Final

Proposed Plan for

Fox Road, Snake Road, and Taylor Road Burning Grounds

National Aeronautics and Space Administration
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Sandusky, Ohio

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Executive Summary

A Proposed Plan (PP) is part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process which provides a consistent approach for site identification, evaluation, and cleanup. The primary goal of the PP is to identify the preferred alternative and rationale for cleaning up environmental contamination at a site and provides the public with information necessary to review and comment on NASA's selection of an appropriate response action. This PP details the evaluation of alternatives and identifies the preferred alternative for the Fox Road Burning Ground (FRBG), Snake Road Burning Ground (SRBG), and Taylor Road Burning Ground (TRBG) sites at National Aeronautics and Space Administration (NASA) Glenn H. Research Center's at the Neil A. Armstrong Test Facility (GRC-ATF) (formerly named Plum Brook Station). The final component of the PP includes public participation with a public meeting and a public comment period. The PP provides the public with information necessary to comment on NASA's selection of an appropriate response action.

A PP generally includes a summary of the site history, site associated risks (to human health and ecological resources), the objectives of completing a remedial action for a site, a summary of the potential remedial alternatives, an evaluation of the potential remedial alternatives based on nine criteria (protection to human health and the environment, applicable or relevant and appropriate requirements, long-term effectiveness and performance, reduction of toxicity, short-term effectiveness, implementability, cost, state support, and community acceptance), and a summary of the preferred remedial alternative.

Previous investigations at GRC-ATF for the three sites (FRBG, SRBG, and TRBG) included a Preliminary Assessment (1991), a Site Characterization (1992), two Site Inspections (1994, 2015), a Phase I Remedial Investigation (RI) for soil (2017), and a Phase II RI for groundwater (2022). The previous environmental investigations concluded that sediment and surface water were not present at any of the three sites. The Phase I RI determined that there were no risks associated with soil at FRBG. The Phase I RI determined that there were 5 locations at SRBG (due to metals, explosives, and PCBs contamination) and 3 locations at TRBG (due to PCBs contamination) which required remedial action for soil to be protective of human health or the environment. Additionally, asbestos was detected at all three sites. NASA has elected to remove all detectable asbestos at each of the three sites. The Phase II RI determined that groundwater was adequately characterized for all three sites, and no further action was required to be protective of human health or the environment.

A Feasibility Study (FS) was completed upon conclusion of the environmental investigations, human health risk assessments, and ecological risk assessments. The FS study identified remedial objectives and examined potential remedial alternatives. This PP summarizes and presents the findings of the FS. A total of 5 response actions were evaluated (no action, institutional controls, containment, removal, and treatment) and 2 potential remedial alternatives were evaluated. The evaluation of the remedial alternatives recommended Alternative 2: Excavation and Off-site Disposal as the selected alternative because Alternative 2 would attain Unrestricted Residential Land Use and comply with all Applicable or Relevant and Appropriate Requirements (ARARs). The selected alternative will address soil contamination that poses risk for the Residential Receptor Use at FRBG, SRBG, and TRBG. The proposed remedial alternative for soil will allow for unrestricted Residential Land Use at all three sites.

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LIST OF ACRONYMS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
COPEC	Chemical of Potential Ecological Concern
CUG	Cleanup Goal
DNT	Dinitrotoluene
ERA	Ecological Risk Assessment
ESV	Ecological Screening Value
FRBG	Fox Road Burning Ground
FS	Feasibility Study
GRA	General Response Action
GRC-ATF	John H. Glenn Research Center at Neil A. Armstrong Test Facility
GSR	Green and Sustainable Remediation
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
Ohio EPA	Ohio Environmental Protection Agency
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PBOW	Plum Brook Ordnance Works
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
PMU	Project Management Unit
RAO	Remedial Action Objective
RCRA	Resources Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act
TAL	Target Analyte List
TNT	Trinitrotoluene
TRBG	Taylor Road Burning Ground
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This Proposed Plan (PP) presents the conclusions and recommendations for soil remediation at Fox Road Burning Ground (FRBG), Snake Road Burning Ground (SRBG), and Taylor Road Burning Ground (TRBG) areas of concern at National Aeronautics and Space Administration's (NASA's) Glenn H. Research Center's Neil A. Armstrong Test Facility (GRC-ATF) (formerly named Plum Brook Station). NASA GRC-ATF is in Sandusky, Ohio, Erie County (Figure 1). (Note that all figures are presented at the end of this PP.)

This PP provides the public with information necessary to comment on NASA's selection of an appropriate response action. The remedy will be selected after all comments submitted during the 30-day public comment period are considered. Therefore, the public is encouraged to review and comment on alternatives presented in this PP.

NASA is issuing this PP as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and Section 300.430(f) (2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 *Code of Federal Regulations* 300).

This PP summarizes information that is provided in detail in the *Revised Final Feasibility Study Report for Fox Road Burning Ground, Snake Road Burning Ground, and Taylor Road Burning Ground* (Leidos 2023) and other documents contained in the Administrative Record file for these sites.

Subsequent to these actions, NASA has completed multiple investigations to identify the extent of contamination, as discussed in Section 3.1. This PP addresses contamination in soil at FRBG, SRBG, and TRBG. The Remedial Investigation (RI) determined that groundwater was adequately characterized at each of the three burning grounds. Human Health Risk Assessments (HHRAs) did not identify any groundwater chemicals of concern (COCs) with residential use at each of the three burning

Public Comment Period:
February 28, 2023 to March 29, 2023

Public Meeting:
NASA will hold a public meeting to present the conclusions and additional details presented in the *Revised Final Feasibility Study Report for Fox Road Burning Ground, Snake Road Burning Ground, and Taylor Road Burning Ground* (Leidos 2023). Oral and written comments will also be accepted at the meeting. The public meeting is scheduled for 7:00PM, March 9, 2023, at the Bowling Green State University Firelands Campus, Cedar Point Center Building, Room 1009, One University Drive, Huron, Ohio 44839.

To attend the meeting virtually, register at https://www1.grc.nasa.gov/neil-armstrong-test-facility-restoration/

Information Repositories:
Information used in selecting the remedy is available for public review at the following locations:

Bowling Green State University Firelands Library
One University Drive
Huron, Ohio 44839
(419) 372-0739

Hours of operation:
7AM-7PM Monday-Thursday
7AM-5PM Friday
Closed Saturday
Closed Sunday

Online
https://www1.grc.nasa.gov/neil-armstrong-test-facility-restoration/
eDocument search via epa.ohio.gov

The **Administrative Record File**, containing additional information used in selecting the remedy, is available for public review at the following location:

NASA Glenn Research Center
Environmental Management Office
21000 Brookpark Road
Cleveland, Ohio 44135
(216) 433-6028
Note: Access is restricted to NASA, but the file can be obtained or viewed with prior notice to NASA.

ground sites, and ecological exposure to chemicals in groundwater was determined to not be a concern. Sediment and surface water are not present at any of the three burning ground sites. In addition, the risk assessments for protection of the planned future land use are summarized in this PP.

NASA's preferred alternative at FRBG, SRBG, and TRBG is Excavation and Offsite Disposal. NASA encourages the public to review the site background documents to gain a more comprehensive understanding of FRBG, SRBG, and TRBG, activities that have been conducted to date, and the rationale for the preferred alternatives.

2.0 NASA GRC-ATF DESCRIPTION AND BACKGROUND

GRC-ATF is in southern Erie County, Ohio, approximately 3 miles south of Sandusky, Ohio (Figure 1). GRC-ATF is currently 6,740 acres. Local farmers lease approximately 895 acres outside the security fence (Leidos 2018). Most of GRC-ATF 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 boundary of GRC-ATF occurs at latitude 41°2'3""N and extends as far south as latitude 41°2'0""N. The westernmost longitude occurs at 82°4'1""W and extends as far east as 82°3'3""W.

GRC-ATF is situated in an area known for its agricultural productivity and is bordered by farmland, some of which NASA leases to local farmers. The area surrounding GRC-ATF is largely rural and agricultural, with some recent residential and commercial development. Some food processing facilities are 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 near the former GRC-ATF 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 U.S. Army Reserve Center is situated adjacent to the southeastern corner, just off Mason Road (SAIC 2013).

The following section describes the setting and history of each of the three burning grounds (FRBG, SRBG, and TRBG).

2.1 Burning Grounds Description and History

Fox Road Burning Ground – FRBG is in the east-central portion of GRC-ATF on the northern side of the intersection of Fox Road and Snake Road (Figure 2). FRBG is approximately 17.2 acres, although the exact locations of historical activities and extents are not certain. FRBG currently comprises forest and shrubland on the eastern portion of the site. The western half of the General Area was a mixture of flat, grassy area with some mature trees, areas of heavy shrub/scrub vegetation, and few soil piles. The three wetlands are independent of each other and are only partially inside the eastern boundaries of the General Area and Drainage Ditch.

In addition to being used as burning grounds, FRBG was documented to have also been used as a landfill (SAIC 1991). Referred to as Disposal Area 1B, it is located to the north of the burning ground area, is accessible by a gravel road, and is approximately 5 acres (SAIC 1991). Disposal Area 1B was created by NASA in the 1960s and was not used by the Army. For the purpose of this PP, FRBG includes Disposal Area 1B.

Various types of waste have been observed in this area, including wood, several empty rusted drums, drum bands, transformer insulators, broken glass, nuts, bolts, and gaskets. No buildings are onsite; however, the remains of a suspected maintenance area (i.e., large concrete slab, two shallow pits with steps) are in the

forested area in the western portion of the site. Surface debris, including fragments of asphalt and concrete, was observed within and around a soil pile within the General Area.

Snake Road Burning Ground – SRBG is west of the current Snake Road and north of West Scheid Road (Figure 3). During operational activities, Snake Road (herein referred to as Old Snake Road) went through SRBG. Since operational activities, Snake Road was re-routed and is now 810 feet east of the eastern edge of the Secondary Burn Area.

As noted in the 1995 Records Review Report (DM 1995), a 1944 historical drawing describes SRBG as being 100 feet wide by 200 feet long and oriented in a north-south direction. The southwestern corner of the burn ground was located approximately 800 feet north of the intersection of West Scheid Road and Old Snake Road. The drawing indicates the burn ground was accessed by a 10-foot-wide driveway at its northwestern corner extending 50 feet due west to the unpaved Old Snake Road, and a 4-foot berm surrounded the burn area with an 8-inch-diameter drainage tile in the northeastern corner. Drainage was indicated to be to a ditch flowing north from the burn area to "sufficient outlet." The drawing shows a graded slope within the burn pit of 0.4 percent south to north and 4 percent east and west to the centerline. Proposed burning spots were specified as having a 4-inch sand base and a 4-inch cinder top.

SRBG is currently vegetated with dry herbaceous field, with four small wetlands scattered in the interior of the site. A plant management area (Central Meadows) and a rare plant species and its habitat also occur within SRBG. One drainage ditch exists at the site, northeast of the former burn area (Figure 3). The drainage ditch was dry in the 2015 SI and 2017 RI field activities.

SRBG currently has no structures. However, as discussed in subsequent sections, debris was identified at the site. Metal debris (shredded steel drum, steel drum lid, and steel posts) and cinder blocks were observed, and some asbestos-containing material (ACM) identified as transite (off-white fibrous material and tan cementitious material) were identified.

Taylor Road Burning Ground – TRBG is in the west-central portion of GRC-ATF, southeast of the intersection of Taylor Road and Ransom Road (Figure 4). As noted in the 1995 Records Review Report (DM 1995), the TRBG configuration (per a 1944 historical drawing No. 1669-T-603-9-1/2) was approximately 300 feet southeast of Taylor Road and 300 feet east of Ransom Road. An access road from Taylor Road was built to the burn area, which had a northwest-southeast orientation and measured approximately 100 by 140 feet. Surface soil in the burning area was excavated and used to construct a 3-foot-high earthen embankment surrounding the burn area. Eight-inch-diameter drainage tiles were installed throughout the embankment at natural low points. A mesh chicken wire fence was installed on top of the embankment.

Review of historical aerial photographs dated October 1950 indicates a disturbed area having the same configuration as that shown on the construction drawing and in an undated close-up aerial photograph provided by NASA. In the 1950 photograph, bare ground or debris appears to be located along the northern edge and in the southwestern corner of the area. The fire-break area around the burning ground appeared to have been cleared of trees and other materials.

During field reconnaissance of TRBG in March 1994 and the fall of 1994, the area was observed to consist of open field. TRBG is currently surrounded by shrub and a forested area with a wetland present on the western portion of the site. The habitat at TRBG is dominated by shrubland surrounded by forested area. Two ephemeral drainage ditches exist at the site, one west of the burn area and one northeast of the burn area (Figure 4). These drainage ditches were dry during the 2015 SI and 2017 RI field activities.

A wetland is associated with a wet weather ditch on the western side of the site that was dry

during the 2015 SI and 2017 RI. The wetland runs south and narrows until it hits an access road at the southern boundary of TRBG and then continues east along the access way past the eastern boundary of the site. Another wetland formed south of TRBG and runs along the ditch on the other side of the access way just inside the site boundary.

2.2 Potential Contaminants

FRBG, SRBG, and TRBG are considered potential sources of environmental contamination at GRC-ATF due to their historical usage as disposal sites and burning grounds. The primary source of contamination is from burning contaminated waste, including explosives, waste oil, solvents, asbestos, and acids. Except for some scattered debris, the sites no longer contain the primary source materials. The secondary contamination source is surface and subsurface soil that was potentially contaminated from burning the primary source material (Leidos 2022b, Leidos 2022c, Leidos 2022d).

In summary, potential contaminants at FRBG, SRBG, and TRBG detected and evaluated in soils include metals, explosives, herbicides, polychlorinated biphenyls (PCBs), pesticides, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and asbestos (Leidos 2022b, Leidos 2022c, Leidos 2022d). Potential contaminants detected and evaluated in groundwater at FRBG and TRBG include metals, explosives, VOCs, SVOCs, and PCBs (Leidos 2022b, Leidos 2022d). Potential contaminants detected and evaluated in groundwater at SRBG include metals, explosives, pesticides, VOCs, SVOCs, and PCBs (Leidos 2022c). Sediment and surface water do not exist at FRBG, SRBG, or TRBG (Leidos 2022b, Leidos, 2022c, Leidos 2022d).

3.0 PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

Since 1990, GRC-ATF has been the subject of multiple CERCLA investigations leading to summary and recommendations outlined for FRBG, SRBG, and TRBG under this Proposed Plan (PP).

The 1990 Contamination Evaluation of Plum Brook Station identified both SRBG and TRBG as sites targeted for investigation to confirm or deny the presence or absence of residual chemical contamination from DoD operational activities (IT Corporation 1991).

The Preliminary Assessment (PA) conducted in 1991 identified potential sources of environmental contamination and placed them into preliminary operable units (OUs). Fourteen OUs were documented under the 1991 PA, with OU4 containing the burning grounds, including TRBG and SRBG. A separate OU, OU11: Disposal Area 1B was created for FRBG as it was considered a landfill. The PA results for TRBG and SRBG indicated that minimal soil contamination had occurred; therefore, groundwater contamination was unlikely. The PA was not able to confirm releases from Disposal Area 1B to the environment (SAIC 1991).

In 1992, a Phase I Site Characterization report was completed for SRBG, which was identified as identified as “Disposal Area Three” at the time of the report. The Phase I Site Characterization did not recommend any further site characterization or remediation. However, because some chemicals (SVOCs, PCBs, lead, and 1,1-dichloroethane) had a high hazard ranking, future land use precautions were recommended (H+GCL 1992).

The 1994 Site Investigation (SI) developed project management units (PMUs) based upon surface drainage patterns at GRC-ATF. The SI developed 5 PMUs, with FRBG under PMU 4, SRBG under PMU 3, and TRBG under PMU 2. Surface soil results within FRBG indicated low concentrations of toluene. Based upon the evaluation of the facility and historical records, the 1994 SI Report recommended that no further action (NFA) under CERCLA was necessary from PMUs 3, 4, and 5. Furthermore, the SI concluded that areas that indicated levels of contamination above background should be

scheduled and remediated under different Federal and state authorities (MK 1994).

The 1995 Records Review Report summarized information regarding seven OUs identified in the 1991 PA. Under the Records Review Report, the OUs are described as areas of concern (AOCs). Under this document, the burning grounds (FRBG, SRBG, and TRBG) are described as AOC 4. This document included historical site documents and photographs, historical aerial photographs, environmental investigation reports, and TNT manufacturing process information. The TNT manufacturing process information was not pertinent to AOC 4 (DM 1995).

The following subsections describe the Phase I and Phase II Remedial Investigations individually for FRBG, SRBG, and TRBG.

3.1 Fox Road Burning Ground

2015 Site Investigation **–** The GRC-ATF Multi-site SI, which included FRBG, was conducted in August 2015, as summarized in the 2016 SI Report (Leidos 2016). The primary objectives of the SI were to determine the presence or absence of contamination in surface soil, subsurface soil, sediment, and surface water. Groundwater was not included as part the SI. Surface water was not present at the Drainage Area of FRBG. Since surface water was not present at FRBG, sediment samples were included in the soil medium evaluations. All soil samples were analyzed for target analyte list (TAL) metals, explosives, herbicides, PCBs, pesticides, SVOCs, and VOCs. Surface soils were analyzed for asbestos (Leidos 2016).

2017 Phase I Remedial Investigation – The Phase I RI at FRBG was completed to supplement the data collected under the 2015 SI. Additional surface soil samples were collected and analyzed for SVOCs, pesticides, PCBs, and TAL metals. Two temporary monitoring wells were installed, and groundwater was evaluated for SVOCs, TAL metals, pesticides, and PCBs. Additionally, a site assessment was performed by an Asbestos Hazard Evaluation Specialist (Leidos 2022a).

2021 Phase II Remedial Investigation – The Phase II RI at FRBG was completed to supplement the Phase I RI. While groundwater at GRC-ATF is not for drinking water and the GRC Master Plan restricts groundwater use onsite, the groundwater at the site was evaluated in the Phase II RI to determine whether historical site use had impacted groundwater and whether further action was necessary. No additional soil sampling was completed under the Phase II RI. Four permanent monitoring wells were installed at FRBG to assess the potential for seven chemicals in soil to leach and migrate to groundwater. Over the course of two seasonal events, groundwater was analyzed for Resource Conservation and Recovery Act (RCRA) metals, explosives, VOCs, SVOCs, and PCBs (Leidos 2022b).

3.2 Snake Road Burning Ground

2015 Site Investigation **–** The GRC-ATF Multi-site SI, which included SRBG, was conducted in August 2015, as summarized in the 2016 SI Report (Leidos 2016). The primary objectives of the SI were to determine the presence or absence of contamination in surface soil, subsurface soil, sediment, and surface water. Groundwater was not included as part the SI. Surface water was not present at the SRBG Drainage Ditch. Since surface water was not present at FRBG, sediment samples were included in the soil medium evaluations. All soil samples were analyzed TAL metals, explosives, herbicides, PCBs, pesticides, SVOCs, and VOCs. Surface soils were analyzed for asbestos (Leidos 2016).

2017 Phase I Remedial Investigation – The Phase I RI at SRBG was completed to supplement the data collected under the 2015 SI. Additional surface soils samples were collected and analyzed for TAL metals, explosives, PCBs, pesticides, and SVOCs. Two temporary wells were planned to evaluate groundwater but could not be sampled due to accessibility issues (Leidos 2022a).

Phase II Remedial Investigation – The Phase II RI at SRBG was completed to supplement the Phase I RI. While groundwater at GRC-ATF is not for drinking water and the GRC Master Plan restricts groundwater use onsite, the groundwater at the site was evaluated in the Phase II RI to determine whether historical site use had impacted groundwater and whether further action was necessary. No additional soil sampling was completed under the Phase II RI. Three new monitoring wells and two existing monitoring wells were sampled at SRBG to assess the potential for thirteen chemicals in soil to leach and migrate to groundwater. Over the course of two seasonal events, groundwater was analyzed for RCRA metals, explosives, PCBs, pesticides, SVOCs, and VOCs (Leidos 2022b).

3.3 Taylor Road Burning Ground

2015 Site Investigation – The GRC-ATF Multi-site SI, which included TRBG, was conducted in August 2015, as summarized in the 2016 SI Report (Leidos 2016). The primary objectives of the SI were to determine the presence or absence of contamination in surface soil, subsurface soil, sediment, and surface water. Groundwater was not included as part the SI. Surface water was not present at either of the two drainage ditches on either side of the Primary Burn Area. Since surface water was not present at TRBG, sediment samples were included in the soil medium evaluations. All soil samples were analyzed TAL metals, explosives, herbicides, PCBs, pesticides, SVOCs, and VOCs. Surface soils were analyzed for asbestos (Leidos 2016).

2017 Phase I Remedial Investigation – The Phase I RI at TRBG was completed to supplement the data collected under the 2015 SI. Additional surface soils samples were collected and analyzed for TAL metals, PCBs, pesticides, and SVOCs. Two temporary wells were planned to evaluate groundwater but could not be sampled, as they did not produce sufficient groundwater (Leidos 2022a).

Phase II Remedial Investigation – The Phase II RI at TRBG was completed to supplement the Phase I RI. While groundwater at GRC-ATF is not for drinking water and the GRC Master Plan restricts groundwater use onsite, the groundwater at the site was evaluated in the Phase II RI to determine whether historical site use had impacted groundwater and whether further action was necessary. No additional soil sampling was completed under the Phase II RI. Five permanent monitoring wells were installed and four were sampled at TRBG to assess the potential for ten chemicals in soil to leach and migrate to groundwater. One of the newly installed monitoring wells at TRBG did not produce groundwater and could not be sampled. Over the course of two seasonal events, groundwater was analyzed for TAL metals, explosives, PCBs, SVOCs, and VOCs (Leidos 2022b).

3.4 Remedial Investigation Results for Soil

The Final Phase II RI reports (Leidos 2022b, Leidos 2022c, and Leidos 2022d) and the Revised Final FS (Leidos 2023) for FRBG, SRBG, and TRBG summarized all data collected since remedial activities occurred, provided updated risk assessments, and evaluated the hypothetical resident receptor and ecological receptors. The COCs for exposure of resident receptors and ecological receptors to soil at FRBG, SRBG, and TRBG are described in the following paragraphs. The Phase II RIs completed for each of the three sites presented the results of human health and ecological screening evaluations that identified COCs exceeding screening criteria. Additionally, a supplemental Risk Evaluation was completed under the Revised Final FS (Leidos 2023). The purpose of the supplemental evaluation was to compare the reginal screening levels (RSLs) used in the 2018 human health and ecological risk evaluations to see if current RSLs would cause new chemicals to become chemicals of potential concern. No additional chemicals were identified.

Fox Road Burning Ground – COCs requiring remediation were not identified in soil. No further action regarding soil is required at FRBG. Additional ACM assessment is not warranted. However, NASA has elected to

remove all detectable asbestos at FRBG (Leidos 2023).

Snake Road Burning Ground –Four COCs (PCB-1248, PCB-1254, PCB-1260, and silver) were identified in surface soil at three sample locations for potential remedial action to be protective of future residential land use. No COCs were identified as requiring remedial action to be protective of future industrial land use. Additional ACM assessment is not warranted. However, NASA has elected to remove all detectable asbestos at SRBG (Leidos 2023).

Taylor Road Burning Ground –Two COCs (PCB-1254 and PCB-1260) were identified for potential remedial action to be protective of future residential land use at sample locations. One COC (PCB-1254) was identified as requiring remedial action to be protective of future industrial land use. Additional ACM assessment is not warranted. However, NASA has elected to remove all detectable asbestos at TRBG (Leidos 2023).

3.5 Remedial Investigation Results for Groundwater

The potential for soil contaminants to impact groundwater was evaluated in a fate and transport evaluation. The details of the fate and transport analysis identifying constituents that may leach from soil and impact groundwater beneath the source and at a nearest downgradient receptor location are presented in the Final Phase II RI reports (Leidos 2022b, Leidos 2022c, and Leidos 2022d) and Revised Final FS (Leidos 2023). The soil leaching contaminant migration chemicals of potential concern were evaluated through the stepwise fate and transport evaluation that included leachate modeling in the unsaturated zone using the SESOIL model and lateral transport modeling in the saturated zone using the AT123D model.

If the predicted maximum leachate concentration of a COI was lower than the screening criteria, the chemical was eliminated from further evaluation using AT123D modeling. For the remaining COIs, maximum concentrations predicted by AT123D in groundwater directly below the source areas and at the downgradient receptor locations were compared to applicable GRC-ATF background concentrations, as well as and resident regional screening levels (RSLs). Modeling results were included in the decision-making process to determine whether performing remedial actions may be necessary to protect groundwater resources.

Fox Road Burning Ground – The Phase I RI fate and transport evaluation for FRBG identified naphthalene, 2,4,6-TNT; 2,4-DNT; 2,6-DNT; 2 amino-4,6-DNT; 4-amino-2,6-DNT; and beta-hexachlorocyclohexane for future groundwater evaluation to assess the modeling results. The explosives were not detected in groundwater above screening criteria, and samples were not analyzed for beta-hexachlorocyclohexane during the Phase II RI because pesticide analyte surface and subsurface soil samples results did not exceed background concentrations or resident RSLs. Naphthalene was the only organic constituent detected above screening criteria at FRBG. Based on the Phase II RI results, FRBG groundwater has been adequately characterized, and further investigation is not warranted. The nature and extent of potentially impacted media have been sufficiently characterized. No COCs were identified with residential use of groundwater, therefore NFA is recommended (Leidos 2022b).

Snake Road Burning Ground – The Phase I RI fate and transport evaluation for SRBG identified hexachloroethane and naphthalene for future groundwater evaluation to assess the modeling results. Hexachloroethane and naphthalene were not detected in groundwater during the Phase II RI. Only inorganic site-related chemicals exist in groundwater. Based on the Phase II RI results, groundwater has been adequately characterized, and further investigation is not warranted. The nature and extent of potentially impacted media has been sufficiently characterized. No COCs were identified with residential use of groundwater, therefore NFA is recommended (Leidos 2022c).

Taylor Road Burning Ground – The Phase I RI fate and transport evaluation identified hexachloroethane and naphthalene for future groundwater evaluation to assess the modeling results. Hexachloroethane was not detected in groundwater during the Phase II RI. Naphthalene was detected in only one groundwater sample at an estimated concentration equal to the tap water RSL of 0.12 µg/L. Based on the Phase II RI results, groundwater has been adequately characterized, and further investigation is not warranted. The nature and extent of potentially impacted media has been sufficiently characterized. No COCs were identified with residential use of groundwater, therefore NFA is recommended (Leidos 2022d).

4.0 LAND USE AND ROLE OF RESPONSE ACTION

The GRC-ATF facility is expected to remain under the control of NASA for the foreseeable future. FRBG, SRBG, and TRBG are best classified as inactive areas and plausible receptors include occupational (groundskeepers, industrial, construction workers), and hunters. Even though hunting is not currently permitted in these areas, hunting is permitted in other areas within GRC-ATF. It is highly unlikely that these sites will be developed for either commercial/industrial or residential purposes in the foreseeable future. However, per NASA's objective of attaining unrestricted reuse conditions at all three sites (i.e., suitable for residential land use), the FS primarily evaluated residential land use as the end goal in order to make appropriate risk management decisions.

5.0 SUMMARY OF HUMAN AND ECOLOGICAL RISKS

5.1 Human Health Risk Assessment

Using information defined by the land uses, an HHRA was performed at FRBG, SRBG and TRBG to identify COCs and provide a risk management evaluation to determine if remediation is required under CERCLA based on potential risks to human receptors. Additionally, the Revised Final FS (Leidos 2023) completed a supplemental risk evaluation for soil, as the original HHRA was completed under the Phase I RI in 2018. The supplemental evaluation considered updated RSLs from those used in the 2018 assessment.

The media evaluated in the HHRA for the Resident Receptor (Adult and Child) were surface soil (0 to 2 ft below ground surface [bgs]), subsurface soil (2 to 10 ft bgs), and groundwater at FRBG, SRBG, and TRBG. The media evaluated in the HHRA for the Industrial Worker were surface soil (0 to 2 ft bgs) and subsurface soil (2 to 10 ft bgs).

The HHRA conducted risk management analysis to determine if COCs are present that pose unacceptable risk to the Industrial and Resident Receptors. If no COCs are identified for the Industrial or Resident Receptor, then no unacceptable risk is present, and it can be concluded that no further action is required from a human health perspective. The results of the HHRA by site are provided below:

Fox Road Burning Ground

The COCs recommended for remediation by media and land use were as follows:

Unrestricted (Residential) Land Use –

- No COCs for all media investigated.

Industrial Land Use –

- No COCs for all media investigated.

Snake Road Burning Ground

Unrestricted (Residential) Land Use –

- Soil
  - PCBs (PCB-1248, PCB-1254, and PCB-1260)
  - silver
- No COCs in groundwater.
- Sediment sampling results were grouped with surface soil results as surface water does not exist at this site.

Industrial Land Use –

- No COCs for all media investigated.

Taylor Road Burning Ground

Unrestricted (Residential) Land Use –

- Soil
  - PCBs (PCB-1254 and PCB-1260)
- No COCs in groundwater.
- Sediment sampling results were grouped with surface soil results as surface water does not exist at this site.

Industrial Land Use –

- Soil
  - PCBs (PCB-1254)
- No COCs in groundwater.
- Sediment sampling results were grouped with surface soil results as surface water does not exist at this site.

The presence of asbestos also presents a potential hazard to human health for all three sites. NASA has elected to remove detected concentrations of asbestos in soil at all three sites.

5.2 Ecological Risk Assessment

Soil was evaluated for ecological risk for FRBG, SRBG, and TRBG during the Phase I RI. Additionally, the Revised Final FS (Leidos 2023) completed a supplemental risk evaluation for soil, as the original ecological risk assessment (ERA) was completed under the Phase I RI in 2018. To evaluate the effects to ecological risk, the 2008 and 2018 versions of the *Guidance for Conducting Ecological Risk Assessments* (Ohio EPA 2008, 2018) were compared for substantive changes that could affect the conclusions of the previous Phase I RIs which were completed using the 2008 guidance.

Fox Road Burning Ground – The Level 1 ERA (Scoping Level) documented the presence of wetlands and onsite contamination. Due to the findings of the Level 1 ERA, FRBG proceeded to a Level II Screening ERA (Leidos 2022a).

Surface soil data were screened against ecological screening values (ESVs) recommended in Ohio EPA guidance, and preliminary chemical of potential ecological concern (COPECs) were identified. Preliminary COPECs were further analyzed to determine if ecological risk was probable with the information available. Frequency of detection, average concentration, sample age and location, and proximity to wetlands were considered when applicable. It was determined that there are no final COPECs at FRBG. Consequently, the ERA for FRBG concluded with a Level II Screening ERA, and NFA was recommended to be protective of important ecological resources (Leidos 2022a).

Snake Road Burning Ground – The Level 1 ERA (Scoping Level) documented the presence of wetlands, rare species, specially designated natural areas, and onsite contamination. Due to the findings of the Level 1 ERA, SRBG proceeded to a Level II Screening ERA (Leidos 2022a).

Surface soil data were screened against ESVs recommended in Ohio EPA guidance, and preliminary COPECs were identified. Preliminary COPECs were further analyzed to determine if ecological risk was probable with the information available. Frequency of detection, average concentration, sample location, migration to wetlands, and impact of recommended human health remediation were considered as applicable. It was determined that cadmium; lead; mercury; PCB-1260; and 2,6-DNT are final COPECs at the Primary Burn Area at SRBG. Removal of surface soil in two sample locations in the Primary Burn Area, SRBG-SL-001 and SRBG-SL-003, was recommended to protect ecological resources at SRBG (Leidos 2022a).

Taylor Road Burning Ground – The Level 1 ERA (Scoping Level) documented the presence of wetlands and onsite contamination. Due to the findings of the Level 1 ERA, TRBG proceeded to a Level II Screening ERA (Leidos 2022a).
Surface soil data were screened against ESVs recommended in Ohio EPA guidance, and preliminary COPECs were identified.

Preliminary COPECs were further analyzed to determine if ecological risk was probable with the information available, and exposure pathway analysis was completed on the wetland. Frequency of detection, average concentration, sample location, migration to wetlands, and impact of recommended human health remediation were considered as applicable. It was determined that there are no final COPECs at TRBG. Consequently, the ERA for TRBG concluded with a Level II Screening ERA, and NFA was recommended to be protective of important ecological resources (Leidos 2022a).

6.0 REMEDIAL INVESTIGATION CONCLUSIONS

Based on the investigation results, FRBG, SRBG, and TRBG have been adequately characterized and the nature and extent of the contamination has been defined.

The Phase I RI completed for FRBG concluded that NFA for soil was necessary to be protective of human health (industrial and residential receptors) and ecological resources related to soil (Leidos 2022a). The supplemental risk evaluation completed under the Revised Final FS (Leidos 2023) confirmed the finding of the Phase I RI, as the RI was completed in 2018. The Phase II RI concluded that groundwater had been adequately characterized, and further investigation was not warranted. The nature and extent of potentially impacted media have been sufficiently characterized (Leidos 2022b).

The Phase I RI completed for SRBG concluded that surface soil remediation would be required to be protective of human health (residential receptors) and ecological resources (Leidos 2022a). Remediation of soil would not be required to be protective of the industrial worker. The supplemental risk evaluation completed under the Revised Final FS (Leidos 2023) confirmed the finding of the Phase I RI, as the RI was completed in 2018. The Phase II RI concluded that groundwater had been adequately characterized, and further investigation was not warranted. The nature and extent of potentially impacted media have been sufficiently characterized (Leidos 2022b).

The Phase I RI completed for TRBG concluded that soil remediation would be required to be protective of human health (residential and industrial receptors). Remediation of soil would not be required to be protective of ecological resources. The supplemental risk evaluation completed under the Revised Final FS (Leidos 2023) confirmed the finding of the Phase I RI, as the RI was completed in 2018. The Phase II RI concluded that groundwater had been adequately characterized, and further investigation was not warranted. The nature and extent of potentially impacted media have been sufficiently characterized (Leidos 2022b).

7.0 REMEDIAL ACTION OBJECTIVES AND CLEANUP GOALS

The following sections summarize the Remedial Action Objectives (RAOs) and Cleanup Goals (CUGs) for FRBG, SRBG, and TRBG.

7.1 Remedial Action Objectives

The RAOs for FRBG, SRBG, and TRBG are as follows:

Fox Road Burning Ground

The historical investigations detailed in the Revised Final Phase I RI Report (Leidos 2022a) concluded that no remediation is required at FRBG to be protective for human health or the environment. However, NASA has elected to remove all detectable asbestos at FRBG. The RAO for FRBG includes:

1. Removal of all detectable asbestos in surface soil.

Snake Road Burning Ground

Areas of surface soil contamination at SRBG were identified as requiring remediation for the hypothetical residential receptors and ecological resources (Leidos 2022a). The RAOs for SRBG include:

1. Reducing human health risk from potential exposure to COCs in surface soil to acceptable levels.

2. Reducing ecological risk from potential exposure to COCs in surface soil to acceptable levels. The human health and ecological COCs are presented in Table 1.

3. Achieving CUGs presented in Table 1 that are protective of future residential land use and ecological resources.

4. Remove all detectable asbestos in surface soil.

Taylor Road Burning Ground

Limited areas of surface and subsurface soil contamination at TRBG were identified as requiring remediation for the hypothetical industrial receptors and/or residential receptors (Leidos 2022a).

1. Reducing human health risk from exposure to COCs in surface and subsurface soil presented in Table 1 to acceptable levels.

2. Achieving CUGs presented in Table 1 that are protective of future residential land use.

3. Removal of all detectable asbestos in surface soil.

7.2 Remedial Action Cleanup Goals

Table 1 presents the human health and ecological COCs and asbestos at each site along with their associated cleanup goals. The table also lists the sample locations recommended for remediation.

The HHRA for SRBG and TRBG recommended CUGs for human health COCs be protective of residential receptors to support the remedial alternative selection process. For silver, the USEPA residential soil RSL using a target HQ of 0.5 (USEPA 2022) was selected as the cleanup goal. For PCBs, the residential cleanup goal from USEPA's Guidance on Remedial Actions for Superfund Sites with PCB Contamination (USEPA 1990) was selected.

The ERA for SRBG recommended CUGs for ecological COCs be protective of ecological receptors that may be present at the site. In order to be conservative, ESVs were selected as CUGs for cadmium and 2,6-DNT. The ESVs for lead and mercury were within background soil concentrations. It is not recommended that CUGs be set within the range of background concentrations. As a result, the CUGs for lead and mercury are based on the site-specific background criteria for NASA GRC-ATF.

The ESV for PCB-1260 used in the ERA was 0.371 mg/kg. Assessments of PCB sites by the Department of the Interior have concluded that PCB concentrations of 1 - 2 mg/kg are protective of wildlife such as migratory birds (USEPA 1990). As 1 mg/kg is generally considered protective of wildlife and is the remedial clean up goals used for human health, this value was selected as the CUG for the SRBG.

In surface soil of the Primary Burn Area at the SRBG (Figure 3), PCB-1260 was detected in four of five samples. Three of these surface soil samples exceeded the PCB-1260 ESV of 0.371 mg/kg. These three samples are SRBG-SL-001 (0 to 2 ft bgs) with a concentration of 0.82 mg/kg, SRBG-SL-003 (0 to 2 ft bgs) with a concentration of 0.77 mg/kg, and SRBG-SL-004 (0 to 2 ft bgs) with a concentration of 1.2 mg/kg. As noted in Table 1, the maximum detected concentration of 1.2 mg/kg will be remediated as part of the human health remediation at SRBG-SL-004. While use of a CUG of 1 mg/kg would not result in removal of any soil for PCB-1260 at SRBL-SL-001 and 003 because concentrations are already below 1 mg/kg, these two locations will be remediated for other ecological COCs as noted in Table 1 so use of a lower PCB-1260 CUG (i.e., 0.371 mg/kg) is not required.

The estimated soil volumes requiring remediation to achieve remedial action cleanup goals are detailed in Table 2 for FRBG, Table 3 for SRBG, and Table 4 for TRBG.

In addition to the RAOs, applicable or relevant and appropriate requirements (ARARs) were developed to be applied during the evaluation of FS alternatives.

8.0 SUMMARY OF FEASIBILITY STUDY TECHNOLOGY TYPES AND PROCESS OPTIONS

Remedial technologies and process options were screened to identify potential remedial alternatives that can achieve the RAO. The general response actions (GRAs) and treatment technologies evaluated are presented in the following subsections.

8.1 No Action

The no action GRA is evaluated as the baseline to which other remedial alternatives are compared. No action may be an appropriate alternative if no unacceptable risk is present at a site. This GRA provides a baseline against which to compare other more proactive alternatives. In this alternative, no action would be taken at FRBG, SRBG, or TRBG to reduce any risk to human health or the environment. Any existing actions, such as land use restrictions or monitoring, would be discontinued.

8.2 Institutional Controls

The implementation of institutional controls includes engineering measures (i.e., fencing, impermeable caps, warning signs, etc.) and non-engineering measures, such as administrative or legal controls, used to prevent or limit exposure to hazardous substances. Institutional controls do not reduce contaminant mobility, volume, or toxicity.

If institutional controls are selected as a component of a remedial alternative, the effectiveness of the remedy must undergo 5-year reviews. The primary goal of these reviews is to evaluate the implementation and performance of the remedy to determine if the remedy is or will be protective of human health and the environment. The 5-year reviews are discontinued when the remedy achieves CUGs for residential land use.

8.3 Containment

The implementation of containment technologies is often used to prevent, or significantly reduce, the migration of contaminants in soil. In general, containment is performed when extensive subsurface contamination at a site precludes excavation and removal of wastes because of potential hazards, technical impracticality, and/or unrealistic cost.

The main advantage of containment methods is that they can prevent further migration of contaminant plumes by minimizing infiltration and leaching. Containment requires periodic inspections for leaks and ponding of liquids, and periodic sampling to confirm the integrity of the containment system.

Common types of containment technologies include capping (e.g., clay cap, multi-layered cap that includes clay and synthetic liners, or an asphalt or concrete cap) and soil covers.

8.4 Removal

Removal includes the removal of contaminated soil from FRBG, SRBG, and TRBG. This alternative would reduce or eliminate the potential for long-term human and environmental exposure to chemicals exceeding concentrations determined to be protective for a given land use. Removed soil may or may not undergo pre-treatment prior to offsite disposal.

Disposal and handling, after removal, involve the final and permanent placement of waste material in a manner protective of human health and the environment. The impacted media could be disposed offsite in a permitted or licensed facility such as a regulated landfill. Similarly, concentrated waste resulting from treatment processes could be disposed offsite in an approved disposal facility.

Transportation is accomplished utilizing various methods, including truck and/or railcar.

8.5 Treatment

Treatment is conducted either in-situ or ex-situ to reduce contaminant concentrations to acceptable levels. Common types of treatment include biological, chemical, physical, and thermal. Biological treatment involves using microbes to degrade contaminants. Chemical treatment processes add chemicals to react with contaminants to reduce their toxicity or mobility. Physical processes involve either physically binding the contaminants to reduce mobility or the potential for exposure (e.g., encapsulation) or extracting the contaminant(s) from a medium to reduce volumes. Thermal treatment, such as incineration, uses high temperatures to volatilize, decompose, or melt contaminants. For soil treated by ex-situ methods, the treatment may allow soil to be placed back into the excavation, or soil may be treated to reduce the chemical concentration or stabilize the soil prior to offsite disposal.

9.0 EVALUATION OF ALTERNATIVES

The remedial alternatives developed under the *Revised Final Feasibility Study Report for Fox Road Burning Ground, Snake Road Burning Ground, and Taylor Road Burning Ground* (Leidos 2023) were initially screened to determine the implementability of the technology types capable of remediating COCs and asbestos present at the three sites. The initial screening results are presented in Table 5 and determined that institutional controls, containment, and treatment GRAs were not viable treatment options, and therefore were not retained. No action and removal were retained for detailed screening and evaluated as alternatives.

9.1 Development of Remedial Alternatives

This section describes the remedial alternatives developed and retained from the initial and detailed technology screening process. The retained remedial alternatives are composed of implementable and cost-effective technology types and process options that address COCs in soil at SRBG and TRBG, and detectable asbestos at all three sites.

Alternative 1: No Action - The no action alternative was evaluated because it is under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This alternative is the baseline to which other remedial alternatives are compared. This alternative assumes all current actions (e.g., access restrictions and environmental monitoring) will be discontinued and no future actions will take place to protect human receptors or the environment. COCs at SRBG and TRBG, and asbestos at all three sites will not be removed or treated.

Alternative 2: Excavation and Offsite Disposal - This alternative would include the excavation and offsite disposal of surface soil (0 to 2 ft bgs) at FRBG and SRBG, and surface and subsurface soil (0 to 2 ft bgs and 2 to 6 ft bgs) at TRBG containing COCs or asbestos at concentrations above the remedial CUGs to achieve residential land use conditions.

9.2 Comparative Analysis of Remedial Alternatives

A comparative analysis was performed for the two selected remedial alternatives against the seven NCP evaluation criteria:

1. Overall Protection to Human Health and the Environment,
2. Compliance with Applicable or Relevant and Appropriate Requirements,
3. Long-Term Effectiveness and Permanence,
4. Reduction in Toxicity, Mobility, or Volume through Treatment,
5. Short-Term Effectiveness,
6. Implementability, and
7. Total Present Value Cost.

Table 6 provides a comparative analysis of the alternatives conducted.

As part of the comparative analysis with respect to the nine CERCLA criteria, a Green and Sustainable Remediation (GSR) evaluation for was completed. USEPA currently defines

"green" remediation as "the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions.

Alternative 1 was determined not to be protective of human health and the environment, is not compliant with ARARs, does not demonstrate long-term effectiveness or permanence, and does not demonstrate reduction in toxicity, mobility, or volume through treatment.

In addition, Alternative 1 did not meet the RAOs developed for the three sites.

Fox Road Burning Ground RAOs – Removal of all detectible asbestos in surface soil.

Snake Road Burning Ground RAOs – Reducing human health risk from potential exposure to COCs in surface soil to acceptable levels and reduce ecological risk from potential exposure to COCs in surface soil to acceptable levels at SRBG. Achieving CUGs that are protective of future residential land use and ecological resources. Removal of all detectible asbestos in surface soil.

Taylor Road Burning Ground RAOs – Reducing human health risk from exposure to COCs in surface and subsurface soil. Achieving CUGs that are protective of future residential land use and ecological resources. Removal of all detectible asbestos in surface soil.

Overall, Alternative 1 failed to meet four of the NCP evaluation criteria and only partially met the short-term effectiveness criterion. Therefore, Alternative 1 was not eligible for selection as the preferred alternative. For the remaining alternative, Alternative 2 (Excavation and Off-site Disposal), all 7 of the NCP criteria were met.

10.0 PREFERRED ALTERNATIVE

Based on the comparative analysis of the alternatives summarized in Table 6, the recommended alternative for FRBG, SRBG, and TRBG is Alternative 2: Excavation and Off-site Disposal. This alternative addresses soil contamination that poses risk for the Residential Receptor Use at FRBG, SRBG, and TRBG. The proposed remedial alternative for soil will allow for unrestricted Residential Land Use at all three sites.

As presented in this PP, the Phase II RI did not identify COCs in groundwater preventing unrestricted Residential Land Use at FRBG, SRBG, and TRBG. Based on the Phase II RI results, groundwater was adequately characterized at all three sites. Additionally, the HHRAs for each site did not identify any COCs with residential use of groundwater. Furthermore, ecological exposures to chemicals in groundwater was determined to not be a concern for any of the three sites. Sediment and surface water do not exist at FRBG, SRBG, and TRBG.

Alternative 2 had the highest score in the balancing criteria analysis. Alternative 2 meets the threshold and primary balancing criteria and is protective of the Residential Receptor by removing and disposing of asbestos contamination in soil at FRBG; by removing and disposing of asbestos, metals (silver, cadmium, lead, and mercury), PCB (PCB-1248, PCB-1254, and PCB-1260), and explosives (2,6-dinitrotoluene) contamination in soil at SRBG; and by removing and disposing of asbestos and PCB (PCB-1254 and PCB-1260) contamination in soil at TRBG at an approved off-site engineered landfill.

The estimated cost of Alternative 2 is $3,233,451, making it the most cost-effective alternative. Figures 2 through 4 present the proposed extent of soil requiring remediation for FRBG, SRBG, and TRBG under the recommended alternative. This recommendation is not a final decision. NASA, following USEPA guidance for preparing a PP, will select the remedy for all three sites after reviewing and considering all comments submitted during the 30-day public comment period. Comments received from the public on this PP will be considered in preparing a ROD to document the final remedy. The ROD will

also include a responsiveness summary addressing comments received on the PP.

11.0 COMMUNITY PARTICIPATION

Public participation is an important required component of the remedy selection. NASA is soliciting input from the community on the preferred alternative.

11.1 Public Comment Period

The 30-day comment period is from February 28, 2023 to March 29, 2023, and provides an opportunity for public involvement in the decision-making process for the proposed action. This period includes a public meeting at which NASA will present this PP.

All public comments will be considered by NASA before selecting a remedy. During the comment period, the public is encouraged to review documents pertinent to FRBG, SRBG, and TRBG.

This information is available at the Information Repositories and online at https://www1.grc.nasa.gov/neil-armstrong-test-facility-restoration/. To obtain further information, contact Mr. John Brodt of NASA GRC Environmental Management Office at GRC-Restoration@mail.nasa.gov.

11.2 Written Comments

If the public would like to comment in writing on this PP or other relevant issues, please deliver comments to NASA at the public meeting or mail written comments (postmarked no later than March 29, 2023).

POINT OF CONTACT FOR WRITTEN COMMENTS

Mailing Address:
NASA Glenn Research Center
Environmental Management Office
Attn: John Brodt
21000 Brookpark Rd. MS 6-7
Cleveland, OH 44135

Email Address:
GRC-Restoration@mail.nasa.gov

11.3 Public Meeting

NASA will hold a public meeting on this PP on March 9, 2023, at 7:00PM, at the Bowling Green State University Firelands Campus, Cedar Point Center Building, Room 1009, at One University Drive, Huron, Ohio 44839 to accept comments. To attend the meeting virtually, register at https://www1.grc.nasa.gov/neil-armstrong-test-facility-restoration/.

This meeting will provide an opportunity for the public to comment on the proposed action. Comments made at the meeting will be transcribed.

11.4 NASA Review of Public Comments

NASA will review the public's comments as part of the process in reaching a final decision for the most appropriate action to be taken.

The Responsiveness Summary, a document that summarizes NASA's responses to comments received during the public comment period, will be included in the ROD.

NASA's final choice of action will be documented in the ROD. The ROD will be added to NASA GRC Environmental Management Office Record and Information Repositories.

INFORMATION REPOSITORIES

Bowling Green State University Firelands Library
One University Drive
Huron, Ohio 44839
(419) 372-0739

Hours of operation:
7AM-7PM Monday-Thursday
7AM-5PM Friday
Closed Saturday
Closed Sunday

Online
https://www1.grc.nasa.gov/neil-armstrong-test-facility-restoration/

eDocument search via epa.ohio.gov

ADMINISTRATIVE RECORD FILE

NASA Glenn Research Center
Environmental Management Office
21000 Brookpark Road
Cleveland, Ohio 44135-3191
(216) 433-6028

Note: Access is restricted to NASA, but the file can be obtained or viewed with prior notice to NASA Environmental Management Office.

12.0 GLOSSARY OF TERMS

Administrative Record: a collection of documents, typically reports and correspondence, generated during site investigation and remedial activities. Information in the Administrative Record represents the information used to select the preferred alternative.

Applicable or Relevant and Appropriate Requirements (ARARs): CERCLA Section 121 specifies that remedial actions must comply with requirements or standards under federal or more stringent state environmental laws that are "applicable or relevant and appropriate to the hazardous substances or particular circumstances at the area of concern." In interpreting ARARs, it is inherently assumed that human health and the environment will be protected. The action-specific and location-specific ARARs are presented in Tables 7 and 8 respectively.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): a federal law passed in 1980, commonly referred to as the Superfund Program. It provides liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous substance release sites that endanger public health or the environment.

Chemical of Concern (COC): a chemical substance specific to an area of concern that potentially poses significant human health or ecological risks. COCs are typically further evaluated for remedial action.

Ecological Receptor: a plant, animal, or habitat exposed to an adverse condition.

Human Receptor: a hypothetical person, based on current or potential future land use, who may be exposed to an adverse condition. For example, Residential Receptor is considered the hypothetical person when evaluating Unrestricted Land Use at NASA.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): the set of regulations that implement CERCLA and address responses to hazardous substances and pollutants or contaminants.

Record of Decision (ROD): a signed legal record that describes the cleanup action or remedy selected for a site, the basis for selecting that remedy, public comments, and responses to comments.

Remedial Investigation (RI): CERCLA investigation that involves sampling environmental media, such as air, soil, and water, to determine the nature and extent of contamination and to calculate human health and environmental risks that result from the contamination.

Responsiveness Summary: a section of the ROD that documents and responds to written and oral comments received from the public about the PP.

Risk Assessment: an evaluation that determines potential harmful effects, or lack thereof, posed to human health and the environment due to exposure to chemicals found at a CERCLA site.

Target Risk: the Ohio Environmental Protection Agency (2022) identifies 1E-05 as a target for cancer risk for carcinogens and an acceptable target hazard quotient of 1 for non-carcinogens.

Unrestricted (Residential) Land Use: defined as suitable for residential land use without any restrictions.

13.0 REFERENCES

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TABLES

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Table 1. Remedial Action Cleanup Goals

Site	Medium	Sample Location(s)	Chemical of Concern (COC)		Remedial Cleanup Goal (mg/kg)	Basis for Cleanup Goal
			Human Health	Ecological		
FRBG	Soil	FRBG-SL-024	Asbestos	–	Non-detect (0%)	(5)
SRBG	Soil	SRBG-SL-001 SRBG-SL-002 SRBG-SL-003 SRBG-SL-004 SRBG-SL-009	PCB-1248	–	1	(1)
			PCB-1254	–	1	(1)
			PCB-1260	–	1	(1)
			Silver	–	195	(2)
			–	Cadmium	0.36	(3)
			–	Lead	400	(2)
			–	Mercury	0.085	(4)
			–	2,6-Dinitrotoluene	0.0328	(3)
			–	PCB-1260	1	(1)
			Asbestos	–	Non-detect (0%)	(5)
TRBG	Soil	TRBG-SL-001 TRBG-SL-002 TRBG-SDSW-004 TR-6	Asbestos	–	Non-detect (0%)	(5)
			PCB-1254	–	1	(1)
			PCB-1260	–	1	(1)

mg/kg = Milligrams per kilogram
PCB = Polychlorinated biphenyl
FRBG = Fox Road Burning Ground
SRBG = Snake Road Burning Ground
TRBG = Taylor Road Burning Ground
Basis for cleanup goal:
(1) = USEPA Guidance on Remedial Actions for Superfund Sites (USEPA 1990)
(2) = Residential RSL, Noncarcinogenic screening level for a child (USEPA 2022)
(3) = Ecological screening value. The ESVs identified for use as CUGs were selected based on the following hierarchy: 1) lowest of the USEPA Ecological SSLs, 2) *PRGs for Ecological Endpoints* (Efroymson et al. 1997), and 3) USEPA Region 5 Ecological Screening Levels (2003).
(4) = NASA GRC-ATF background concentration
(5) = USEPA Guidance for Evaluating Asbestos at Superfund Cleanups (USEPA 2004b)

Table 2. Estimated Soil Volume Requiring Remediation at Fox Road Burning Ground

Fox Road Burning Ground (Sample location)	Depth bgs (ft)	Width (ft)	Length (ft)	Area (SF)	In-Situ		Tons[2]	Notes
					Volume (CY)	Volume with Constructability[1] (CY)		
Soil hotspot (FRBG-SL-024)	2	25	25	625	46.30	55.56	100	Hotspot extent based on detectable asbestos in soil at specific depth and location

[1]Constructability factor accounts for over excavation, sloping of sidewalls, and addresses limitations of removal equipment. The in-situ volume is increased by 20% for a constructability factor

[2]Assume density of soil at 1.8 tons/CY .

bgs = Below ground surface

COC = Chemical of concern

CY = Cubic yards

FRBG = Fox Road Burning Ground

ft = Feet

SF = Square feet

Table 3. Estimated Soil Volume Requiring Remediation at Snake Road Burning Ground

Snake Road Burning Ground	Depth bgs (ft)	Width (ft)	Length (ft)	Area (SF)	In-Situ		Tons[2]	Notes
					Volume (CY)	Volume with Constructability[1] (CY)		
Soil hotspot (SRBG-SL-002)	2	75	75	5,625	416.67	500	900	HHRA COCs: PCBs and silver, hotspot extents based on PCB and silver exceedances at specific depths and locations Detectable asbestos containing soil removal (NASA has elected to remove all detectable asbestos at SRBG).
Soil hotspot (SRBG-SL-009)	2	75	75	5,625	416.67	500	900	
Soil hotspot (SRBG-SL-001)	2	75	75	5,625	416.67	500	900	ERA COCs: Cadmium; lead; mercury; PCB-1260; and 2,6-dinitrotoluene, hotspot extents based on PCB and silver exceedances at specific depths and locations Hot spot excavations-based COC exceedances at specific depths and locations. Detectable asbestos containing soil removal (NASA has elected to remove all detectable asbestos at SRBG).
Soil hotspot (SRBG-SL-003, SRBG-SL-004)	2	50	125	6,250	462.96	555.56	1,000	
					Subtotal	**2,056**	**3,700**	

[1]Constructability factor accounts for over excavation, sloping of sidewalls, and addresses limitations of removal equipment. The in-situ volume is increased by 20% for a constructability factor
[2]Assume density of soil at 1.8 tons/CY
bgs = Below ground surface.
COC = Chemical of concern
CY = Cubic yards
ERA = Ecological Risk Assessment
ft = Feet
HHRA = Human Health Risk Assessment
PCB = Polychlorinated biphenyl
SF = Square feet
SRBG = Snake Road Burning Ground

Table 4. Estimated Soil Volume Requiring Remediation at Taylor Road Burning Ground

Taylor Road Burning Ground	Depth bgs (ft)	Width (ft)	Length (ft)	Area (SF)	In-Situ		Tons[3]	Notes
					Volume (CY)	Volume with Constructability[1] (CY)		
Soil hotspot (TRBG-SL-002)	6	50	50	2,500	555.56[(2)]	800	1,440	COCs: PCBs Hotspot extents based on PCB exceedances at specific depths and locations. Detectable asbestos in soil removal (NASA has elected to remove all detectable asbestos at TRBG).
Soil hotspot (TRBG-SL-001, TR-6)	2	50	125	6,250	462.96	555.56	1,000	
Soil hotspot (TRBG-SDSW-004)	2	30	70	2,100	155.56	186.67	336	
					Subtotal	**1,543**	**2,776**	

[1]Constructability factor accounts for over excavation, sloping of sidewalls, and addresses limitations of removal equipment. The in-situ volume is increased by 20% for a constructability factor
[2]Includes additional 20% soil for excavation slope at TRBG-SL-002.
[3]Assume density of soil at 1.8 tons/CY
bgs = Below ground surface
COC = Chemical of concern
CY = Cubic yards
ft = Feet
PCB = Polychlorinated biphenyl
TRBG = Taylor Road Burning Ground
SF = Square feet

Table 5. Initial Screening of Technologies

General Response Actions	Technology Type	Process Options	Description	Screening Results
No Action	None	None	No action would be taken at FRBG, SRBG, and TRBG. Any current LUCs, access restrictions, and monitoring programs would be discontinued. No remedial technologies would be implemented to reduce hazards to potential human or ecological receptors.	Retained. Required under NCP to be carried through CERCLA analysis.
Institutional Controls	Access Restrictions	LUCs with CERCLA 5-Year Reviews	Implement LUCs at FRBG, SRBG, and TRBG to restrict access and land use for commercial/industrial purposes. LUCs will be administered, enforced, and reviewed in CERCLA 5-year reviews. These reviews include reviewing sampling and monitoring plans and results of monitoring activities, conducting interviews and inspections, and reviewing status.	Not retained. LUCs will inhibit intended objective of attaining unrestricted reuse (i.e., residential land use) for both sites.
		Fencing	Place fencing around areas of contamination (at a minimum) to restrict access and exposure to contamination left in place.	Not retained. Fencing will inhibit intended objective of attaining unrestricted reuse (i.e., residential land use) for both sites.
Containment	Capping	Asphalt/Concrete	Asphalt or concrete layers are used to cover contamination and prevent exposure. Additionally, this technology limits water infiltration; however, it is susceptible to cracking if not properly maintained.	Not retained. Using engineering controls (asphalt/concrete cap) in areas with contamination will inhibit intended objective of attaining unrestricted reuse (i.e., residential land use) for both sites.
Removal	Bulk Removal	Excavation and Offsite Disposal	Contaminated material is removed and transported to permitted offsite treatment and/or disposal facilities.	Retained.
Treatment	In-situ Biological Treatment	Enhanced Bioremediation	Adding oxygen and nutrients aids indigenous or inoculated micro-organisms (e.g., fungi, bacteria, and other microbes) in degrading (metabolizing) organic contaminants found in soil and/or groundwater, converting them to innocuous end products.	Not retained. This technology is not suitable for metals or ACM and has limited effectiveness for PCBs.
	In-situ Biological Treatment	Phytoremediation	Using plants to remove, transfer, stabilize, and destroy contaminants in soil and sediment.	Not retained. This technology is not suitable for metals or ACM and has limited effectiveness for PCBs.

Table 5. Initial Screening of Technologies (continued)

General Response Actions	Technology Type	Process Options	Description	Screening Results
	In-situ Physical/Chemical Treatment	Chemical Oxidation	Oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide.	Not retained. This technology could pose practical operating difficulties given the shallow bedrock conditions encountered at FRBG, SRBG, and TRBG and the potential mobilization of contaminants into groundwater.
		Soil Flushing	Water, or water containing an additive to enhance contaminant solubility, is applied to soil or injected into groundwater to raise the water table into the contaminated soil zone. Contaminants are leached into the groundwater, which is then extracted and treated.	Not retained. Contaminants will be transferred into groundwater media that was evaluated in the Phase II RIs for all three sites.
		Solidification/ Stabilization	Contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization).	Not retained. This technology has limited effectiveness for PCBs; although the technology reduces the mobility of PCBs, it does not destroy the PCBs.
	In-situ Thermal Treatment	Thermal Treatment	Steam/hot air injection or electrical resistance/electromagnetic/fiber optic/radio frequency heating is used to increase the volatilization rate of semi-volatiles and facilitate extraction.	Not retained. This technology has some limitations when contamination is very shallow and it could pose practical operating difficulties given the shallow bedrock conditions encountered at FRBG, SRBG, and TRBG.
	Ex-situ Biological Treatment	Biopiles	Excavated soil is mixed with soil amendments and placed in aboveground enclosures. It is an aerated static pile composting process in which compost is formed into piles and aerated with blowers or vacuum pumps.	Not retained. Technology focuses on remediating media contaminated with volatile petroleum hydrocarbons. Not suitable for ACM, metals, and PCBs, as volatility is limited.

Table 5. Initial Screening of Technologies (continued)

General Response Actions	Technology Type	Process Options	Description	Screening Results
	Ex-situ Biological Treatment	Landfarming	Contaminated soil, sediment, or sludge is excavated, applied into lined beds, and periodically turned over or tilled to aerate the waste.	Not retained. Technology focuses on remediating media contaminated with volatile petroleum hydrocarbons. Not suitable for ACM, metals, and PCBs, as volatility is limited. Also, there is a chance of contaminant movement to previously non-contaminated areas of the site.
	Ex-situ Physical/Chemical Treatment	Solvent Extraction	Waste-contaminated soil and extractant are mixed in an extractor, thereby dissolving the contaminants. The extracted solution is then placed in a separator, where the contaminants and extractant are separated for treatment and further use.	Not retained. Not suitable for ACM.
		Chemical Reduction/ Oxidation	Reduction/oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	Not retained. Not suitable for ACM.
		Soil Washing	Contaminants sorbed onto fine soil particles are separated from bulk soil in an aqueous-based system on the basis of particle size. The wash water may be augmented with a basic leaching agent, surfactant, pH adjustment, or chelating agent to help remove organic chemicals and heavy metals.	Not retained. Not suitable for ACM.
		Solidification/ Stabilization	Contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization).	Not retained. This technology has limited effectiveness for PCBs; although the technology reduces the mobility of PCBs, it does not destroy the PCBs.
	Ex-situ Thermal Treatment	Incineration	High temperatures, 870-1,200°C (1,600-2,200°F), are used to combust (in the presence of oxygen) organic constituents in hazardous waste.	Not retained. Not suitable for ACM.

Table 5. Initial Screening of Technologies (continued)

General Response Actions	Technology Type	Process Options	Description	Screening Results
	Ex-situ Thermal Treatment	Vitrification (Pyrolysis)	Chemical decomposition is induced in organic material by heat in the absence of oxygen. Organic material is transformed into gaseous components and a solid residue (coke) containing fixed carbon and ash.	Not retained. Not suitable for ACM.
		Thermal Desorption	Waste is heated in a mobile thermal treatment system to volatilize organic contaminants. The vapor emissions are treated using air filters, and the treated vapor is reused as an energy source for the operation of the thermal treatment system.	Not retained. Not suitable for ACM.

ACM = Asbestos-Containing Material
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
FRBG = Fox Road Burning Ground
LUC = Land use control
NCP = National Contingency Plan
PCB = Polychlorinated biphenyl
SRBG = Snake Road Burning Ground
TRBG = Taylor Road Burning Ground

Table 6. Summary of Comparative Analysis of Remedial Alternatives for Fox Road Burning Ground, Snake Road Burning Ground, and Taylor Road Burning Ground

Remedial Action Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Total Present Value Cost[a]
Alternative 1: No Action	○	○	○	○	◒	●	$0
Alternative 2: Excavation and Offsite Disposal - Attain Residential Land Use	●	●	●	●	●	●	$3,233,451

[a] A discounted rate is not applicable to Alternative 2. All costs for Alternative 2 are assumed to be in base year 2022 dollars)
ARAR = Applicable or relevant and appropriate requirement

● = Fully meets criterion

◒ = Partially meets criterion

○ = Does not meet criterion

Table 7. Potential Action-Specific ARARs

Standard, Requirement, and Citation	Description of Requirement	Potential ARAR Status and ARAR type	Comments
Federal Authority Level ARARs			
Standards Applicable to Generation of Hazardous Waste; 40 CFR Part 262	Establishes standards for generators of hazardous waste under RCRA. Specifies requirements for hazardous waste packaging, labeling, manifesting, record keeping, and accumulation time.	Applicable	Standards will be followed if any hazardous wastes are generated onsite.
Clean Air Act (CAA) – National Ambient Air Quality Standards (NAAQs); 40 CFR 50	These provide air quality standards for particulate matter, lead, NO2, SO2, CO, and volatile organic compounds.	Applicable	During all remedial activities, air emissions will be properly controlled and monitored to comply with these standards.
State Authority Level ARARs			
Prohibition of air pollution nuisances (e.g., fugitive dust); OAC Section 3745-15-07	These rules prohibit releasing nuisance air pollution that endangers health, safety, or welfare of the public or cause personal injury or property damage. This would include dust from excavation or soil management processes.	Applicable	During all remedial activities, air pollution nuisances will be properly controlled and monitored.
Generation of contaminated soil or debris; OAC Section 3745-52-11	These rules require that a generator determine whether a material generated is a hazardous waste. Must be characterized to determine whether the material is or contains a hazardous waste	Applicable	During all remedial activities, air pollution nuisances will be properly controlled and monitored.
Management of contaminated soil or debris that is or contains a hazardous waste; OAC Sections 3745-52-30 through 3745-52-17	These rules require that hazardous waste be properly packaged, labeled, marked, and accumulated onsite pending on or offsite disposal.	Applicable	All hazardous waste will be accumulated in a compliant manner that includes proper marking, labeling, and packaging in accordance with the specified regulations. This includes inspecting containers or container areas where hazardous waste is accumulated onsite.
NPDES Requirement for Stormwater Management at Construction Sites; OAC Section 3745-39-04	Establishes requirements for a stormwater discharge permit for construction activities that disturb greater than one acre of land.	Not Applicable	Excavation area is currently planned to be less than one acre.

Table 7. Potential Action-Specific ARARs (continued)

Standard, Requirement and Citation	Description of Requirement	Potential ARAR Status and ARAR type	Comments
Soil contaminated with RCRA hazardous waste; OAC Section 3745-270-49 OAC Section 3745-270-48 UTS	These rules prohibit land disposal of RCRA hazardous wastes subject to them, unless the waste is treated to meet certain standards that are protective of human health and the environment. Standards for treating hazardous waste-contaminated soil prior to disposal are set forth in the two cited rules. Using the greater of either technology-based standards or UTS is prescribed.	Applicable.	All soil subject to treatment will be treated to achieve a 90% constituent reduction standard on a constituent-specific basis as detailed in the rule.
Asbestos Emission Control; OAC Sections 3745-20-01 through 3745-20-05 OAC Section 3745-20-22	These rules established the standards for asbestos waste handling, including that it is conducted under the supervision of an appropriately licensed Asbestos Hazard Abatement Specialist.	Applicable	Applies to any activity that could result in discharge of visible emissions to the outside air during the collection, processing, packaging, transporting, or deposition of any asbestos-containing waste material.
Safety and Health Regulations for Construction; 29 CFR 1926.1101 Asbestos	Regulates asbestos exposure in during construction activities including transportation and disposal of asbestos containing material	Applicable	All construction activities will comply with these requirements by implementing work practices to control workers' exposure.
Asbestos Emission Control OAC 3745-20-03, OAC 3745-22-04(C)(4), and 40 CFR 61.145(b)	These rules establish that notification is required to the Ohio EPA Central Office – Division of Air Pollution Control a minimum of 10 working days before the remedial action ("abatement") begins. "Abatement" refers to any asbestos hazard abatement activity involving the removal, renovation, enclosure, repair, or encapsulation of reasonably related friable ACMs in an amount greater than 50 linear feet or 50 square feet.	Applicable	Discharge of visible emissions to the outside air is prohibited during asbestos waste handling.

ACM = Asbestos-containing material
ARAR = Applicable and Relevant or Appropriate Requirements
CFR = Code of Federal Regulations
EPA = Environmental Protection Agency
LDR = Land disposal restrictions
OAC = Ohio Administrative Code
RCRA = Resource Conservation and Recovery Act
UTS = Universal Treatment Standard

Table 8. Potential Location-Specific ARARs

Standard, Requirement, Criteria, or Limitation	Media and Citation	ARAR Status and Type	Comments
Federal Authority ARARs			
Endangered Species Act; 16 USC 1531 50 CFR Parts 200 and 402	Requires action to conserve threatened or endangered species, including consultation with the Department of Interior.	Applicable	Threatened or endangered species were observed within the property boundary. However, no endangered species were observed within the boundary of proposed remedial action. The remedy will comply with the Act if endangered species are found during remedial activities.
National Historical Preservation Act; 16 USC 470 Section 106 16 USC 469 43 CFR 7	Requires federal agencies to assess the site for potential historical structures or artifacts. These properties shall be preserved for future generations of Americans.	Applicable	The potential effects of any remedial action will be evaluated to ensure that these requirements are met.
Migratory Bird Treaty Act; 16 USC 703	The selected remedial action(s) must be executed in a manner that avoids the taking or killing of protected migratory bird species, including individual birds or their nests or eggs.	Applicable	The potential effects of any remedial action will be evaluated to ensure that these requirements are met.
Protection of Wetlands; 44 CFR Part 9, Executive Order 11990	Federal agencies are directed to avoid construction located in wetlands unless the agency head finds: (1) No practical alternative to such construction and The proposed action includes all practical measures to minimize harm to wetlands which might result from such use.	Applicable	The potential effects of any remedial action will be evaluated to ensure that these requirements are met.
Protection of Wetlands; 40 CFR 230, 33 USC 1344, CWA Section 404, Section 10 of the Rivers and Harbors Act	Sets forth guidelines for fill material in wetlands. Requires federal agencies to avoid impacts associated with the destruction or loss of wetlands.	Applicable	Backfilling excavated wetland soil is expected to be part of the remedy. These guidelines will be met during the remedial activities.
Wetlands Permitting; 32 CFR 650.68	Identifies permitting requirements for excavation activities in wetlands.	Applicable	This requirement will be met before commencement of remedial activities.

Table 8. Potential Location-Specific ARARs (continued)

State Authority ARARs			
Ohio T&E Species Conservation; Ohio Revised Statute 1518 and 1532	Requires action to conserve state-listed threatened or endangered species.	Applicable	Threatened or endangered species were observed within the property boundary. However, no endangered species were observed within the boundary of proposed remedial action. The remedy will comply with the Statute if endangered species are found during remedial activities.
Wetland Antidegradation; OAC 3745-1-54	This establishes requirements to minimize potential adverse impacts on wetlands	Applicable	The potential effects of any remedial action will be evaluated to ensure that these requirements are met.

ARAR = Applicable and Relevant or Appropriate Requirements
CFR = Code of Federal Regulations
CWA = Clean Water Act
T&E = Threatened and Endangered
USC = United States Code

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FIGURES

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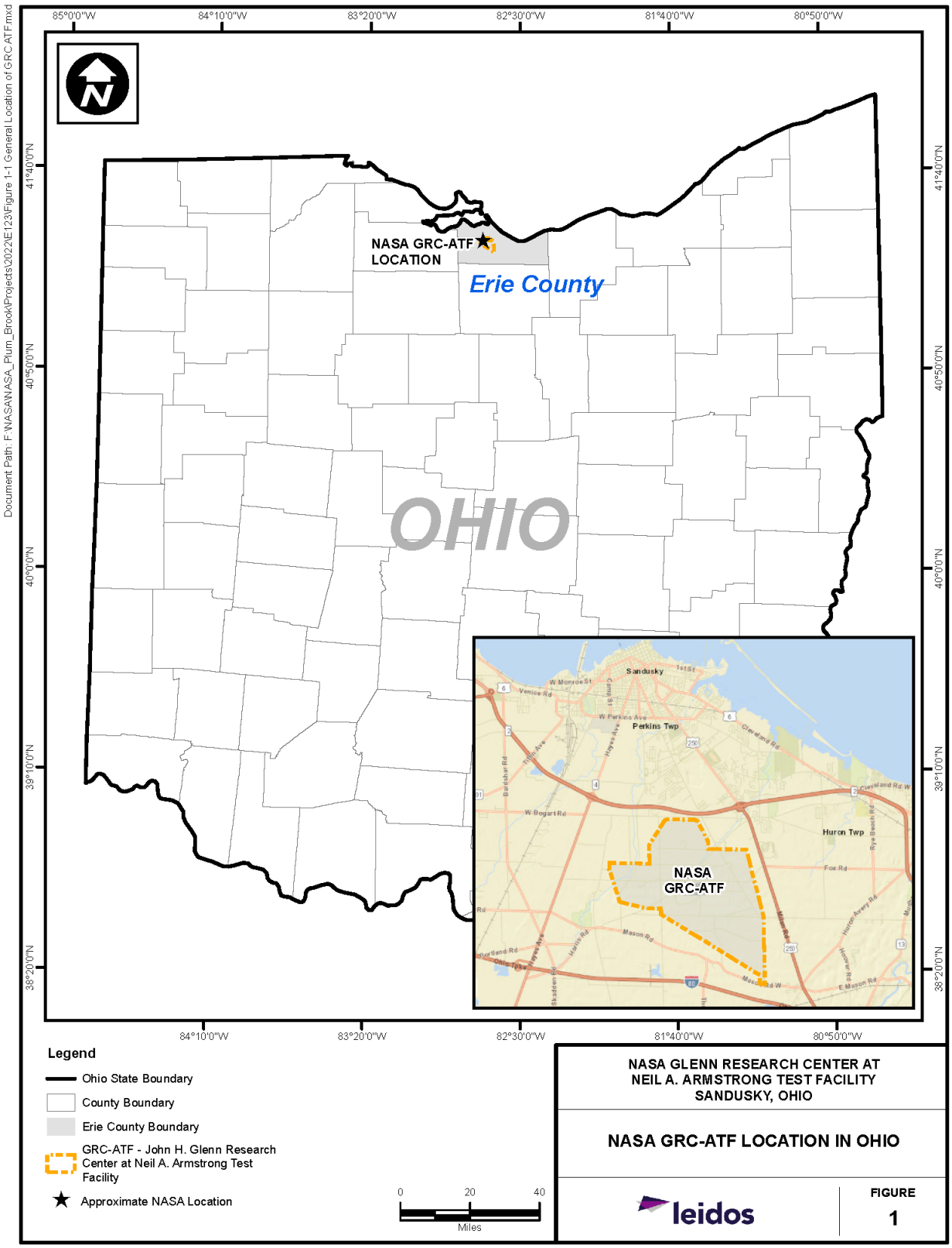

Figure 1. NASA GRC-ATF Location in Ohio

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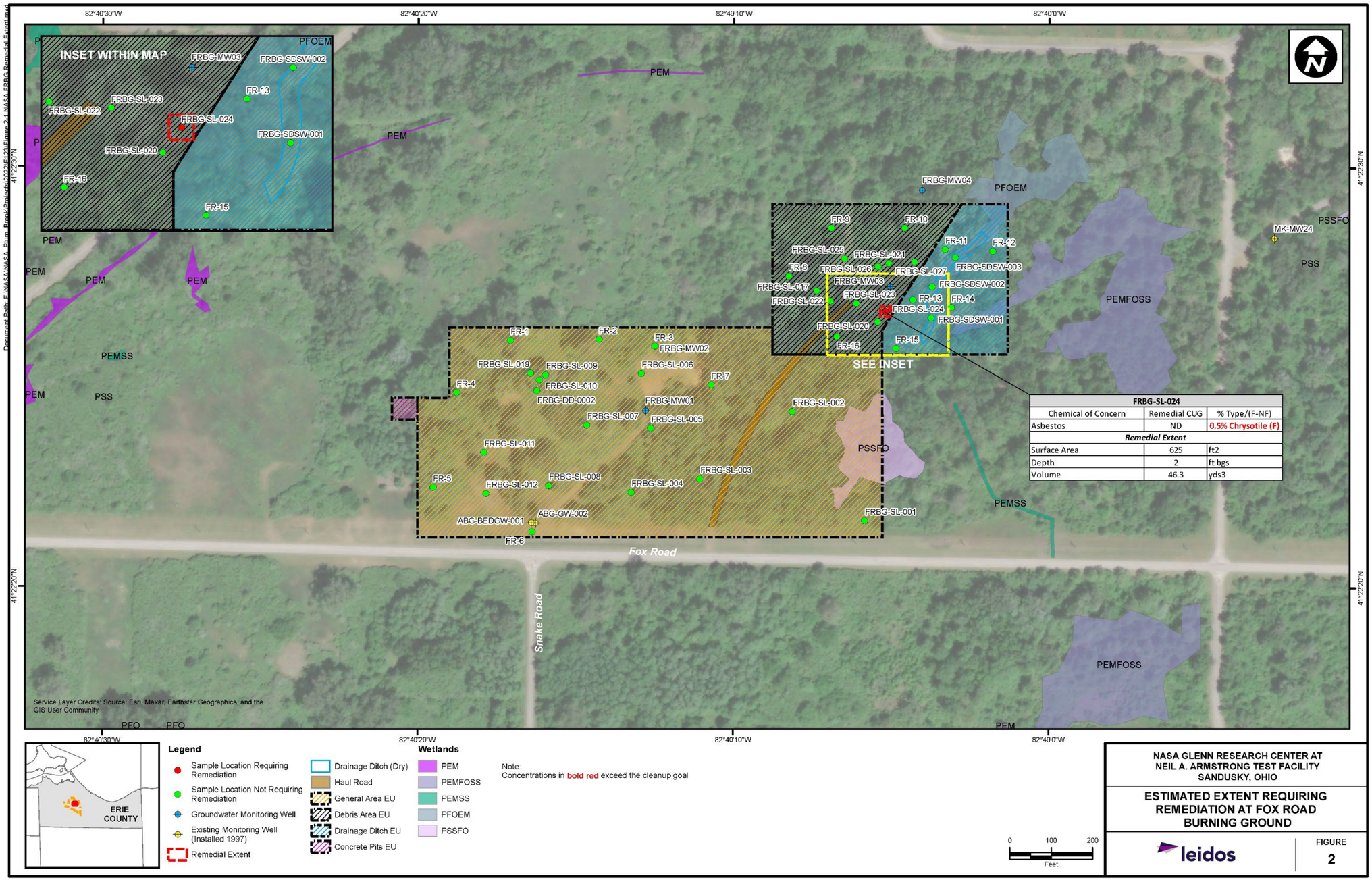
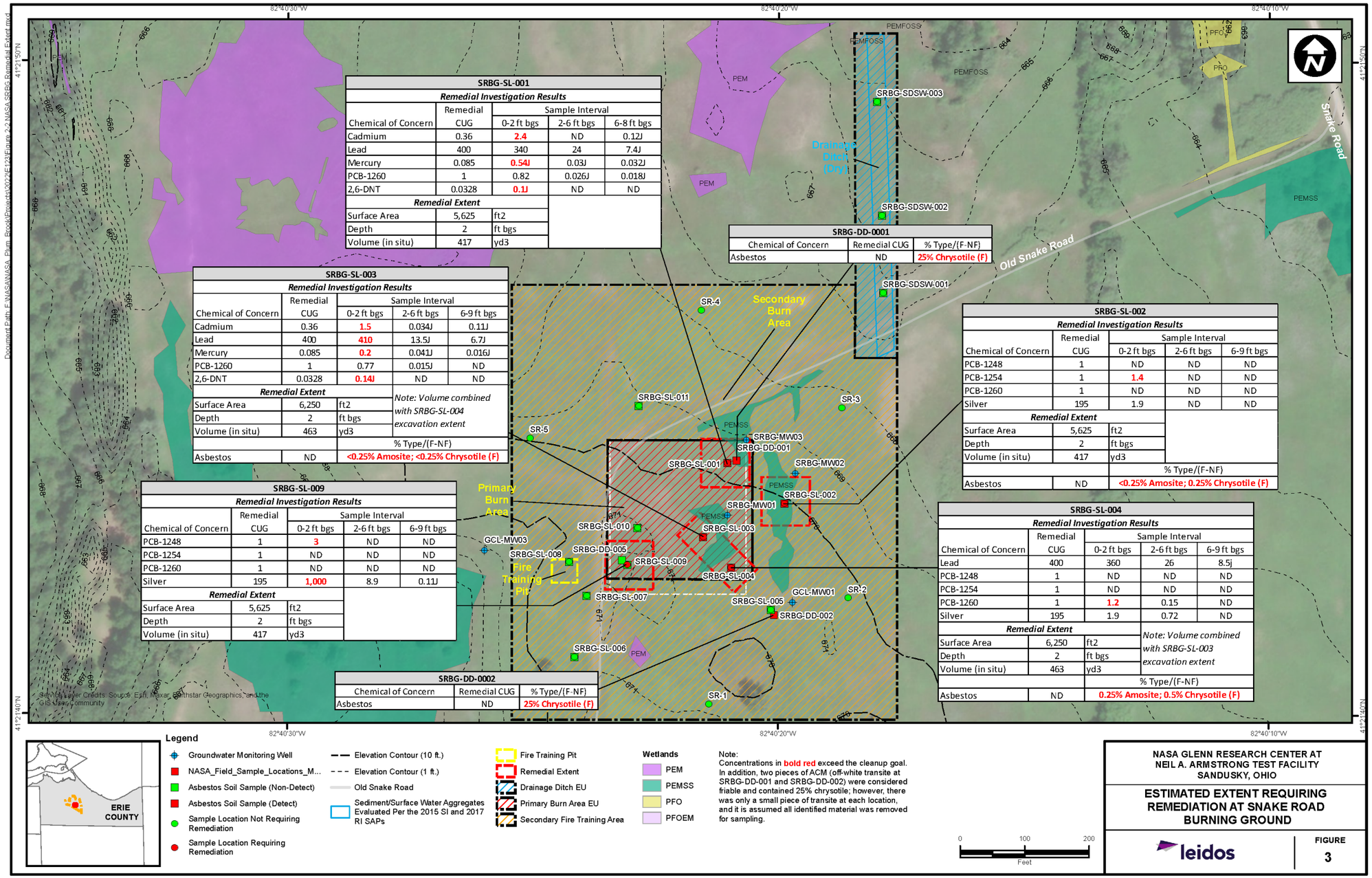


FRBG-SL-024		
Chemical of Concern	Remedial CUG	% Type/(F-NF)
Asbestos	ND	0.5% Chrysotile (F)
Remedial Extent		
Surface Area	625	ft2
Depth	2	ft bgs
Volume	46.3	yds3

Figure 2. Estimated Extent Requiring Remediation at Fox Road Burning Ground



SRBG-SL-001
Remedial Investigation Results

Chemical of Concern	Remedial CUG	Sample Interval 0-2 ft bgs	2-6 ft bgs	6-8 ft bgs
Cadmium	0.36	**2.4**	ND	0.12J
Lead	400	340	24	7.4J
Mercury	0.085	**0.54J**	0.03J	0.032J
PCB-1260	1	0.82	0.026J	0.018J
2,6-DNT	0.0328	**0.1J**	ND	ND
Remedial Extent				
Surface Area	5,625	ft2		
Depth	2	ft bgs		
Volume (in situ)	417	yd3		

SRBG-DD-0001

Chemical of Concern	Remedial CUG	% Type/(F-NF)
Asbestos	ND	**25% Chrysotile (F)**

SRBG-SL-003
Remedial Investigation Results

Chemical of Concern	Remedial CUG	Sample Interval 0-2 ft bgs	2-6 ft bgs	6-9 ft bgs
Cadmium	0.36	**1.5**	0.034J	0.11J
Lead	400	**410**	13.5J	6.7J
Mercury	0.085	**0.2**	0.041J	0.016J
PCB-1260	1	0.77	0.015J	ND
2,6-DNT	0.0328	**0.14J**	ND	ND
Remedial Extent				
Surface Area	6,250	ft2	*Note: Volume combined with SRBG-SL-004 excavation extent*	
Depth	2	ft bgs		
Volume (in situ)	463	yd3		
		% Type/(F-NF)		
Asbestos	ND	**<0.25% Amosite; <0.25% Chrysotile (F)**		

SRBG-SL-002
Remedial Investigation Results

Chemical of Concern	Remedial CUG	Sample Interval 0-2 ft bgs	2-6 ft bgs	6-9 ft bgs
PCB-1248	1	ND	ND	ND
PCB-1254	1	**1.4**	ND	ND
PCB-1260	1	ND	ND	ND
Silver	195	1.9	ND	ND
Remedial Extent				
Surface Area	5,625	ft2		
Depth	2	ft bgs		
Volume (in situ)	417	yd3		
		% Type/(F-NF)		
Asbestos	ND	**<0.25% Amosite; 0.25% Chrysotile (F)**		

SRBG-SL-009
Remedial Investigation Results

Chemical of Concern	Remedial CUG	Sample Interval 0-2 ft bgs	2-6 ft bgs	6-9 ft bgs
PCB-1248	1	**3**	ND	ND
PCB-1254	1	ND	ND	ND
PCB-1260	1	ND	ND	ND
Silver	195	**1,000**	8.9	0.11J
Remedial Extent				
Surface Area	5,625	ft2		
Depth	2	ft bgs		
Volume (in situ)	417	yd3		

SRBG-SL-004
Remedial Investigation Results

Chemical of Concern	Remedial CUG	Sample Interval 0-2 ft bgs	2-6 ft bgs	6-9 ft bgs
Lead	400	360	26	8.5j
PCB-1248	1	ND	ND	ND
PCB-1254	1	ND	ND	ND
PCB-1260	1	**1.2**	0.15	ND
Silver	195	1.9	0.72	ND
Remedial Extent				
Surface Area	6,250	ft2	*Note: Volume combined with SRBG-SL-003 excavation extent*	
Depth	2	ft bgs		
Volume (in situ)	463	yd3		
		% Type/(F-NF)		
Asbestos	ND	**0.25% Amosite; 0.5% Chrysotile (F)**		

SRBG-DD-0002

Chemical of Concern	Remedial CUG	% Type/(F-NF)
Asbestos	ND	**25% Chrysotile (F)**

Figure 3. Estimated Extent Requiring Remediation at Snake Road Burning Ground

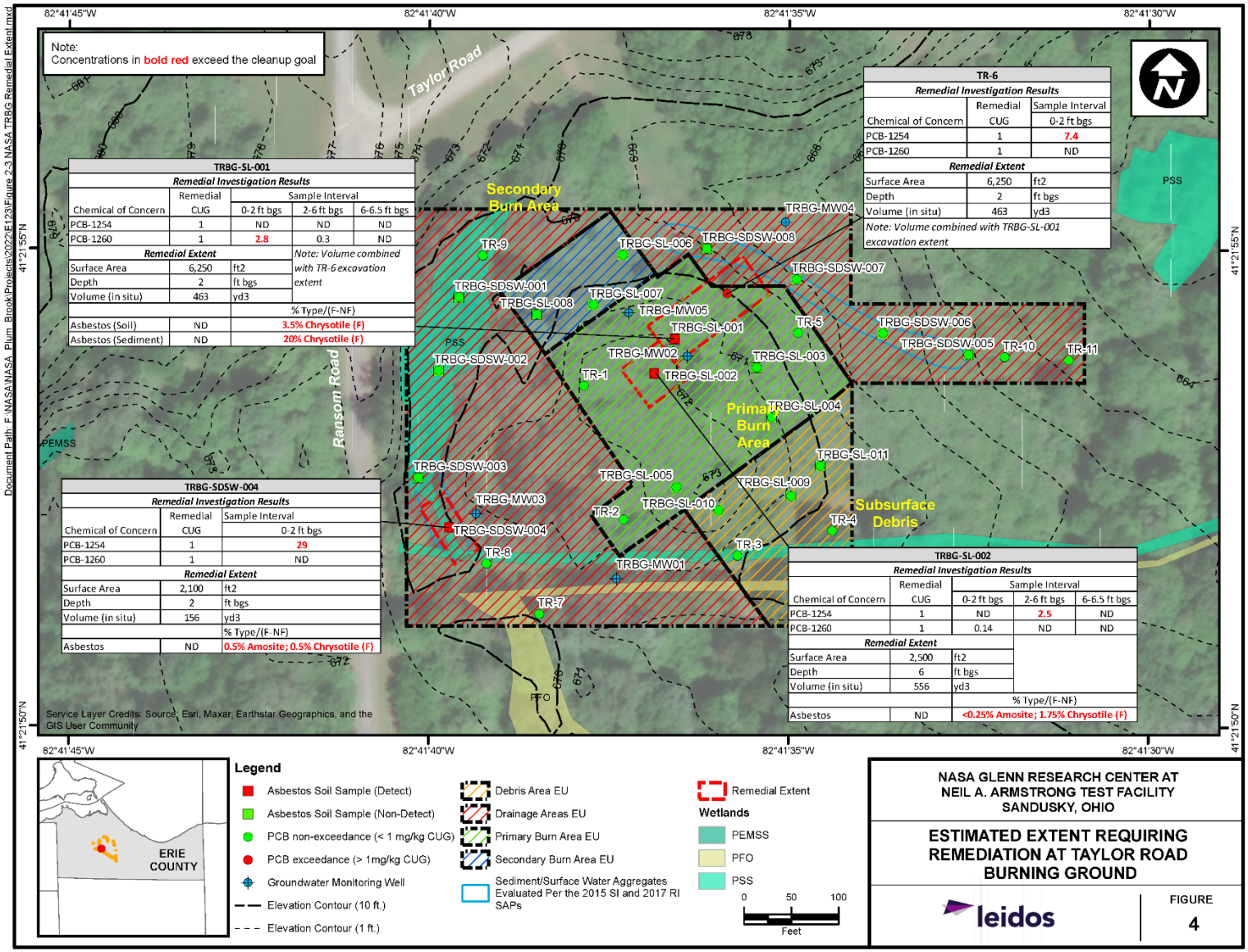


Figure 4. Estimated Extent Requiring Remediation at Taylor Road Burning Ground

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