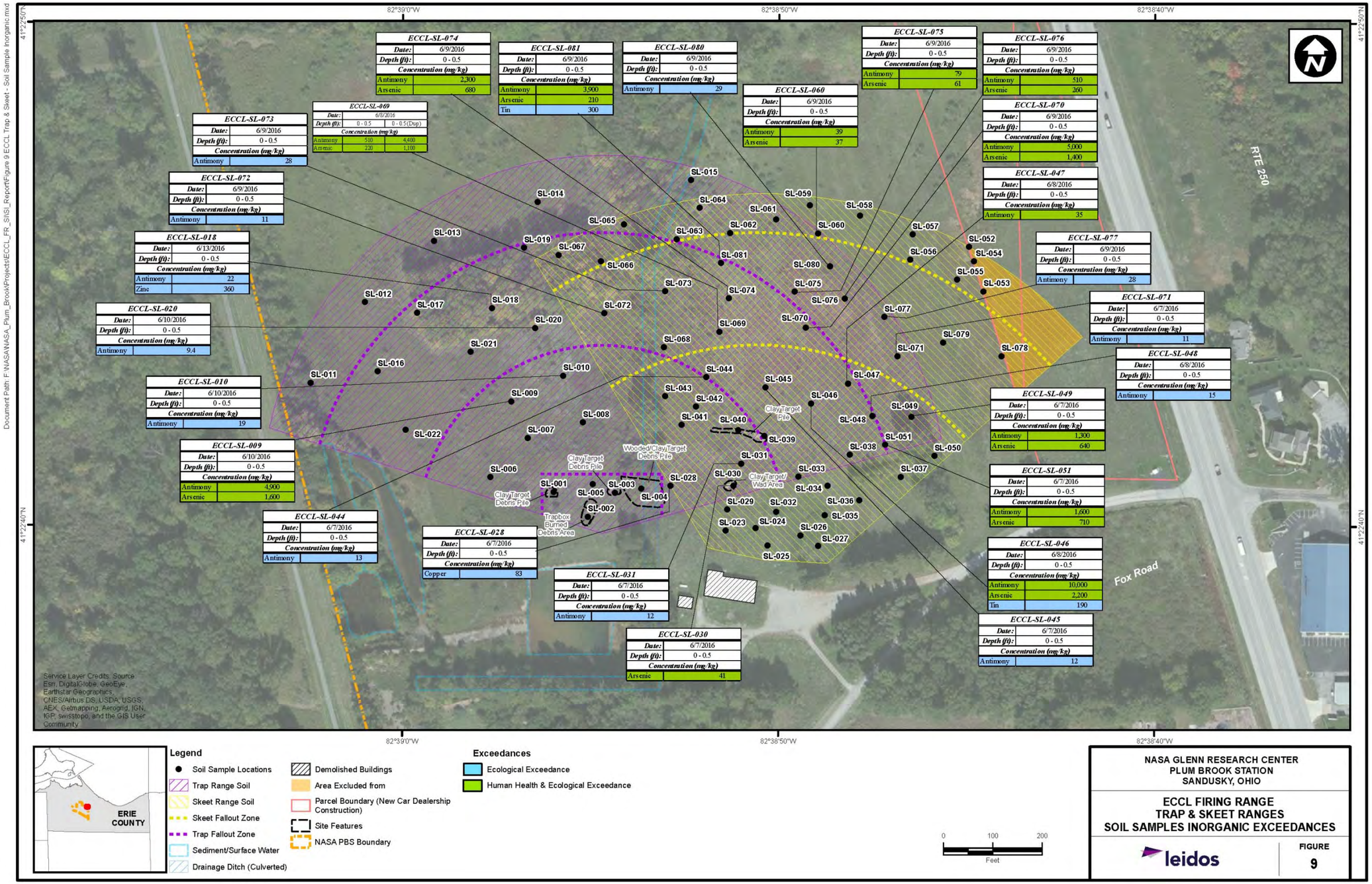

Figure 9. ECCL Firing Range – Trap & Skeet Ranges – Soil Samples Inorganic Exceedances

Document Path: F:\NASA\NASA_Plum_Brook\Projects\ECCL_FR_SI\SI_Report\Figure 10 ECCL Trap & Skeet - Soil Sample Organic - West.mxd

82°39'0"W

82°38'50"W

41°22'40"N

ECCL-SL-014
Date: 6/10/2016
Depth (ft): 0 - 0.5 | 0 - 0.5 (Dup)
Concentration (mg/kg)
Benzo(a)pyrene: 0.024 | 0.012

ECCL-SL-063
Date: 6/9/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benzo(a)pyrene: 0.058

ECCL-SL-069
Date: 6/8/2016
Depth (ft): 0 - 0.5 | 0 - 0.5 (Dup)
Concentration (mg/kg)
Benzo(a)pyrene: 0.016 | 0.029
Naphthalene: 0.008 U | 0.5

ECCL-SL-072
Date: 6/9/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Bis(2-ethylhexyl)phthalate: 1.5

ECCL-SL-044
Date: 6/7/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benzo(a)pyrene: 0.019

ECCL-SL-068
Date: 6/8/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benzo(a)pyrene: 0.034

ECCL-SL-042
Date: 6/7/2016
Depth (ft): 0 - 0.5 | 0 - 0.5 (Dup)
Concentration (mg/kg)
Benz(a)anthracene: 0.19 | 0.04 J
Benzo(a)pyrene: 0.19 | 0.059 J
Dibenz(a,h)anthracene: 0.052 | 0.012 J

ECCL-SL-001
Date: 6/10/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Benz(a)anthracene: 21
Benzo(a)pyrene: 24
Benzo(b)fluoranthene: 12
Chrysene: 43
Dibenz(a,h)anthracene: 3.2
Indeno(1,2,3-cd)pyrene: 2.3
Naphthalene: 0.28 J

ECCL-SL-043
Date: 6/7/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benzo(a)pyrene: 0.049

ECCL-SL-041
Date: 6/7/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benz(a)anthracene: 0.58
Benzo(a)pyrene: 0.73
Benzo(b)fluoranthene: 0.69
Carbazole: 0.035 J
Dibenz(a,h)anthracene: 0.18
Indeno(1,2,3-cd)pyrene: 0.36

ECCL-SL-005
Date: 6/10/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Benz(a)anthracene: 3.8
Benzo(a)pyrene: 4.1
Benzo(b)fluoranthene: 2.9
Chrysene: 7.7
Dibenz(a,h)anthracene: 0.67
Indeno(1,2,3-cd)pyrene: 0.78

ECCL-SL-006
Date: 6/10/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benz(a)anthracene: 0.48
Benzo(a)pyrene: 0.46
Benzo(b)fluoranthene: 0.73
Carbazole: 0.075
Dibenz(a,h)anthracene: 0.053

ECCL-SL-028
Date: 6/7/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
2-Methylnaphthalene: 8.7
Benz(a)anthracene: 170
Benzo(a)pyrene: 220
Benzo(b)fluoranthene: 150
Benzo(k)fluoranthene: 49
Carbazole: 8.7
Chrysene: 220
Dibenz(a,h)anthracene: 32
Indeno(1,2,3-cd)pyrene: 55
Naphthalene: 2
Phenanthrene: 54
Pyrene: 200

ECCL-SL-004
Date: 6/10/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benz(a)anthracene: 43
Benzo(a)pyrene: 54
Benzo(b)fluoranthene: 50
Benzo(k)fluoranthene: 19
Chrysene: 71
Dibenz(a,h)anthracene: 7.4
Indeno(1,2,3-cd)pyrene: 18
Naphthalene: 0.63

ECCL-SL-002
Date: 6/10/2016
Depth (ft): 0 - 1 | 0 - 1 (Dup)
Concentration (mg/kg)
Benz(a)anthracene: 0.32 | 0.55
Benzo(a)pyrene: 0.53 | 0.86
Benzo(b)fluoranthene: 0.5 | 0.82
Dibenz(a,h)anthracene: 0.064 | 0.086
Indeno(1,2,3-cd)pyrene: 0.12 | 0.2

ECCL-SL-003
Date: 6/10/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Benz(a)anthracene: 21
Benzo(a)pyrene: 30
Benzo(b)fluoranthene: 37
Benzo(k)fluoranthene: 12
Carbazole: 2 J
Chrysene: 28
Dibenz(a,h)anthracene: 4.5
Indeno(1,2,3-cd)pyrene: 14
Naphthalene: 0.24 J

SL-001 SL-002 SL-003 SL-004 SL-005 SL-006 SL-007 SL-008 SL-009 SL-010 SL-011 SL-012 SL-013 SL-014 SL-015 SL-016 SL-017 SL-018 SL-019 SL-020 SL-021 SL-022 SL-028 SL-041 SL-042 SL-043 SL-044 SL-062 SL-063 SL-064 SL-065 SL-066 SL-067 SL-068 SL-069 SL-072 SL-073 SL-074 SL-081

Clay Target Debris Pile
Clay Target Debris Pile
Trapbox Burned Debris Area
Wooded Clay Target Debris Pile

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

EXTENT WITHIN MAP

ERIE COUNTY

Legend
- Soil Sample Locations
- Trap Range Soil
- Skeet Range Soil
- Skeet Fallout Zone
- Trap Fallout Zone
- Sediment/Surface Water
- Drainage Ditch (Culverted)
- Demolished Buildings
- Area Excluded from Parcel Boundary (New Car Dealership Construction)
- Site Features
- NASA PBS Boundary

Exceedances
- Human Health Exceedance
- Ecological Exceedance
- Human Health & Ecological Exceedance

0 100 200
Feet

NASA GLENN RESEARCH CENTER
PLUM BROOK STATION
SANDUSKY, OHIO

ECCL FIRING RANGE
TRAP & SKEET RANGES (WEST)
SOIL SAMPLES ORGANIC EXCEEDANCES

leidos

FIGURE 10

Figure 10. ECCL Firing Range – Trap & Skeet Ranges –Soil Samples Organic Exceedances – West

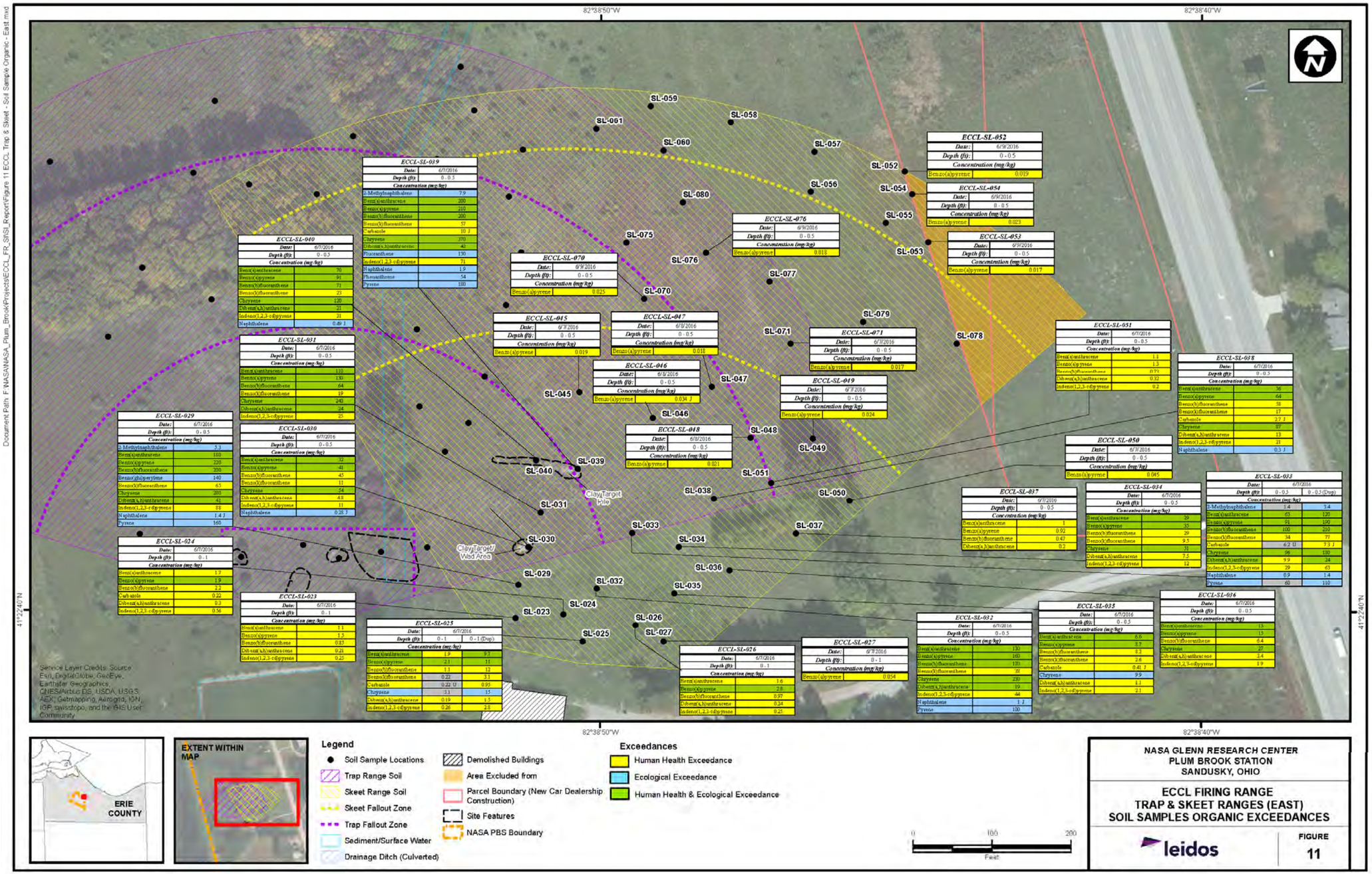

Figure 11. ECCL Firing Range – Trap & Skeet Ranges –Soil Samples Organic Exceedances – East

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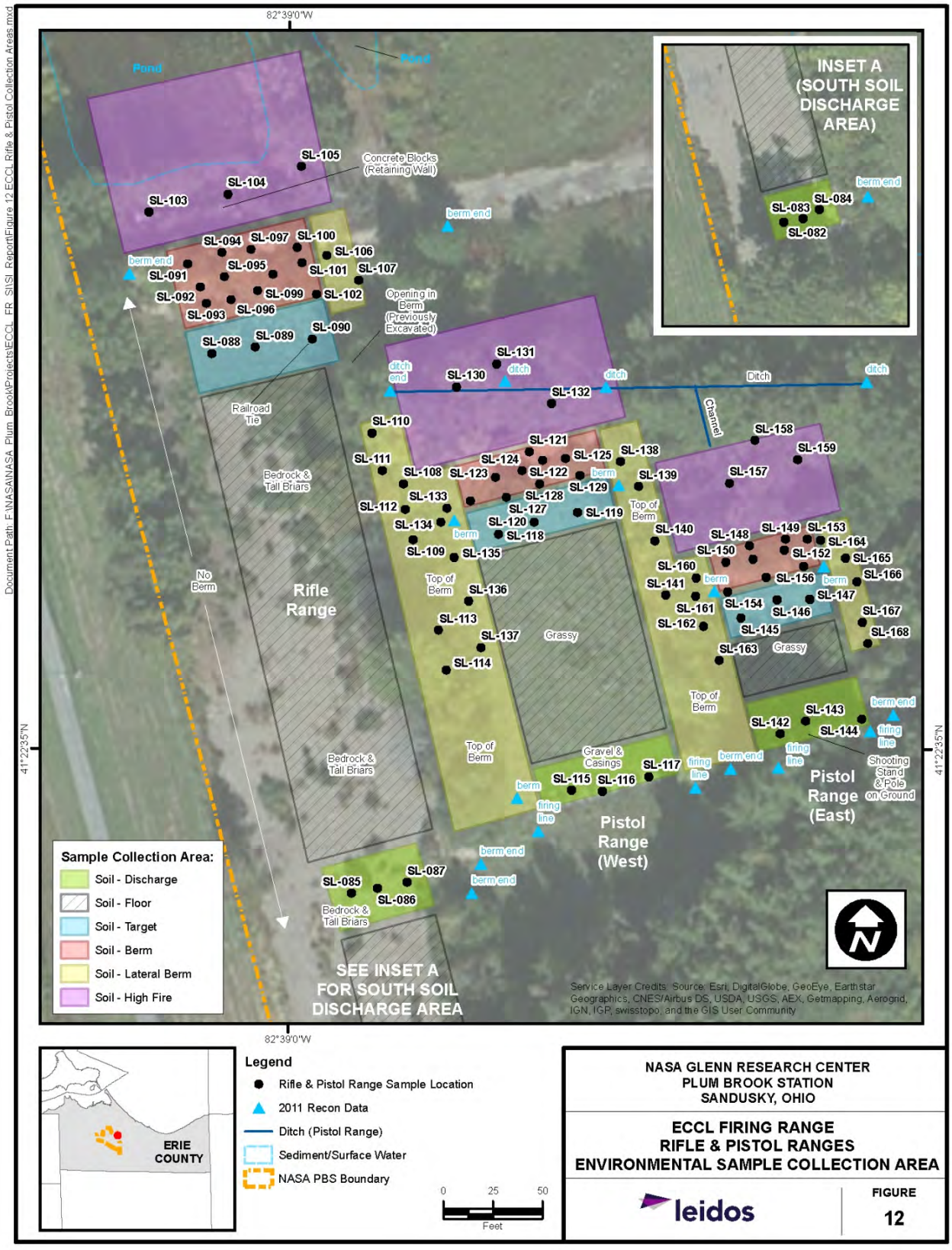

Figure 12. ECCL Firing Range – Rifle & Pistol Ranges – Environmental Sample Collection Areas

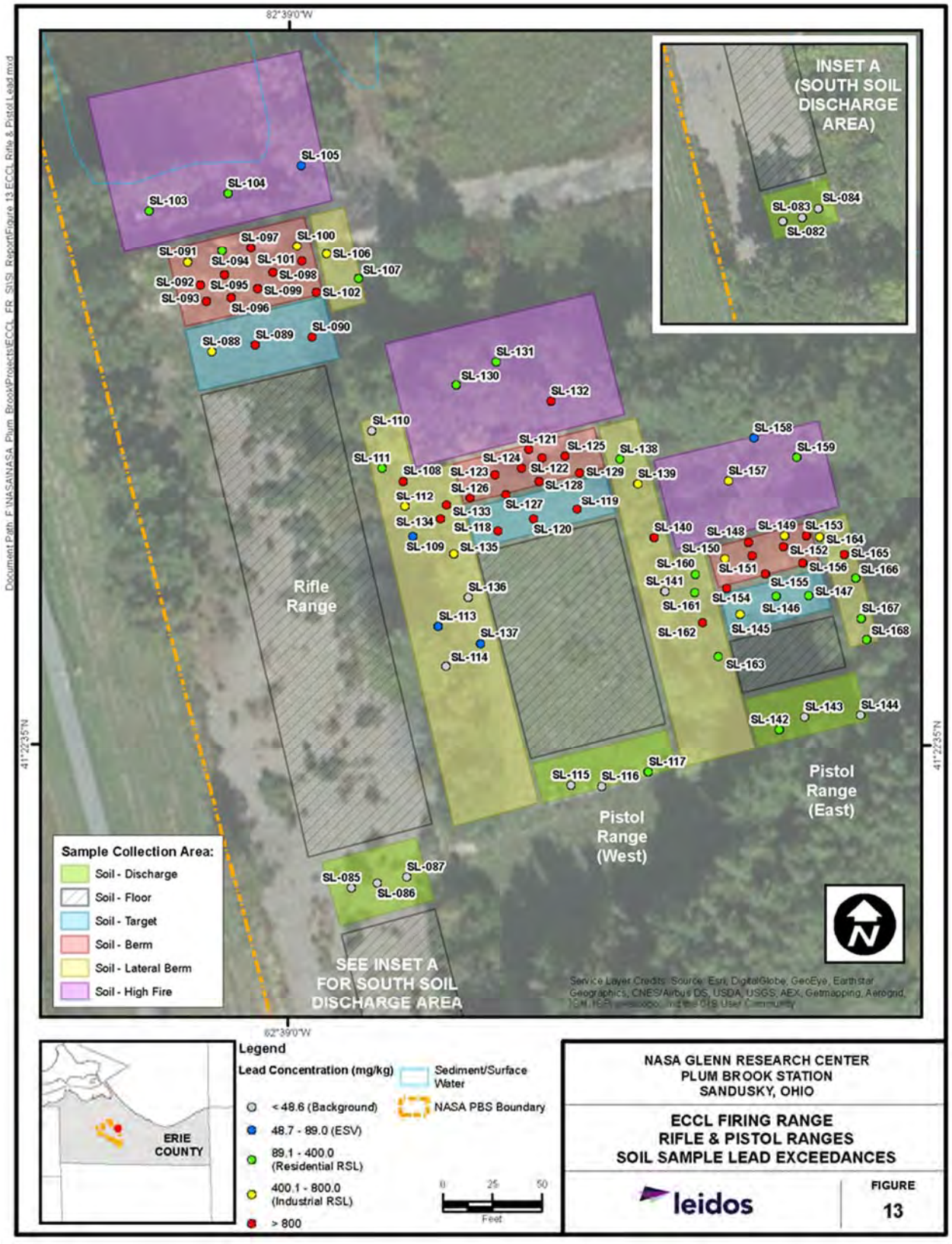

Figure 13. ECCL Firing Range – Rifle & Pistol Ranges – Soil Samples Lead Exceedances

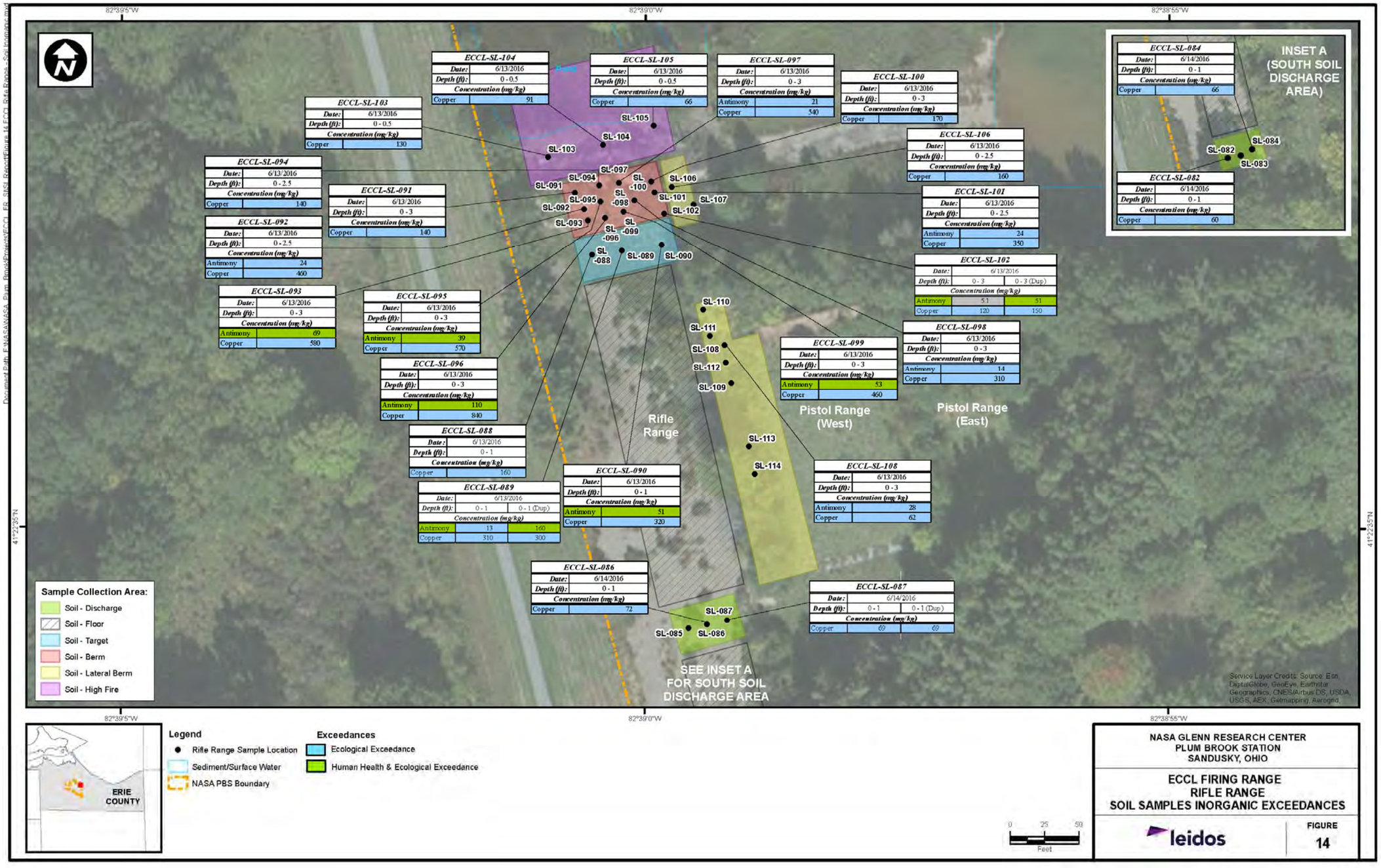

Figure 14. ECCL Firing Range – Rifle Range – Soil Samples Inorganic Exceedances

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82°39'5"W 82°39'0"W 82°38'55"W

41°22'35"N

Pistol Range (West)

Pistol Range (East)

Rifle Range

ECCL-SL-103
Date: 6/13/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Benzo(a)pyrene 0.017

ECCL-SL-105
Date: 6/13/2016
Depth (ft): 0 - 0.5
Concentration (mg/kg)
Naphthalene 0.33

ECCL-SL-100
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Naphthalene 0.23

ECCL-SL-106
Date: 6/13/2016
Depth (ft): 0 - 2.5
Concentration (mg/kg)
Naphthalene 0.25

ECCL-SL-101
Date: 6/13/2016
Depth (ft): 0 - 2.5
Concentration (mg/kg)
Benz(a)anthracene 4.5
Benzo(a)pyrene 4.9
Benzo(b)fluoranthene 2.8
Chrysene 11
Dibenz(a,h)anthracene 0.71
Indeno(1,2,3-cd)pyrene 0.58
Naphthalene 0.11

ECCL-SL-084
Date: 6/14/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Naphthalene 0.15

ECCL-SL-083
Date: 6/14/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Naphthalene 0.32

ECCL-SL-082
Date: 6/14/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Benzo(a)pyrene 0.11
Naphthalene 0.22

INSET A (SOUTH SOIL DISCHARGE AREA)

ECCL-SL-091
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benzo(a)pyrene 0.053
Naphthalene 0.12

ECCL-SL-092
Date: 6/13/2016
Depth (ft): 0 - 2.5
Concentration (mg/kg)
Benzo(a)pyrene 0.084
Benzo(b)fluoranthene 0.17
Naphthalene 0.16

ECCL-SL-093
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benz(a)anthracene 0.47
Benzo(a)pyrene 0.47
Benzo(b)fluoranthene 0.93
Dibenz(a,h)anthracene 0.058

ECCL-SL-095
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benzo(a)pyrene 0.082

ECCL-SL-096
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benzo(a)pyrene 0.066
Naphthalene 0.12

ECCL-SL-102
Date: 6/13/2016
Depth (ft): 0 - 3 | 0 - 3 (Dup)
Concentration (mg/kg)
Benzo(a)pyrene 0.037 | 0.051

ECCL-SL-098
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benzo(a)pyrene 0.19
Benzo(b)fluoranthene 0.26

ECCL-SL-099
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benzo(a)pyrene 0.14
Benzo(b)fluoranthene 0.18

ECCL-SL-088
Date: 6/13/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Benzo(a)pyrene 0.033
Naphthalene 0.22

ECCL-SL-089
Date: 6/13/2016
Depth (ft): 0 - 1 | 0 - 1 (Dup)
Concentration (mg/kg)
Benzo(a)pyrene 0.025 | 0.027
Naphthalene 0.14 | 0.23

ECCL-SL-090
Date: 6/13/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Benzo(a)pyrene 0.021
Naphthalene 0.18

ECCL-SL-112
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benzo(a)pyrene 0.029

ECCL-SL-110
Date: 6/13/2016
Depth (ft): 0 - 2.5
Concentration (mg/kg)
Benzo(a)pyrene 0.14
Benzo(b)fluoranthene 0.25
Naphthalene 0.15

ECCL-SL-111
Date: 6/13/2016
Depth (ft): 0 - 2.5
Concentration (mg/kg)
Benz(a)anthracene 0.2
Benzo(a)pyrene 0.2
Benzo(b)fluoranthene 0.43
Dibenz(a,h)anthracene 0.034
Naphthalene 0.15

ECCL-SL-108
Date: 6/13/2016
Depth (ft): 0 - 3
Concentration (mg/kg)
Benz(a)anthracene 0.31
Benzo(a)pyrene 0.32
Benzo(b)fluoranthene 0.57
Dibenz(a,h)anthracene 0.046
Naphthalene 0.11

ECCL-SL-086
Date: 6/14/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Naphthalene 0.17

ECCL-SL-085
Date: 6/14/2016
Depth (ft): 0 - 1
Concentration (mg/kg)
Naphthalene 0.38

ECCL-SL-087
Date: 6/14/2016
Depth (ft): 0 - 1 | 0 - 1 (Dup)
Concentration (mg/kg)
Naphthalene 0.31 | 0.35

SL-103 SL-104 SL-105 SL-106 SL-107 SL-110 SL-111 SL-108 SL-109 SL-112 SL-113 SL-114 SL-097 SL-094 SL-091 SL-095 SL-092 SL-093 SL-096 SL-088 SL-089 SL-090 SL-098 SL-100 SL-101 SL-102 SL-099 SL-082 SL-083 SL-084 SL-085 SL-086 SL-087

SEE INSET A FOR SOUTH SOIL DISCHARGE AREA

Sample Collection Area:
- Soil - Discharge
- Soil - Floor
- Soil - Target
- Soil - Berm
- Soil - Lateral Berm
- Soil - High Fire

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid,

ERIE COUNTY

Legend
- Pistol Range Sample Location
- Sediment/Surface Water
- NASA PBS Boundary

Exceedances
- Human Health Exceedance
- Ecological Exceedance
- Human Health & Ecological Exceedance

0 25 50 Feet

NASA GLENN RESEARCH CENTER
PLUM BROOK STATION
SANDUSKY, OHIO

ECCL FIRING RANGE
RIFLE RANGE
SOIL SAMPLES ORGANIC EXCEEDANCES

leidos

FIGURE 15

Figure 15. ECCL Firing Range – Rifle Range – Soil Samples Organic Exceedances

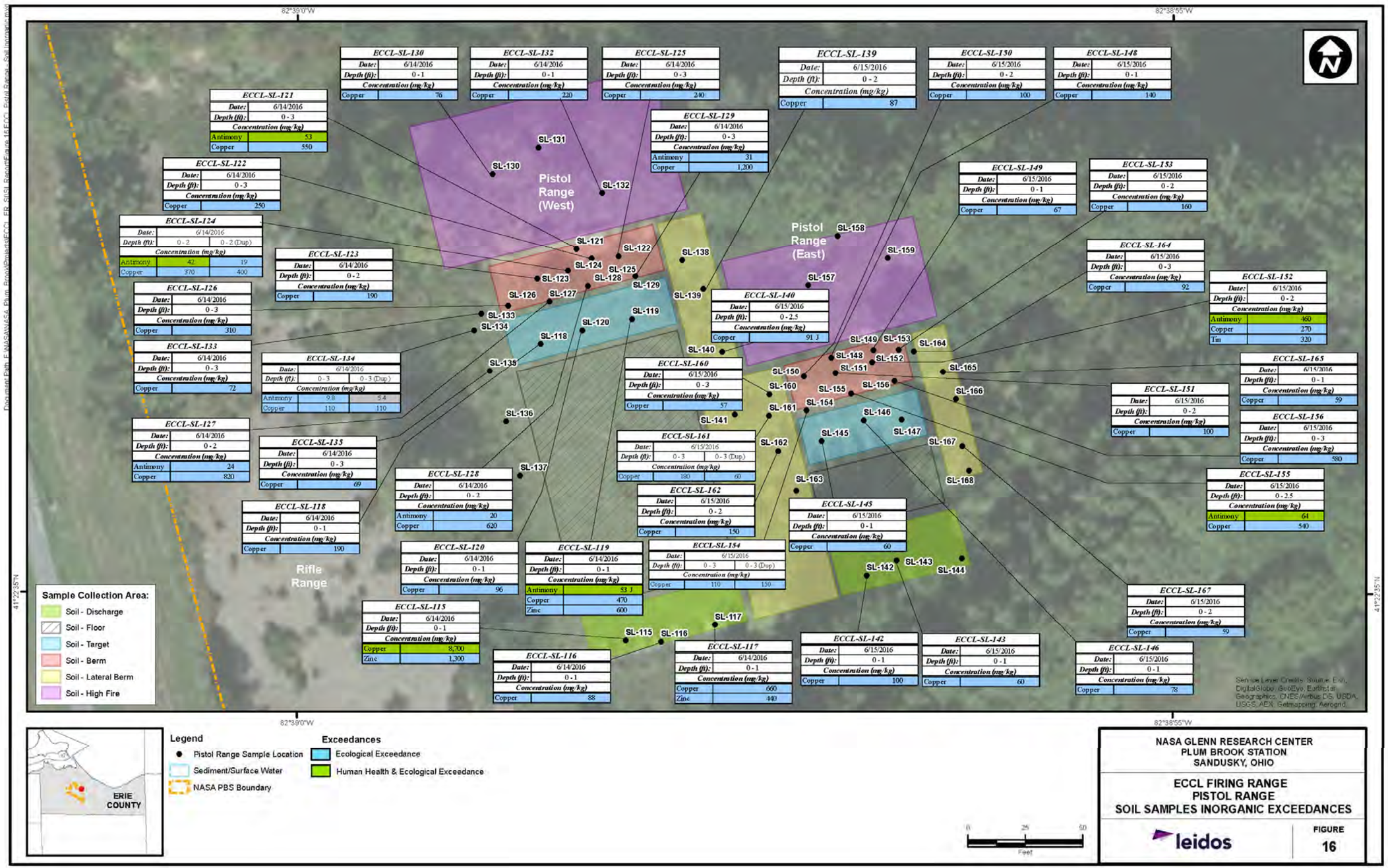

Figure 16. ECCL Firing Range – Pistol Ranges – Soil Samples Inorganic Exceedances

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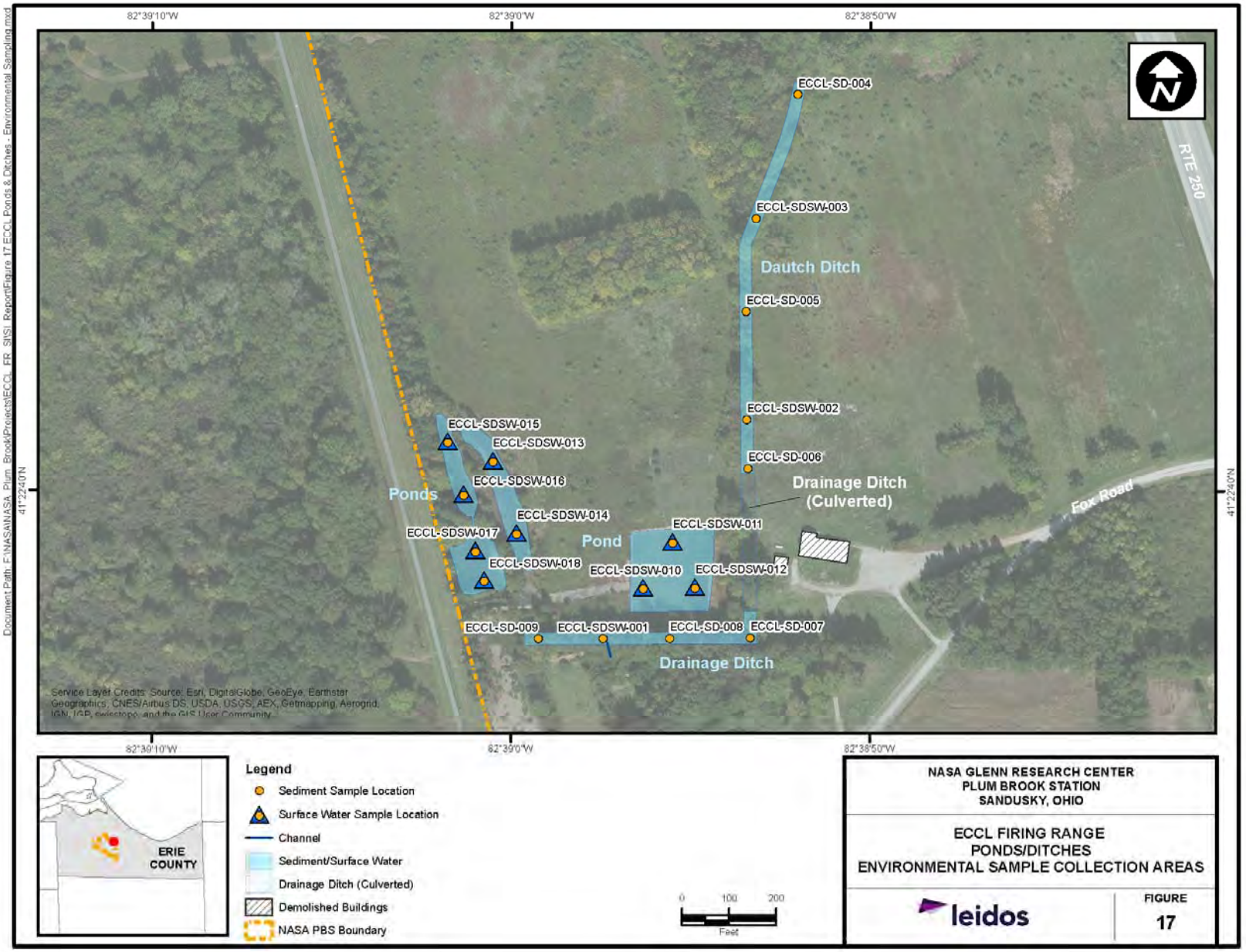

Figure 17. ECCL Firing Range – Ponds/Ditches – Environmental Sample Collection Areas

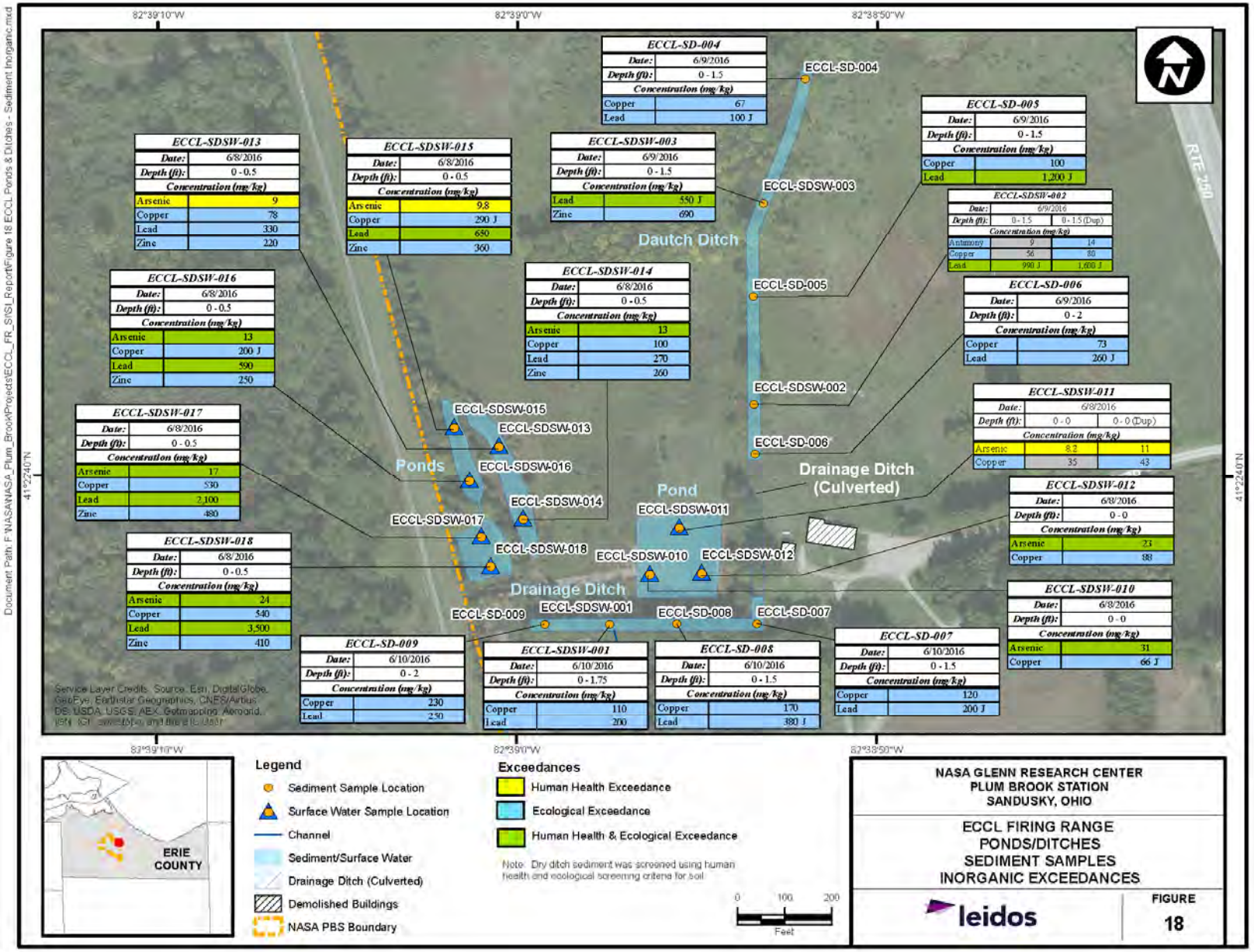

Figure 18. ECCL Firing Range – Ponds/Ditches – Sediment Samples Inorganic Exceedances

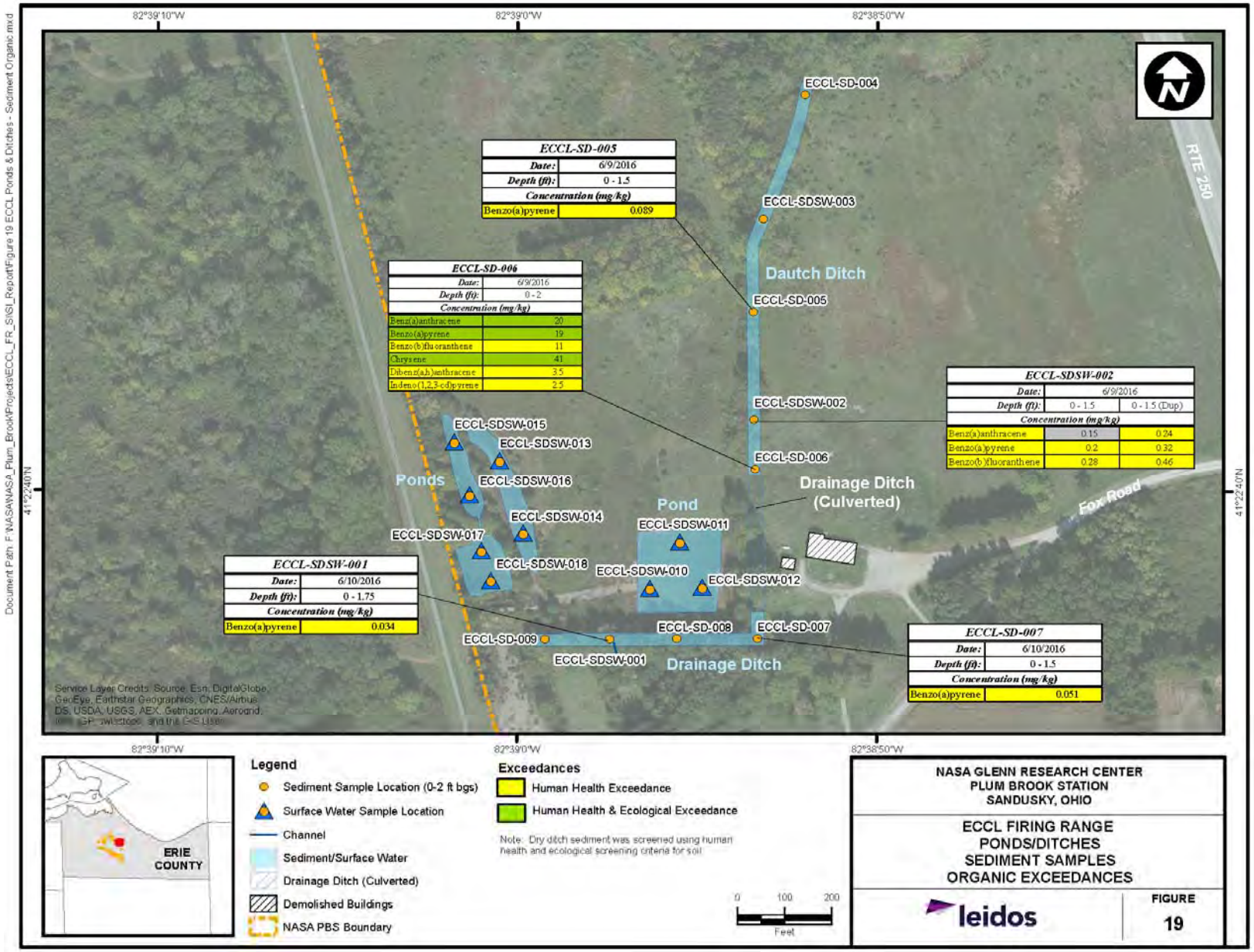

Figure 19. ECCL Firing Range – Ponds/Ditches – Sediment Samples Organic Exceedances

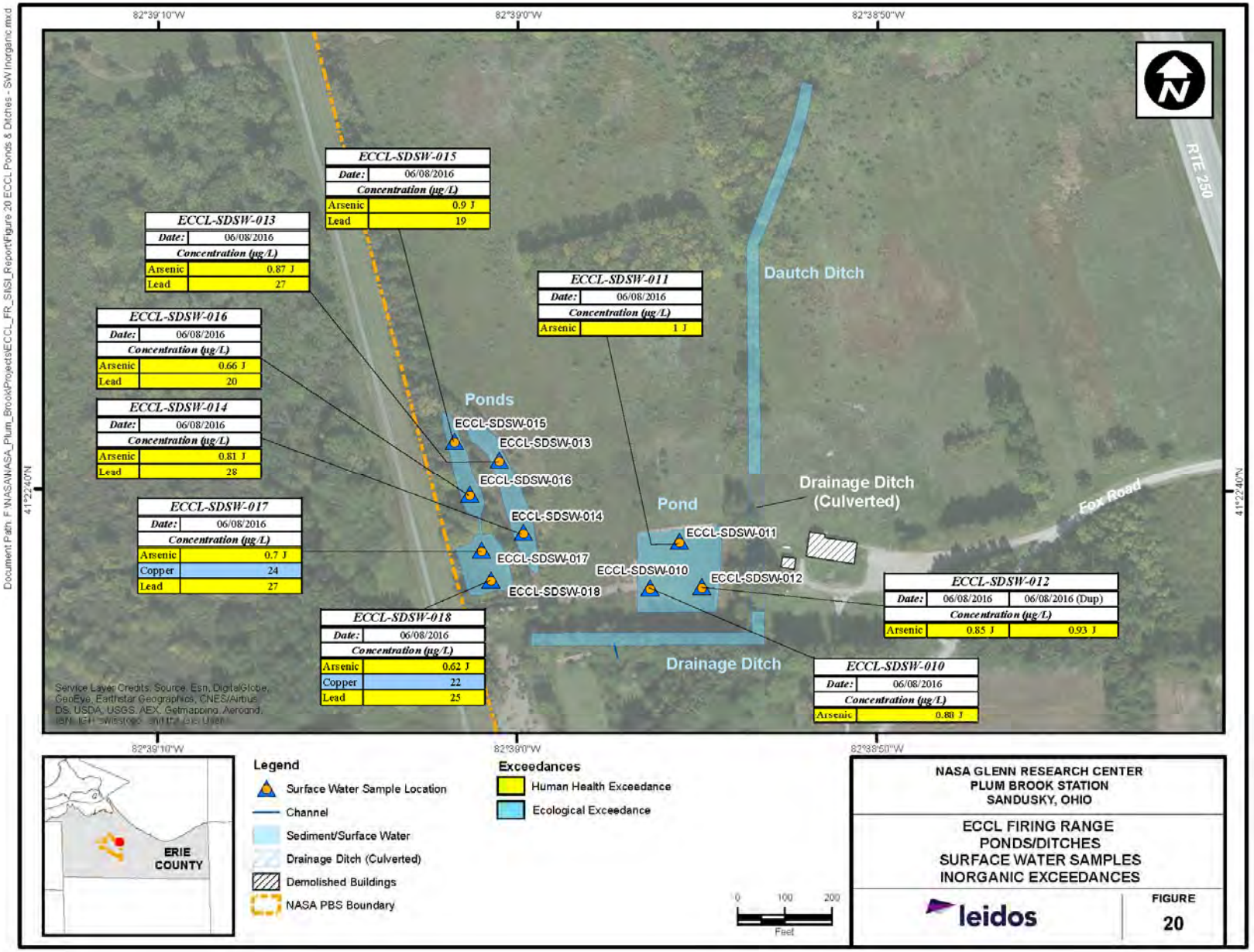

Figure 20. ECCL Firing Range – Ponds/Ditches – Surface Water Samples Inorganic Exceedances

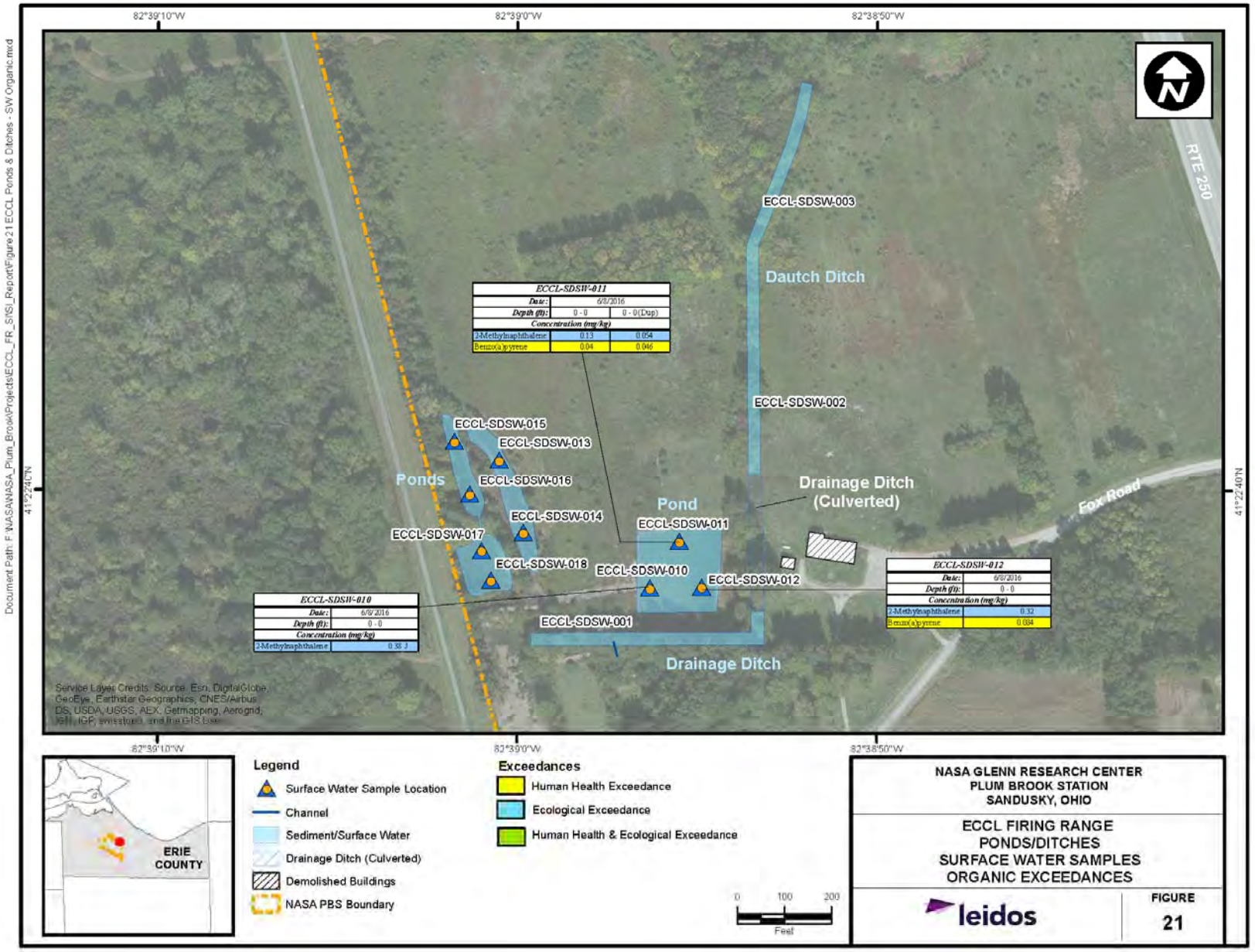

Figure 21. ECCL Firing Range – Ponds/Ditches – Surface Water Samples Organic Exceedances