SIXTH FIVE-YEAR REVIEW REPORT FOR
L.A. CLARKE & SON SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

JULY 2020

Prepared by

U.S. Environmental Protection Agency
Region 3
Philadelphia, Pennsylvania

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U.S. EPA, Region 3

Date

Table of Contents

LIST OF ABBREVIATIONS AND ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
CASI	Commonwealth Atlantic-Spotsylvania, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
IC	Institutional Control
mg/kg	Milligrams per Kilogram
NCP	National Contingency Plan
NPL	National Priorities List
NTCRA	Non-time-critical Removal Action
O&M	Operation and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design and Remedial Action
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
TEQ	Toxic Equivalence Quotient
TPAH	Total Polycyclic Aromatic Hydrocarbon
UU/UE	Unlimited Use/Unrestricted Exposure
VDEQ	Virginia Department of Environmental Quality

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR Reports such as this one. In addition, FYR Reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the sixth FYR for the L.A. Clarke & Son Superfund site (the Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of five operable units (OUs):

- OU1 addresses site security with fencing and signage.
- OU2 addresses decontamination and demolition at the Site, including demolition of the process buildings, disposal of railroad ties, telephone poles and unused treated wood, and decommissioning of the wastewater impoundment.
- OU3 addresses surface water controls.
- OU4 addresses treatment and disposal of upland contaminated surface soil and sediments.
- OU5 addresses groundwater and downgradient sediment.

This FYR addresses three of the five OUs (OU1, OU2, and OU 4). The FYR does not address OU3 because it was not implemented or OU5 because the groundwater and downgradient sediment remedy has not yet been selected.[1,2]

The EPA remedial project manager (RPM) led this FYR. Additional participants from EPA included the community involvement coordinator (CIC), human health and ecological risk assessors, and a hydrogeologist. Virginia Department of Environmental Quality (VDEQ) staff also participated in the review. Skeo provided EPA contractor support for this FYR. The potentially responsible party (PRP) the Commonwealth Atlantic-Spotsylvania, Inc. (CASI) was notified of the initiation of the FYR. The review began on July 23, 2019.

Site Background

The Site is located in Spotsylvania County, Virginia, about 4.5 miles southeast of Fredericksburg (Figure 1). Wood preserving operations took place at the Site from 1937 to 1988. Operators preserved railroad ties, telephone poles and fence posts by injecting the lumber with a mixture of creosote and coal tar under high temperature and pressure in a sealed compartment. Contamination at the Site resulted from facility operations, spills, waste streams entering drainage ditches, and on-site disposal of waste products. Figure 2 includes the current features and the locations of historic source areas.

The Site consists of about 40 acres of unoccupied land owned by CASI and a related entity. The North Terrace and South Terrace areas are the former L.A. Clarke and Son property. They are separated by a railroad right-of-way that includes an active spur. The third area comprises Massaponax Creek and its floodplain; the area will be addressed under OU5.

[1] The purpose of OU3 was to investigate the feasibility of minimizing the amount of stormwater running onto the Site. EPA ultimately determined that stormwater controls were not feasible at the Site.

[2] The selection of the OU5 Remedy will also address areas where excavated sediments were recontaminated.

Surface topography is relatively flat due to extensive fill and grading operations. Surface runoff from the Site flows into drainage ditches that discharge into the Massaponax Creek floodplain south of the Site. Groundwater at the Site flows in a southeasterly direction within two water-bearing zones. The shallow aquifer flows beneath the former operations area and surfaces at the southern property boundary in the floodplain area. Groundwater from the Site sometimes enters the drainage ditches, with outfalls in the floodplain. A deeper aquifer flows under the Site and the floodplain.

Residences are located about 1,000 feet upgradient of the Site. These homes are on public water service provided by Spotsylvania County. The North Terrace and South Terrace areas and most of the Massaponax Creek floodplain are zoned for industrial uses.

Appendix A provides a list of the site-related resources used to prepare this FYR Report. Appendix B provides the Site's chronology of events.

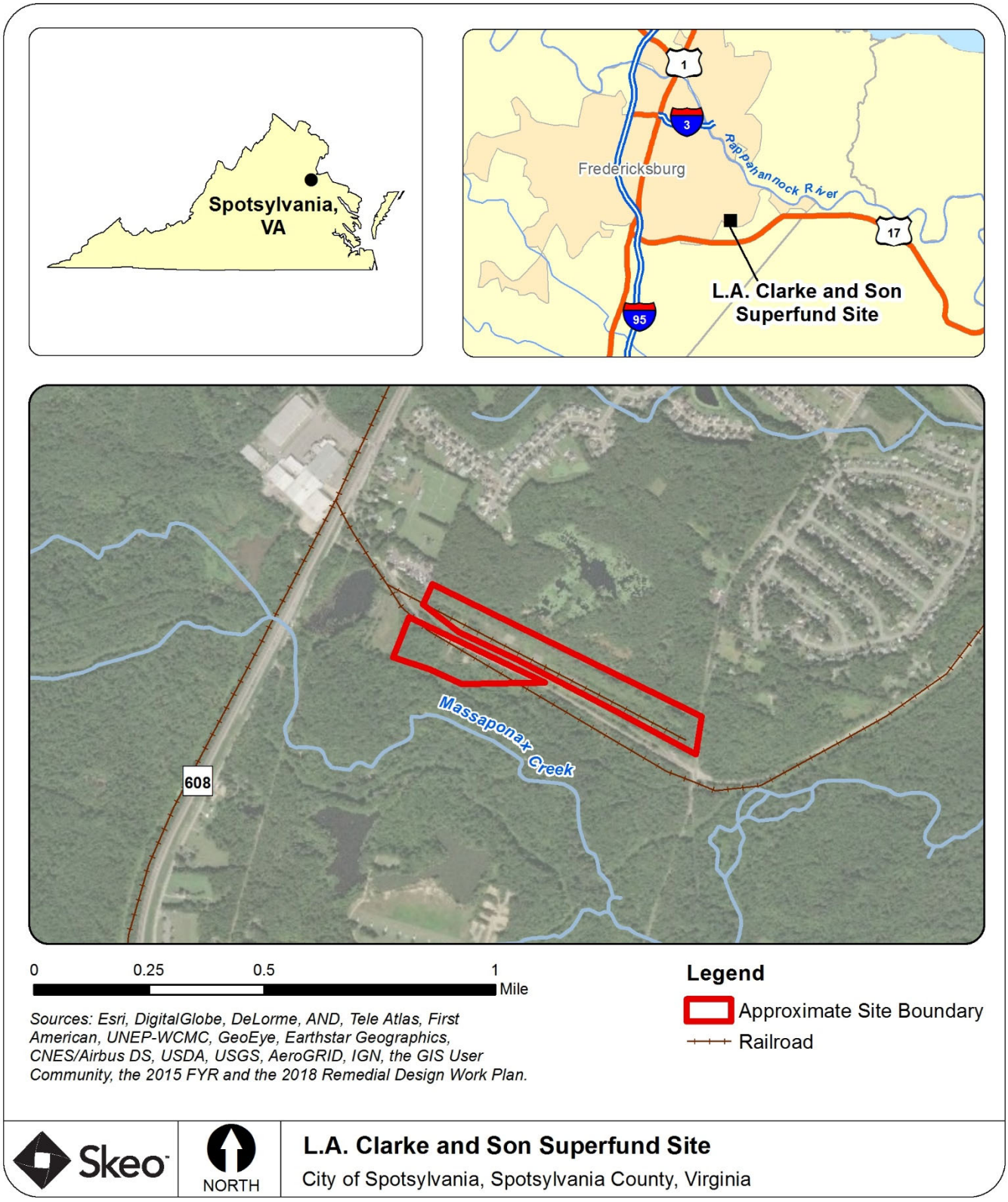
FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: L.A. Clarke & Son		
EPA ID: VAD007972482		
Region: 3	**State:** VA	**City/County:** Spotsylvania / Spotsylvania

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the Site achieved construction completion?** No

REVIEW STATUS
Lead agency: EPA
Author name: Jeffrey Thomas, with additional support provided by Skeo
Author affiliation: EPA Region 3
Review period: 7/23/2019 – 8/1/2020
Date of site inspection: 11/11/2019
Type of review: Statutory
Review number: 6
Triggering action date: 8/29/2015
Due date *(five years after triggering action date)*: 8/29/2020

Figure 1: Site Vicinity Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In 1980, L.A. Clarke and Sons, Inc. (L.A. Clarke) was classified under the Resource Conservation and Recovery Act (RCRA) as a treater of hazardous wastes because of its use of an on-site wastewater impoundment (Figure 2). As part of the RCRA permitting process, a state-mandated remedial action required excavation of soils from the processing area and from drainage ditch #2 along the northern property line. The work, conducted prior to 1984, created a RCRA-regulated soil waste pile. The waste pile contained about 1,400 cubic yards of soil and was underlain by two synthetic liners. This pile was subsequently sent for off-site disposal as part of remedial action activities for OU2.

EPA detected soil, sediment, groundwater and surface water contamination at the Site during a 1983 site investigation. EPA added the Site to the Superfund program's National Priorities List (NPL) in July 1986 and completed a remedial investigation and feasibility study (RI/FS) in 1988. EPA identified endangerment to human health, welfare and the environment presented by direct contact with contaminated surface soils and sediments and the potential contamination of groundwater by the future release of contaminants from subsurface soils and sediments at the Site. At that time, EPA decided to address groundwater and downgradient sediment in a separate RI and remedial action.

The contamination consists of the byproducts of creosote: polycyclic aromatic hydrocarbons (PAHs), benzene and dense non-aqueous phase liquids (DNAPLs). Sample results showed free product creosote 5 or more feet below the surface both next to the facility and along the southern site boundary.

Subsequent investigations indicated that contamination was transported off site via surface flow or migrated along thin subsurface sand lenses to the floodplain area of Massaponax Creek.

Response Actions

EPA signed the Site's Record of Decision (ROD) on March 31, 1988, to address the contaminated surface soils (soils defined at a depth of less than 18 inches) and sediments. The ROD selected a remedy for OU1, which EPA subsequently divided into OUs 1 – 4. The ROD noted that further RI/FS work would be undertaken to study and address impacted groundwater and downgradient sediments (now OU5).

The remedy selected in the 1988 ROD included:

- Biological treatment of contaminated soil under the process buildings via in-situ soil flushing with a surfactant solution followed by in-situ bioremediation.
- Biological treatment of excavated surface soils, sediments via on-site landfarming.
- Biological treatment of all other contaminated soil and sediment via on-site landfarming.
- Backfilling of excavated areas with treated soil and sediment. Covering of backfilled areas with 1.5 feet of topsoil and revegetation.
- Biological treatment of the RCRA-regulated soil pile via land treatment in place.
- Biological treatment of the former wastewater impoundment sludge.
- Groundwater monitoring during and after treatment.
- Implementation of institutional controls.

The 1988 ROD states that the primary remedial action objective (RAO) is to eliminate soil and sediment contamination that presents an unacceptable risk to human health and the environment. Explanations of Significant Differences (ESDs) in 1989, 1994, 1999 and 2015 modified the remedy. In December 1989, EPA issued the first ESD, which called for removal of the on-site process buildings and associated appurtenances. For soils under the process buildings, the 1988 ROD selected in-situ soil flushing followed by bioremediation. The ROD specified that if the on-site process buildings were removed, contaminated soils under the buildings would be cleaned up using the same methods as other site soils and sediments.

The 1994 ESD modified the remedy for the wastewater impoundment sludge. Because the sludge was considered waste under RCRA, it had to meet the Land Disposal Restrictions before disposal. Because the Land Disposal Restrictions became effective in August 1988, it was not known at the time of the March 1988 ROD that biological treatment of the sludge could not meet the restrictions. As a result, EPA selected off-site incineration for the wastewater impoundment sludge remedy in the 1994 ESD.

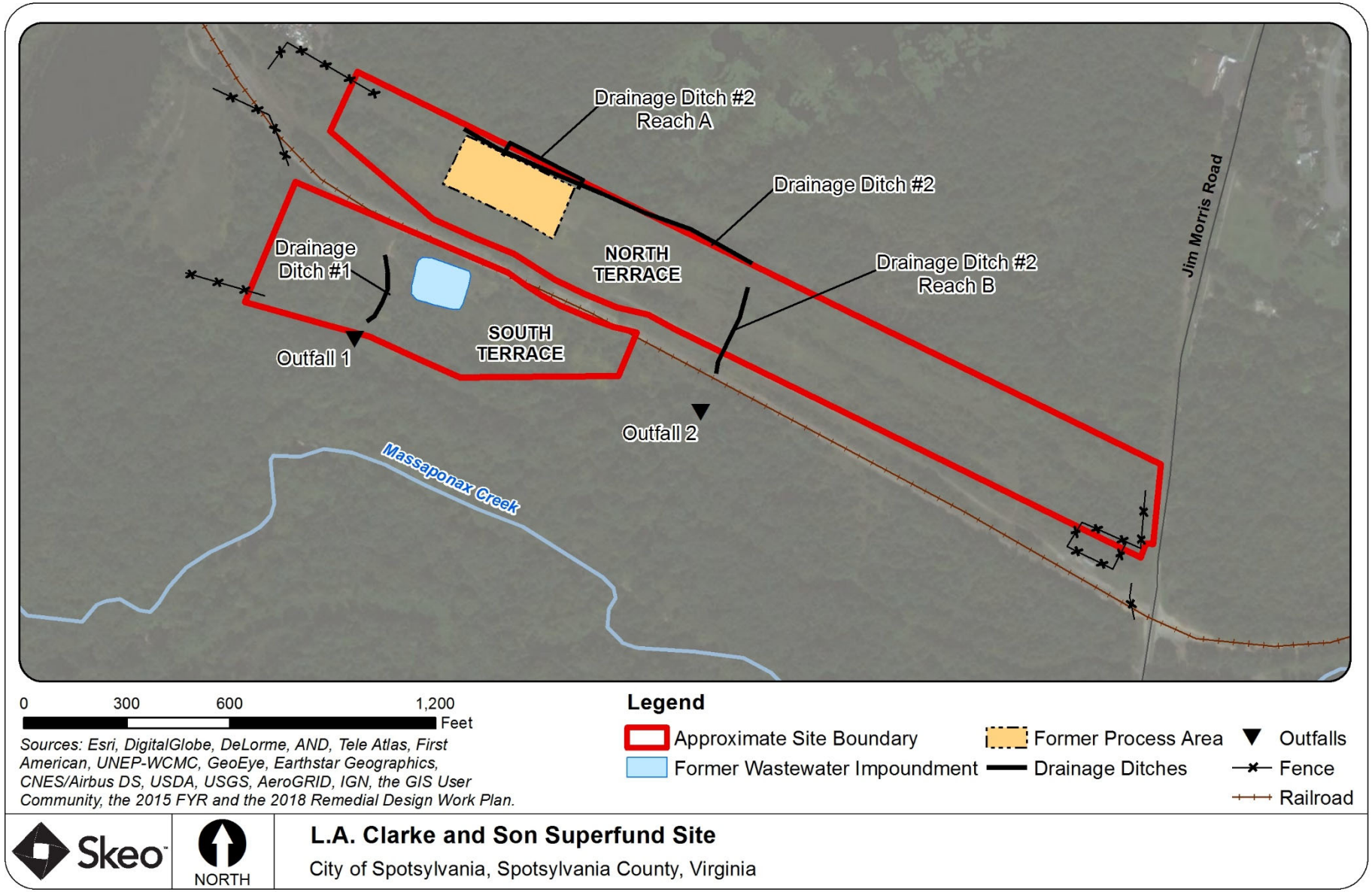
The 1999 ESD modified the remedy for floodplain and drainage ditch sediments to off-site disposal of the top 6 inches of sediment from areas exceeding the ROD sediment cleanup criteria instead of on-site biological treatment of sediments. The excavated areas were to be backfilled with accepted material. The sediment target cleanup level of 352 milligrams per kilogram (mg/kg) PAHs was an ecological risk-based value. Sampling results of the sediment indicated only 700 cubic yards would require treatment. Therefore, EPA modified the remedy for off-site disposal.

The 2015 ESD revised the surface soil cleanup levels (human health and ecological), revised the institutional controls necessary to ensure long-term protectiveness, formally required fencing and signage to limit access and warn the public, and eliminated the requirement for a soil cover due to the revised cleanup goal. EPA determined that a change in the human health surface soil cleanup level at the Site for incidental ingestion and dermal contact is appropriate because more recent science allows distinguishing the separate risk posed by individual PAHs; the future reuse scenario for the Site now calls for commercial or industrial uses and for residential use to be prohibited; and there are more sophisticated methods available now to perform risk assessments.

The revised soil cleanup goals are:

- Human health cleanup level for surface soil at the Site of 60 mg/kg carcinogenic PAH benzo(a)pyrene toxic equivalence quotients (TEQs), as a site average.
- Ecological cleanup level in soils less than 6 inches below ground surface of 50 mg/kg total PAHs as a sitewide average, with a not-to-exceed value of 100 mg/kg total PAHs.

Figure 2: Detailed Site Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Status of Implementation

The PRPs entered into a Consent Decree with EPA in July 1989 to conduct the remedial design and remedial action (RD/RA) for the remedy selected in the 1988 ROD.

OU1 – Site security

The OU1 remedial design took place in March 1989. CASI began the remedial action in September 1989 and completed work in September 1993. A fence was placed around the upland areas eastern and western boundaries, except where the railroad exits and enters the site boundary. Warning signs were placed at the site boundaries to deter trespassers from entering and risking exposure to contaminants of concern. The railroad spur prevents complete fencing of the property.

OU2 – Site Demolition

OU2 covered decontamination, demolition and removal of all structures and foundations at the Site, including all process area buildings and related structures. CASI conducted the remedial design from September 1989 through August 1990 and conducted the remedial action from August 1990 through May 1997, with completion of the impoundment removal. This effort included removal and off-site incineration and disposal of wastewater, emulsion, sludge, liner material and contaminated soil.

OU4 – Terrace Soil and Sediment

CASI began the remedial design in March 1990. In 1999, CASI petitioned EPA to change the surface soil cleanup level based on a risk-based industrial land use rather than residential land use, which was required in the ROD. CASI completed remedial design in September 2000. EPA provisionally accepted the proposed cleanup level and did not enforce soil cleanup to the extent required in the ROD. The revised cleanup goal was formally adopted in the 2015 ESD. Remedial action began in July 2001. By fall 2001, upland sediments were removed from the drainage ditches and discharge point of the ditches in the floodplain and disposed of offsite pursuant to the 1999 ESD. Following the completion of the sediment removal activities in each ditch section, the excavation was backfilled.

Due to groundwater in the terrace areas discharging to the remediated drainage ditches, which then discharge to the Massaponax Creek floodplain, EPA directed CASI to resample the excavated areas to determine if soil and sediments were recontaminated by contaminated groundwater discharge. This sampling, which occurred in the summer of 2012, identified several areas where site-specific cleanup levels were exceeded. A phased pre remedial design surface soil landfarming pilot study began in 2013 to evaluate whether landfarming could achieve remediation in all soil areas to be sufficiently protective of potential ecological receptors and to test the effectiveness of soil amendments.

Following the 2015 ESD, EPA directed CASI to submit a RD/RA Work Plan for completion of the surface soil Landfarming remedial action. The 2018 RD/RA Work Plan describes how landfarming will be conducted, how final confirmation sampling and analysis will be conducted and identifies potential soil remediation contingency measures. Active landfarming under the RD/RA Workplan began during the 2018 Landfarming season and is ongoing. Information regarding the October 2018 confirmation sampling event is included in the data review section. Additionally, Appendix C includes maps and results from the landfarming pilot and the RD/RA activities.

Once the RAOs are achieved, terrace area restoration will be initiated. Restoration activities will include dismantling the irrigation system, minor regrading of areas disturbed during the RA, removing silt fencing, and re-establishing vegetative cover by planting grass seed.

OU5 – Groundwater, surface water and sediments that were not otherwise finally addressed in the 1988 ROD

While not part of the remedy evaluated during this five-year review, the following status of OU5 activities is provided to give a comprehensive update on Site activities.

In September 2014, the PRP submitted a draft RI/FS report to EPA for OU5 that was modified in January 2015 following meetings between the PRP and EPA. EPA provided extensive comments on the RI/FS report to the PRP

in January 2017 and the PRP provided responses to those comments in June 2017. Between 2018 and 2019, after significant communications between the PRP and EPA, the PRP performed four quarters of groundwater monitoring following an EPA-approved work plan and is actively revising the human health and screening level ecological risk assessments based on the updated groundwater monitoring data. The revised risk assessments and additional groundwater data will be incorporated into a revised OU5 RI/FS that is expected to be completed in August of 2021, and after the non-time-critical removal action (NTCRA) discussed below. EPA will select a final remedy for OU5 upon completion of the RI/FS for OU5 that is currently ongoing.

On April 30, 2020, EPA signed an Enforcement Action Memo selecting a non-time-critical removal action (NTCRA) to address creosote source material (mainly subsurface creosote DNAPL) at the Site. The creosote DNAPL is an ongoing source of contamination to groundwater. The selected NTCRA includes construction and operation of approximately 80 DNAPL recovery wells across the 40-acre Site along with surface soil/sediment excavation in four specific areas. The selected action was identified as the preferred alternative in the preceding Engineering Evaluation/Cost Analysis, dated February 2020, that underwent a 30-day public comment period in accordance with the NCP. The PRP has indicated they intend to prepare the design and perform the removal action work.

Institutional Control (IC) Review

No institutional controls have been implemented at the Site. Based on the requirements in the 2015 ESD, CASI will place institutional controls on its parcels to restrict future use of the Site to industrial and commercial uses and require stipulations for the future owner of the property. Groundwater is not in use at the CASI properties. Any necessary groundwater or downgradient soil or sediment institutional controls will be included in the OU5 remedy.

Table 1: Summary of Planned Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil	Yes	Yes	Parcels 37-A-17C	Restrict land use to industrial and commercial uses.	A covenant will be added to affected parcels as per the 2015 ESD once landfarming is complete.

Systems Operations/Operation and Maintenance (O&M)

As part of the ongoing OU4 RD/RA work, the PRP performs monthly tilling and site monitoring beginning in April continuing through October each year. Monitoring includes erosion controls, pH and moisture monitoring. The monthly monitoring data and observations are provided to EPA and VDEQ in monthly progress reports.

III. PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determinations and statements from the previous FYR Report as well as the recommendations from the previous FYR Report and the status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2015 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The remedy at OU1 currently protects human health and the environment because fencing and signage are in place to deter trespassers. However, in order to be protective in the long-term the proposed changes, to the soil remedy need to be recorded and implemented to ensure protectiveness.
2	Protective	The remedy at OU2 is protective of human health and the environment. All site-related buildings and structures have been demolished and disposed of off site.
4	Short-term Protective	The remedy at OU4 currently protects human health and the environment because surface soil contamination has been reduced and there are currently no complete exposure pathways. However, soil cleanup goals in the ROD have not been met, the soil cover called for in the ROD has not been added and subsurface soil cleanup has been deferred until OU5 groundwater is addressed. In order to be protective in the long-term, EPA needs to finalize and implement proposed modifications to the soil remedy to ensure protectiveness.

Table 3: Status of Recommendations from the 2015 FYR Report

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	Securing the site with fencing and signage was not identified in the 1988 ROD or any subsequent ESD and is required to ensure protectiveness.	Issue a decision document identifying the need to address site security with fencing and signage.	Completed	EPA recorded the need for site security in the 2015 ESD.	9/25/2015
4	Institutional controls have not been implemented.	Define the appropriate institutional controls based on the modified selected remedy and issue a decision document that requires implementation.	Ongoing	The 2015 ESD formally revised the remedy to include restrict future land use to commercial or industrial uses. CASI is willing to place institutional controls on the site property to restrict the future use of the Site to these uses once landfarming is complete. Furthermore, EPA recently completed an EE/CA for a non-time critical removal action to address the cresote source area that may impact the soils in the terrace area. EPA recommends coordinating ICs once work at OU4 and the OU5 ROD is issued.	NA
4	Soil cleanup has not been achieved to the cleanup goals specified in the ROD. In addition, the PRP did not install the protective soil cover.	Determine if performance standards in the ROD can be modified and still achieve protectiveness. Issue a decision document recording the changes to the remedy.	Completed	EPA recorded the change in soil cleanup goals and eliminated the requirement for a soil cover in the 2015 ESD based on more recent science that allows the distinguishing of the separate risks posed by individual PAHs, and the change to the future re-use scenario of the Site	9/25/2015

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

On March 28, 2020, EPA placed a notice in the Fredericksburg Freelance Star newspaper notifying the community that EPA was conducting the sixth FYR for the Site (Appendix D). It stated that the FYR was underway and invited the public to submit any comments to EPA. The results of the FYR will be made available at the Site's information repository, Central Rappahannock Regional Library Snow Branch located at 8740 Courthouse Rd, Spotsylvania, VA 22551.

During the FYR process, interviews were conducted with local officials from Spotsylvania County to document any perceived problems or successes with the remedy that has been implemented to date. Officials reported no issues or concerns but acknowledged that a community meeting may be valuable. Also, during the interview with the County, they did express interest in the future potential uses of the site. They were unaware of any community concerns related to the Site. A formal Interview Form was not drafted.

In coordination with Spotsylvania County, and Fredericksburg Christian School, on Monday, February 24, 2020 EPA held a community meeting at the at the Fredericksburg Christian School - Upper School, located at 9400 Thorton Rolling Rd. Fredericksburg. At the meeting, EPA provided a brief update on cleanup efforts at the L.A. Clarke & Son Superfund Site. Over a dozen community members attended, as well as the representatives of the County. Additionally, representatives of the Potentially Responsible Party were also present. No new concerns or issues were noted by the public.

Data Review

OU4 Soil

The remedial action for terrace area surface soils is ongoing. Available data indicate the current extent and concentrations of total PAHs (TPAHs) in terrace area surface soils are much less than observed during the RI completed in the early 1990s and observed at the outset of the landfarming pilot study. TPAH results for actively landfarmed plots from 2015 through 2018 are included in Table C-1. Generally, the TPAHs within the landfarmed plots has decreased and many of the plots are now below the not-to-exceed (NTE) goal of 100 milligrams per kilogram (mg/kg). However, until the 50 mg/kg sitewide average is achieved, there is unacceptable ecological risk and the remedy is not protective to ecological receptors.

In accordance with the RD/RA Work Plan, confirmation soil sampling of the terrace was conducted at 80 locations in October 2018. These 80 locations where not undergoing active landfarming at the time. Additionally, samples were taken from the five locations were active landfarming was being performed. Based on the sample results (Table C-2) the NTE cleanup goal was met for 66 of the 80 confirmation samples collected in October 2018 while 14 samples had TPAH concentrations greater than 100 mg/kg. In addition, based on the 2018 end-of-season performance sample results (Table C-3), the five active landfarming locations had TPAH concentrations greater than the 100 mg/kg cleanup goal. Of the total locations sampled (both active and inactive landfarming areas) 19 locations exceeded the NTE cleanup goal locations The 2019 landfarming season addressed the 19 and were designated as plots; 1A, 2D, 2E, 2F, 2G, 3B, 4B, 4E, 4F, 4G, 4H, 5A, 5B, 6B, 7B, 7C, 8B, 8C, and 10B.

The 19 plots were resampled during the baseline sampling event in May 2019. TPAH concentrations were less than the 100 mg/kg NTE cleanup goal in four of the 19 of the 2019 baseline soil samples SS-1A, SS-2F, SS-6B, and SS-8B. Mid-season performance sampling consisted of surface soil sampling in the 15 plots (2D, 2E, 2G, 3B, 4B, 4E, 4F, 4G, 4H, 5A, 5B, 7B, 7C, 8C, 10B) where TPAH concentrations remained above the NTE cleanup goal of 100 mg/kg. Because the TPAH concentrations for the mid-season performance sampling for Plots 2D, 4H were less than the NTE cleanup goal of 100 mg/kg, landfarming activities were discontinued for these plots. The end of season performance sampling was performed on the 13 remaining plots (2E, 2G, 3B, 4B, 4E, 4F, 4G, 5A,

5B, 7B, 7C, 8C, and 10B) where the TPAH concentrations remained above the NTE goal. Based on the sample results (Table C-4) the TPAH concentrations remained greater than the NTE cleanup goal in all 13 samples analyzed.

Site Inspection

EPA conducted the site inspection on November 11, 2019. Site inspection participants included EPA RPMs, the VDEQ Project Manager, the EPA CIC, the PRP's attorney and contractor, and EPA's FYR contractor. The purpose of the inspection was to assess the protectiveness of the remedy. Site inspection participants walked the Site, beginning at the locked gate on the eastern access point. No issues with access or trespassing were noted during the inspection or reported by the O&M contractor. The fencing on the eastern and western boundaries appeared to be in good repair. The landfarming plots were observed and their status discussed. Appendices F and G provide the site inspection checklist and inspection photos.

On November 11, 2019, Skeo Solutions staff visited the designated site repository, Spotsylvania Courthouse, as part of the site inspection, but did not find any site documents. EPA intends to provide the Site's Administrative Record to a local library.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

The remedy is functioning as intended. Based on the remedy called for in the 1988 ROD and the ESDs, the PRP conducted the following actions: installation of site fencing, demolition of process area buildings and structures, excavation and off-site incineration of sediments from the wastewater impoundment, excavation and off-site disposal of drainage ditch and flood plain sediments, and landfarming of surface soils. Remedy implementation is complete for OUs 1 and 2. In addition, the 2019 site inspection found access to the property is limited through fencing and gates at vehicle access points and vegetation along the northern and southern boundaries. However, the revised 2015 soil cleanup goals for OU4 soils have not yet been met. Until the cleanup goals are achieved, there is unacceptable ecological risk and the remedy is not protective to ecological receptors. Landfarming is ongoing to address remaining contamination.

Institutional controls to restrict land use are not yet in place. However, CASI is the property owner and intends to record appropriate restrictions on its parcels to limit land use to commercial and industrial uses as required by the 2015 ESD.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Question B Summary:

Yes, while there have been changes in exposure and toxicity data that resulted in revised cleanup levels for surface soils these changes were addressed in the 2015 ESD. The 2015 ESD records modifications to the human health and ecological soil cleanup goals based on expected land use, benzo(a)pyrene equivalence factors and a probabilistic risk assessment. Only the cleanup levels for human health were based on a probabilistic risk assessment. Since the 2015 ESD, there have been no changes that would call into question the derived cleanup goals.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OU1 and OU2

Issues and Recommendations Identified in the FYR:				
OU(s): 4	**Issue Category: Institutional Controls**			
	Issue: Institutional controls have not been implemented.			
	Recommendation: Implement institutional controls as specified the 2015 ESD. Furthermore, EPA recommends coordinating ICs once work at OU4 is complete and the OU5 ROD is issued.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	2/8/2023

OTHER FINDINGS

One additional recommendation was identified during the FYR. This recommendation does not affect current and/or future protectiveness.

- EPA will update the site document repository with relevant site documents.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: OU1	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at OU1 currently protects human health and the environment because fencing and signage are in place to deter trespassers.	

Protectiveness Statement(s)	
Operable Unit: OU2	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at OU2 is protective of human health and the environment. All site-related buildings and structures have been demolished and disposed of off site.	

Protectiveness Statement(s)	
Operable Unit: OU4	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The remedy at OU4 currently protects human health because surface soil contamination has been reduced and there are currently no complete exposure pathways. However, the remedy has not yet adequately reduced surface soil contamination to meet ecologically protective levels and there is a complete exposure pathway for ecological receptors. The remedy at OU4 is expected to be protective for ecological receptors upon completion. In the interim, landfarming activities continue to reduce the surface soil contamination. Furthermore, institutional controls are not yet in place. For the remedy to be protective over the long term, performance standards need to be achieved and institutional controls need to be implemented.	

VIII. NEXT REVIEW

The next FYR Report for the L.A. Clarke and Son Superfund site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

CPF Associates, Phase III Landfarming Pilot Study Work Plan, March 19, 2005.

Key Environmental, Draft Remedial Investigation and Feasibility Study Report, L.A. Clarke and Son Superfund Site. January 27, 2015.

U.S. Environmental Protection Agency, Record of Decision, L.A. Clarke and Son Superfund Site. EPA Region 3. March 31, 1988.

U.S. Environmental Protection Agency, Explanation of Significant Differences, L.A. Clarke and Son Superfund Site. EPA Region 3. December 29, 1989.

U.S. Environmental Protection Agency, Explanation of Significant Differences, L.A. Clarke and Son Superfund Site. EPA Region 3. March 31, 1994.

U.S. Environmental Protection Agency, Explanation of Significant Differences, L.A. Clarke and Son Superfund Site. EPA Region 3. July 14, 1999.

U.S. Environmental Protection Agency Five-year Review, L.A. Clarke and Son Superfund Site. EPA Region 3. September 30, 1999.

U.S. Environmental Protection Agency, Five-year Review, L.A. Clarke and Son Superfund Site. EPA Region 3. September 30, 205.

U.S. Environmental Protection Agency, Five-year Review, L.A. Clarke and Son Superfund Site. EPA Region 3. September 30, 2010.

U.S. Environmental Protection Agency, Five-year Review, L.A. Clarke and Son Superfund Site. EPA Region 3. August 29, 2015.

APPENDIX B – SITE CHRONOLOGY

Table B-1: Site Chronology

Event	Date
Wood preserving operations took place at the Site	June 1937 – 1988
EPA conducted a site inspection and discovered contamination	April 1, 1983
EPA listed the Site on the NPL	July 10, 1986
EPA completed the RI/FS	February 1988
EPA signed the ROD for OU1, OU2, OU3 and OU4	March 31, 1988
PRPs began the remedial design for OU1	March 1989
EPA and PRP entered into Consent Decree for the RD/RA	July 17, 1989
EPA issued an Administrative Order on Consent (AOC)	September 6, 1989
PRP began the RD for OU2	September 1989
EPA issued first ESD for OU2	December 29, 1989
PRP began the RD for OU4	March 1990
PRP completed the RD and began the RA for OU2	August 1990
PRP completed first ESD work	January 13, 1993
PRP completed RD/RA for OU1	September 1993
EPA issued the second ESD for OU2	March 31, 1994
EPA signed Site's first FYR Report	September 30, 1994
EPA issued AOC for removal order	September 29, 1995
PRP completed second ESD work	February 28, 1997
PRP completed RA for OU2	May 1997
EPA signed ESD for OU4	June 14, 1999
EPA signed Site's second FYR Report	September 30, 1999
PRP completed the RD for a portion of OU4	September 2000
PRP began the RA for a portion of OU4	July 2001
PRP completed third ESD work	October 2001
PRP submitted Supplemental Site Characterization Report	April 2005
EPA signed Site's third FYR Report	September 29, 2005
EPA signed Site's fourth FYR Report	September 29, 2010
PRP conducted supplemental sampling of subsurface soils, sediments and surface water	October 2012
PRP submitted draft RI/FS for groundwater	March 2015
EPA signed Site's fifth FYR Report EPA signed ESD for site fencing, soil cleanup goals and institutional controls	September 25, 2015
PRP submitted RD/RA Work Plan for Terrace Area Surface Soils	August 2018

APPENDIX C –LANDFARMING MAPS and RESULTS

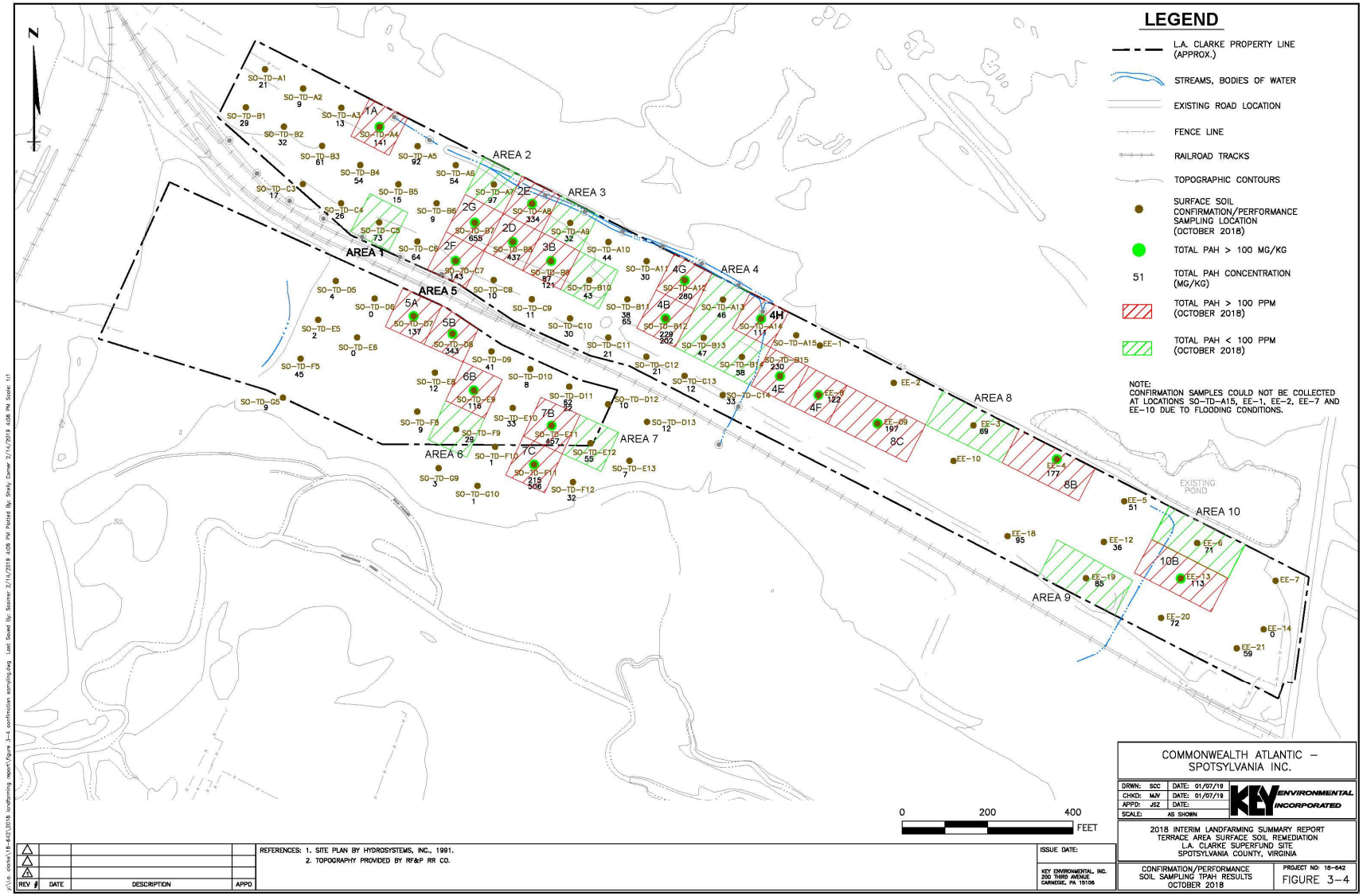


TABLE C-1
COMPARISON OF PERFORMANCE TPAH RESULTS, 2015 THROUGH 2018
2018 INTERIM LANDFARMING SUMMARY REPORT
TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

Plot	May 2015	October 2015	April 2016	June 2017	October 2017	April 2018	August 2018	October 2018
2A	159.6	124.2/119.8	109.7	91.4	NS	NS	NS	NS
2B	134.7	29.1	NS	NS	NS	NS	NS	NS
3A	149.8	115.7	313.9	280.5	158.8	177.2	89.8	NS
3B	141.06	73.25	NS	NS	NS	NS	NS	NS
4A	92.82	NS	NS	NS	NS	NS	NS	NS
4B	265.5	249.1	318.9	452.4	289.6	346.7	218.6	229.1/201.7
4C	101.9	75.9	NS	NS	NS	NS	NS	NS
4D	45.4	NS	NS	NS	NS	NS	NS	NS
4E	127.8	181.3	254.5	198.1	176.1	321.4/320.4/189.5	357.6	230.0
4F	180.0	227.5	1,265.7	225.4	250.9	221.2	126.0/167.6/1053.5	122.0
4G	63.9	NS	NS	NS	NS	NS	NS	NS
4H	80.9	NS	NS	NS	NS	NS	NS	NS
5A	518.2	397.6	236.5	194.4	785.1	549.2	192.4	136.5
5B	295.9	210.8	254.0	230.8/267.7	292.4	200.3	264.7	343.3
7	119.1	57.12	NS	NS	NS	NS	NS	NS
9A	55.4	NS	NS	NS	NS	NS	NS	NS
9B	116.8	65.9	NS	NS	NS	NS	NS	NS

Results = mg/kg TPAH
NS = not sampled due to attainment of the cleanup goal in the prior sample at this location

TABLE C-2
CONFIRMATION SOIL SAMPLING TPAH RESULTS – OCTOBER 2018
2018 INTERIM LANDFARMING SUMMARY REPORT
TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

Sample ID		EPA	EE-03		EE-04		EE-05		EE-06		EE-09		EE-12	EE-13	EE-14		EE-18		EE-19		EE-20	EE-21	SO-TD-A1		SO-TD-A2		SO-TD-A3		SO-TD-A4		SO-TD-A5		SO-TD-A6	
Sample Date		Screening	10/17/2018		10/18/2018		10/18/2018		10/17/2018		10/17/2018		10/18/2018	10/18/2018	10/18/2018		10/18/2018		10/17/2018		10/18/2018	10/18/2018	10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/17/2018	
chemical_name	units																																	
Acenaphthene	mg/kg	-	0.1	U	0.2	J	0.083	J	0.13	J	0.28	J	0.054	0.16	J	0.0025	U	0.16	J	0.081	J	0.11	0.082	J	0.028	J	0.017	J	0.043	U	0.51	J	0.13	J	0.2	J
Acenaphthylene	mg/kg	-	1.6		4.2		1.3		2.1		4.7		0.93	2.6		0.0092		3.5		1.9		1.6	1.5		0.43		0.24		0.39		3.2		1.8		1.6	
Anthracene	mg/kg	-	1.7		5.3		2		1.6		5		1.2	3.5		0.0093		3.7		1.9		1.6	1.9		0.56		0.45		0.56		11		2.2		2.2	
Benzo(a)anthracene	mg/kg	-	6.1		15		3.8		4.8		18		2.8	7.3		0.015		6.4		7.2		4.6	3.6		1.7		0.69	J	0.77		5		5.2		3	
Benzo(a)pyrene	mg/kg	-	4.6		7.8		3.2		4.7		13		2.3	6		0.027		6		4.6		3.3	3.7		1.7		0.57		1		13		6		3.4	
Benzo(b)fluoranthene	mg/kg	-	11		19		8.3		12		34		5	15		0.061		14		13		10	9.4		4.1		2		2.7		21		19		8.9	
Benzo(g,h,i)perylene	mg/kg	-	4.2		10		3.9		4.9		12		2.9	8		0.056		7.9		5		4	5.1		1.6		0.8		0.055	J	17		8.6		5.7	
Benzo(k)fluoranthene	mg/kg	-	3.1		8.7		2.4		4		11		1.8	4.3		0.023		4.9		4.4		3.4	3.4		1.5		0.56		0.9		7.8		6.1		2.3	
Carbazole	mg/kg	-	0.38		1.3		0.63		0.59		1.2		0.25	0.9		0.0046	J	0.88		0.82		1.2	0.57		0.2		0.15		0.19		1.7		0.62		0.52	
Chrysene	mg/kg	-	7.8		24		6.7		7.8		26		4	13		0.033		11		10		8.2	6.3		2.5		1		1.2		19		9.8		4.7	
Dibenz(a,h)anthracene	mg/kg	-	1.3		2.8		1		1.3		3.4		0.7	2		0.016		2		1.3		1.1	1.5		0.44		0.23		0.41		3.7		2.2		1.4	
Fluoranthene	mg/kg	-	12		33		7.2		12		27		5.7	21		0.029		13		16		16	8		2.3		1.5	R	1.3		9.6		9.7		6	
Fluorene	mg/kg	-	0.16	J	0.3	J	0.13		0.18		0.47	J	0.077	0.27		0.0017	U	0.32	J	0.047	U	0.15	0.12	J	0.063	J	0.042		0.064	J	0.79	J	0.26	J	0.25	J
Indeno(1,2,3-cd)pyrene	mg/kg	-	3.7		8.9		3.6		4.7		11		2.6	7.1		0.044		6.9		4.5		3.7	4.7		1.6		0.8		1.7		15		8.3		5	
Naphthalene	mg/kg	-	0.2	J	0.54		0.26		0.14	J	0.69		0.14	0.23		0.0033	J	0.63		0.7		0.65	0.53		0.17		0.084		0.094	J	2		0.35	J	1.7	
Phenanthrene	mg/kg	-	1.3		7.5		1.1		1.9		2.2		1.4	3.6		0.0092		2.4		2.9		3	1.6		0.41		0.32		0.28		2.8		1.2		1.8	
Pyrene	mg/kg	-	10		30		6.2		9.2		28		4.5	19		0.028		12		12		11	8		2		1.2	J	1.3		10		11		5.6	
Total PAHs	mg/kg	100	68.76		**177.2**		51.17		71.45		**196.7**		36.10	**113.1**		0.363		94.81		85.48		72.41	59.43		21.10		9.003		12.72		**141.4**		91.84		53.75	
TPH	mg/kg	-	110	U	NA		NA		110	U	170	U	NA	NA		NA		NA		100	U	NA	NA		NA		NA		NA		NA		NA		NA	

Notes:
mg/kg - milligrams per kilogram
U - result not detected at reported concentration
J - estimated result
R - rejected result
NA - not analyzed
Total PAH values do not include rejected results

TABLE C-2
CONFIRMATION SOIL SAMPLING TPAH RESULTS – OCTOBER 2018
2018 INTERIM LANDFARMING SUMMARY REPORT
TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

Sample ID		EPA	SO-TD-A7		SO-TD-A8		SO-TD-A9		SO-TD-A10		SO-TD-A11		SO-TD-A12		SO-TD-A13		SO-TD-A14		SO-TD-B1		SO-TD-B2		SO-TD-B3		SO-TD-B4		SO-TD-B5		SO-TD-B6		SO-TD-B7		SO-TD-B8		SO-TD-B9		SO-TD-B9 DUP	
Sample Date		Screening	10/17/2018		10/17/2018		10/17/2018		10/18/2018		10/18/2018		10/18/2018		10/17/2018		10/18/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/17/2018		10/17/2018		10/17/2018		10/17/2018		10/17/2018	
chemical_name	units																																			
Acenaphthene	mg/kg	-	0.23	U	0.41	J	0.058	U	0.065		0.047		0.54	J	0.13		0.2		0.076	J	0.25	U	0.14	J	0.27	U	0.048		0.027		1.6		0.49	J	0.18	J	0.21	J
Acenaphthylene	mg/kg	-	2.6	R	5.4		0.94		0.84		0.74		6.5		1.2		2.7		0.73		0.98		1.7		1.6		0.43		0.26		5.8		9.4		1.9		2.2	
Anthracene	mg/kg	-	3.5		5.8		1.2		1.2		1		8		1.3		3.7		1.1		1.4		1.9		2.4		0.52		0.31		14		17		3.2		3.1	
Benzo(a)anthracene	mg/kg	-	5.2		30		1.7		3.2		2.1		21		2.8		8.7		1.5		1.9		4.5		2.9		0.98		0.54		39		32		5.8		8.6	
Benzo(a)pyrene	mg/kg	-	7.9		20		1.8		2.1		1.5		20		3.5		7		1.7		1.8		4.9		4.3		1.1		0.66		28		38		6.3		7.3	
Benzo(b)fluoranthene	mg/kg	-	21		51		6.5		8.9		5.8		53		11		16		6.7		5.6		8.2		9		2.6		1.7		56		84		17		23	
Benzo(g,h,i)perylene	mg/kg	-	13		17		3.9		2.9		2.2		20		4		8.9		2.6		3		6.1		6.3		1.3		0.86		25		32		6.8		7.8	
Benzo(k)fluoranthene	mg/kg	-	6.1		23		2.1		2.8		1.9		19		2.9		6.1		2		1.6		3.2		2.6		0.98		0.36		26		30	J	7.5		6.9	
Carbazole	mg/kg	-	0.93	R	1.2		0.38		0.32		0.26		2.1		0.42		0.71		0.33		0.61	J	0.5		0.64	J	0.14		0.083		2.6		4.9		0.92		0.88	
Chrysene	mg/kg	-	8.7		39		2.7		6.4		3.2		31		4.2		12		3.4		3.6		5.7		4.1		1.5		0.85		65		52		7.8		11	
Dibenz(a,h)anthracene	mg/kg	-	3	R	5.2		0.87		1		0.76		5.8		1.2		2.6		0.78		1		1.4		1.6		0.32		0.23		6.5		8.7		2.2		2.3	
Fluoranthene	mg/kg	-	9.7		51		3.1		5.5		3.8		32		3.9		15		2.6		3.7		8.4		5.1		1.8		0.83		210		45		8.9	J	19	J
Fluorene	mg/kg	-	0.33	J	0.58	J	0.11	J	0.074		0.073		0.85	J	0.16		0.28		0.13	J	0.22	J	0.28	J	0.35	J	0.066		0.033		2.4		0.92	J	0.29	J	0.29	J
Indeno(1,2,3-cd)pyrene	mg/kg	-	11		16		3.3		3.2		2.4		20		4.1		8.3		2.9		2.7		4.9		5.5		1.2		0.8		22		30	J	7.3		8.2	
Naphthalene	mg/kg	-	0.85	R	1.1		0.41		0.23		0.17		1.4		0.66		0.4		0.24		0.28	J	0.86		1.9		0.23		0.15		1.1		1.1	J	1.4		1.6	
Phenanthrene	mg/kg	-	2.6	R	4		0.78		0.64		0.51		3.2		0.94		1.8		0.56		1.3		1.1		2.1		0.5		0.19		43		3.9		1.8		2.9	
Pyrene	mg/kg	-	11		64		3		5.1		3.7		38		4.5		17		2.3		3.3		8.1		4.6		1.5		0.77		110		52		8.7	J	17	J
Total PAHs	mg/kg	100	97.43		**333.5**		32.41		44.15		29.90		**280.3**		46.49		**110.7**		29.32		32.38		61.38		54.35		15.07		8.570		**655.4**		**436.5**		87.07		**121.4**	
TPH	mg/kg	-	160	J	NA		130	J	NA		NA		NA		150	U	NA		NA		NA		NA		NA		NA		NA		260		NA		120	J	130	J

Notes:
mg/kg - milligrams per kilogram
U - result not detected at reported concentration
J - estimated result
R - rejected result
NA - not analyzed
Total PAH values do not include rejected results

TABLE C-2
CONFIRMATION SOIL SAMPLING TPAH RESULTS – OCTOBER 2018
2018 INTERIM LANDFARMING SUMMARY REPORT
TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

Sample ID		EPA	SO-TD-B10		SO-TD-B11		SO-TD-B11 DUP		SO-TD-B13		SO-TD-B14		SO-TD-C3		SO-TD-C4		SO-TD-C5		SO-TD-C6		SO-TD-C7		SO-TD-C8		SO-TD-C9		SO-TD-C10		SO-TD-C11		SO-TD-C12		SO-TD-C13		SO-TD-C14		SO-TD-D5	
Sample Date		Screening	10/17/2018		10/18/2018		10/18/2018		10/18/2018		10/17/2018		10/16/2018		10/16/2018		10/17/2018		10/17/2018		10/17/2018		10/17/2018		10/17/2018		10/18/2018		10/18/2018		10/18/2018		10/18/2018		10/18/2018		10/16/2018	
chemical_name	units																																			
Acenaphthene	mg/kg	-	0.058	J	0.11		0.1	J	0.14		0.075		0.037	J	0.1	U	0.2	J	0.25		0.3	J	0.041		0.027	J	0.053	J	0.19		0.043	J	0.036	J	0.038	J	0.01	
Acenaphthylene	mg/kg	-	0.86		1.2		1.2		1.2		0.99		0.27		0.66		1.2		1.1		2.7		0.27		0.23		0.67		0.47		0.69		0.4		0.59		0.067	
Anthracene	mg/kg	-	1.1		1.2		1.8		1.8		0.99		0.54		1.1		2.4		2.1		3.2		0.33		0.34		0.93		0.91		0.8		0.48		1.1		0.089	
Benzo(a)anthracene	mg/kg	-	2.6		2.5	J	4.9	J	2.9	J	4.3		1.2		1.3		4.3		3.3		14		0.64		0.63		1.8		1.3		1.4		0.77		2.8		0.33	
Benzo(a)pyrene	mg/kg	-	2.7		2.6		4		3	J	3.8		1.2		1.7		5.3		3.1		10		0.56		0.49		1.4		1.1		1.3		0.82		2.4		0.35	
Benzo(b)fluoranthene	mg/kg	-	8.7		6.6		8.4		7.5		12		3.1		3.8		11		10		20		1.7		1.4		5.1		2.7		3.6		2.1		6.9		0.84	
Benzo(g,h,i)perylene	mg/kg	-	3.8		4		5.5		4.2		3.5		1.5		2.7		6.6		5.6		7.9		1		0.99		2		1.7		1.9		1.2		2.8		0.39	
Benzo(k)fluoranthene	mg/kg	-	3.2		1.9	J	4.1	J	2.6	J	4		1.2		1.4		4.2		3.3		7.2		0.49		0.5		1.9		0.94		1.2		0.7		1.8		0.3	
Carbazole	mg/kg	-	0.34		0.35		0.37		0.47		0.36		0.13		0.34	J	0.66		0.53		0.77		0.082		0.095		0.39		0.33		0.26		0.14		0.28		0.024	
Chrysene	mg/kg	-	6		3.4	J	6.5	J	5.9		6.7		1.6		2.2		6.5		4.7		16		0.8		0.91		3		1.7		2.2		1.2		4		0.42	
Dibenz(a,h)anthracene	mg/kg	-	1.1		0.96		1.2		1	J	1.1		0.38		0.67		1.7		1.7		2.3		0.25		0.23		0.63		0.4		0.43		0.28		0.88		0.12	
Fluoranthene	mg/kg	-	4		3.9	J	11	J	5.1		7.7		1.8		3.2		10		8.4		27		1.1		1.6		4.7		3.2		2.7		1.2		3.1		0.48	
Fluorene	mg/kg	-	0.088		0.13		0.17		0.2		0.1		0.053		0.15	J	0.25	J	0.19		0.41		0.046		0.035	J	0.066	J	0.16		0.078	J	0.045	J	0.091	J	0.012	
Indeno(1,2,3-cd)pyrene	mg/kg	-	3.9		3.5		4.9		4		3.7		1.5		2.5		5.8		6		7.7		1		0.86		2		1.6		1.7		1.1		2.7		0.37	
Naphthalene	mg/kg	-	0.28		0.31		0.22		1.1		0.23		0.26		0.84		1.8		4		0.96		0.17		0.61		0.34		0.18		0.25		0.18		0.19		0.019	
Phenanthrene	mg/kg	-	0.68		0.75		1.2		1.2		0.66		0.51		1.2		2.5		3.2		2.3		0.31		0.6		0.76		1.4		0.51		0.32		0.4		0.09	
Pyrene	mg/kg	-	4.4		4.5	J	9.9	J	5.2		8.1		1.8		2.7		9.1		6.6		21		0.95		1.3		4.3		2.7		2.6		1.4		3.6		0.43	
Total PAHs	mg/kg	100	43.47		37.56		65.09		47.04		57.95		16.95		26.12		72.85		63.54		**143.0**		9.657		10.75		29.65		20.65		21.40		12.23		33.39		4.317	
TPH	mg/kg	-	100	J	NA		NA		NA		91	U	NA		NA		100	U	NA		100	J	NA		NA		NA		NA		NA		NA		NA		NA	

Notes:
mg/kg - milligrams per kilogram
U - result not detected at reported concentration
J - estimated result
R - rejected result
NA - not analyzed
Total PAH values do not include rejected results

TABLE C-2
CONFIRMATION SOIL SAMPLING TPAH RESULTS – OCTOBER 2018
2018 INTERIM LANDFARMING SUMMARY REPORT
TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

Sample ID		EPA	SO-TD-D6		SO-TD-D9		SO-TD-D10		SO-TD-D11		SO-TD-D11 DUP		SO-TD-D12		SO-TD-D13		SO-TD-E5		SO-TD-E6		SO-TD-E8		SO-TD-E9		SO-TD-E10		SO-TD-E11		SO-TD-E12		SO-TD-E13		SO-TD-F5		SO-TD-F8		SO-TD-F9	
Sample Date		Screening	10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/16/2018		10/17/2018		10/16/2018		10/15/2018		10/15/2018		10/17/2018	
chemical_name	units																																					
Acenaphthene	mg/kg	-	0.0021	U	0.12	J	0.017		0.18	J	0.041	J	0.014		0.011	J	0.0071	J	0.0022	U	0.028		0.31		0.051		0.58	J	0.041	J	0.011		0.4		0.021	J	0.095	
Acenaphthylene	mg/kg	-	0.0016	U	1		0.23		0.48		0.41		0.14		0.23		0.059		0.0037	J	0.25		2.7		0.84		13		1		0.084		0.28		0.14	J	0.57	
Anthracene	mg/kg	-	0.0019	U	1.3		0.26		1.1		0.77		0.23		0.29		0.072		0.0019	U	0.3		2.8		0.9		11		1.1		0.12		1.4		0.21	J	0.58	
Benzo(a)anthracene	mg/kg	-	0.0023	J	2.6		0.58		5	J	1.4	J	0.74		0.53		0.17		0.0021	J	0.79		7		2		23		3.5		0.49		3.5		0.73	J	2.1	
Benzo(a)pyrene	mg/kg	-	0.0028	J	3.2		0.49		3.7	J	1.4	J	0.94		0.98		0.2		0.0029	J	0.89		8.2		2.6		46		3.7		0.54		2.7		0.75	J	2.3	
Benzo(b)fluoranthene	mg/kg	-	0.0058	J	8.1		1.8		9.1	J	4.9	J	2		3.1		0.47		0.0049	J	2.3		23		6.8		100		13		1.2		4		1.6	J	6.4	
Benzo(g,h,i)perylene	mg/kg	-	0.0016	U	3.1		0.64		2.7	J	1.6	J	0.86		1.4		0.21		0.0029	J	0.84		8.1		2.7		44		4.5		0.52		1.9		0.61	J	2.2	
Benzo(k)fluoranthene	mg/kg	-	0.0022	U	3.8		0.58		3.2	J	1.7	J	0.56		0.92		0.13		0.0026	J	1.2		10		2.5		54		5.5		0.48		1.7		0.68	J	1.6	
Carbazole	mg/kg	-	0.0017	U	0.27		0.088		0.43		0.4		0.1		0.23		0.021		0.0017	U	0.097		1		0.29		2.6		0.38		0.075		0.94		0.072	J	0.15	
Chrysene	mg/kg	-	0.0032	J	4.6		0.81		6.2	J	2.3	J	1		1.2		0.25		0.0037	J	1.1		12		3.5		35		5		0.65		5.1		0.96	J	2.6	
Dibenz(a,h)anthracene	mg/kg	-	0.0017	U	1.1		0.2		0.88	J	0.48	J	0.2		0.3		0.057		0.0017	U	0.3		3.2		0.93		13		1.6		0.14		0.59		0.15	J	0.67	
Fluoranthene	mg/kg	-	0.0035	J	3.3		0.97		13	J	2.5	J	1.2		0.94		0.29		0.0042	J	1.1		14		3.1		25		4.5		0.76		9.4		1.1	J	3.3	
Fluorene	mg/kg	-	0.0015	U	0.15	J	0.025		0.18	J	0.062	J	0.017		0.017	J	0.0093		0.0015	U	0.027		0.3		0.082		0.83	J	0.062	J	0.011		0.35		0.02	J	0.061	J
Indeno(1,2,3-cd)pyrene	mg/kg	-	0.0027	J	3.6		0.69		3	J	1.7	J	0.87		1.4		0.19		0.0028	J	0.91		8.9		2.8		44		5		0.49		1.9		0.59	J	2.4	
Naphthalene	mg/kg	-	0.0015	U	0.48		0.085		0.1		0.097		0.018		0.029	J	0.015		0.0015	U	0.068		0.7		0.13		1.8		0.3		0.034		0.056		0.023		0.2	
Phenanthrene	mg/kg	-	0.002	U	0.58		0.17		2.7	J	0.32	J	0.14		0.098		0.051		0.0075	U	0.25		2.1		0.47		3.1		0.48		0.12		3.3		0.23	J	0.52	
Pyrene	mg/kg	-	0.0032	J	3.7		0.88		10	J	2.5	J	1.1		0.98		0.28		0.0046	J	1.3		13		3.8		43		5.6		0.96		8.9		1	J	3.6	
Total PAHs	mg/kg	100	0.0235		40.73		8.427		61.52		22.18		10.03		12.43		2.460		0.0344		11.65		**116.3**		33.20		**457.3**		54.88		6.685		45.48		8.814		29.20	
TPH	mg/kg	-	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		140	J	NA		NA		NA		110	U

Notes:
mg/kg - milligrams per kilogram
U - result not detected at reported concentration
J - estimated result
R - rejected result
NA - not analyzed
Total PAH values do not include rejected results

TABLE C-2
CONFIRMATION SOIL SAMPLING TPAH RESULTS – OCTOBER 2018
2018 INTERIM LANDFARMING SUMMARY REPORT
TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

Sample ID / Sample Date		EPA Screening	SO-TD-F10 10/15/2018		SO-TD-F11 10/15/2018		SO-TD-F11 DUP 10/15/2018		SO-TD-F12 10/15/2018		SO-TD-G5 10/15/2018		SO-TD-G9 10/15/2018		SO-TD-G10 10/15/2018	
chemical_name	units															
Acenaphthene	mg/kg	-	0.0024	J	0.33	J	0.56	J	0.046		0.0096	J	0.0068	U	0.0022	U
Acenaphthylene	mg/kg	-	0.019		5.2		7.1		0.83		0.015	J	0.018	J	0.0071	J
Anthracene	mg/kg	-	0.022		5.7		9.2		0.88		0.12		0.042		0.015	
Benzo(a)anthracene	mg/kg	-	0.037		15	J	42	J	2.6		0.93		0.25		0.12	
Benzo(a)pyrene	mg/kg	-	0.037		17	J	29	J	2.8		0.68		0.23		0.12	
Benzo(b)fluoranthene	mg/kg	-	0.1		37	J	78	J	6.7		1.1		0.33		0.17	
Benzo(g,h,i)perylene	mg/kg	-	0.059		17		24		2.6		0.39		0.2		0.11	
Benzo(k)fluoranthene	mg/kg	-	0.04		16	J	32	J	3		0.43		0.17		0.076	
Carbazole	mg/kg	-	0.0076	J	2		3.3		0.25		0.058		0.018	J	0.0074	J
Chrysene	mg/kg	-	0.054		24	J	51	J	3.1		0.89		0.27		0.13	
Dibenz(a,h)anthracene	mg/kg	-	0.015		5.3		7		0.87		0.1		0.056		0.025	
Fluoranthene	mg/kg	-	0.053		23	J	94	J	2.3		1.7		0.4		0.16	
Fluorene	mg/kg	-	0.003	J	0.55		0.8		0.092		0.012	J	0.0061	J	0.0028	J
Indeno(1,2,3-cd)pyrene	mg/kg	-	0.054		17		24		2.7		0.36		0.17		0.093	
Naphthalene	mg/kg	-	0.009		1.2	J	2.3	J	0.15		0.005	U	0.0076	J	0.0024	J
Phenanthrene	mg/kg	-	0.028		3.2	J	16	J	0.36		0.42		0.092		0.036	
Pyrene	mg/kg	-	0.047		27	J	89	J	3.4		1.4		0.33		0.15	
Total PAHs	mg/kg	100	0.5794		**214.5**		**506.0**		32.43		8.557		2.572		1.217	
TPH	mg/kg	-	NA		NA		NA		NA		NA		NA		NA	

Notes:
mg/kg - milligrams per kilogram
U - result not detected at reported concentration
J - estimated result
R - rejected result
NA - not analyzed
Total PAH values do not include rejected results

TABLE C-3
PERFORMANCE SOIL SAMPLING TPAH RESULTS – OCTOBER 2018
2018 INTERIM LANDFARMING SUMMARY REPORT
TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARKE SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

Sample ID / Sample Date		SS-4B 10/24/2018		SS-99 (DUP of SS-4B) 10/24/2018		SS-4E 10/24/2018		SS-4F 10/24/2018		SS-5A 10/24/2018		SS-5B 10/24/2018	
Chemical Name	**Units**												
Acenaphthene	ug/kg	590	J	290	J	470	J	320	J	290		890	
Acenaphthylene	ug/kg	6100		4100		9500		5800		2900		12000	
Anthracene	ug/kg	8200		5100		10000		5900		7000		19000	
Benzo[a]anthracene	ug/kg	15000		15000		17000		7800		8500		21000	
Benzo[a]pyrene	ug/kg	15000		12000		12000		8500		12000		26000	
Benzo[b]fluoranthene	ug/kg	23000		33000		29000		17000		31000		70000	
Benzo[g,h,i]perylene	ug/kg	16000		13000		17000		11000		11000		32000	
Benzo[k]fluoranthene	ug/kg	28000	J	13000	J	22000		12000		12000		29000	
Chrysene	ug/kg	25000		22000		25000		13000		15000		38000	
Dibenz(a,h)anthracene	ug/kg	4900		3600		5000		3200		3500		7400	
Fluoranthene	ug/kg	30000		30000		32000		13000		8600		20000	
Fluorene	ug/kg	820	J	490	J	1200		650		480		980	
Indeno[1,2,3-cd]pyrene	ug/kg	15000		12000		15000		8900		11000		30000	
Naphthalene	ug/kg	3400	J	1200	J	880		740		1300		4900	
Phenanthrene	ug/kg	7100		4900		4900		2200		1900		5100	
Pyrene	ug/kg	31000		32000		29000		12000		10000		27000	
Total PAHs		229110		201680		229950		122010		136470		343270	
Carbazole	ug/kg	1800		1100		2400		1500		810		2800	
pH	S. U.	8.3		8.4		8.2		8.3		8.2		8	
Total organic carbon	mg/kg	20000		24000		30000		35000		19000		41000	
Nitrite as N	mg/kg	0.49	U	0.46	U	0.49	U	0.53	U	0.46	U	0.51	U
Nitrate as N	mg/kg	2		2.3		1.2		0.47	U	4.5		7.5	
Phosphorous	mg/kg	120		150		160		160		130		300	
Phosphorous as PO4	mg/kg	350		450		480		480		400		920	
Culture Bacteria													
Actinomycetes	CFU/Unit	-		-		-		-		-		-	
Bacillus	CFU/Unit	200000	J	30000	J	-		-		400000		300000	
Gram negative rods	CFU/Unit	-		-		-		-		-		-	
Gram positive cocci	CFU/Unit	-		-		-		-		-		-	
Gram positive rods	CFU/Unit	400000	J	100000	J	500		400		800000		600000	
Heterotrophic Plate Count	CFU/gram	-		-		-		-		-		-	

Notes:
PAH = Polycyclic Aromatic Hydrocarbons
ug/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
S.U. = standard units
J = estimated result
HF - analyzed outside of hold time due to being a field parameter
CFU/Units = Colony Forming Units
- = not analyzed

TABLE C-4
2019 END OF SEASON SURFACE SOIL ANALYTICAL
RESULTS TERRACE AREA SURFACE SOIL
REMEDIATION
L.A. CLARK SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

	Sample ID	SS-10B	SS-2E	SS-2G	SS-3B	SS-4B	SS-4E	SS-4F	SS-4G	SS-5A	SS-5B	SS-7B
	Sample Date	10/28/2019	10/29/2019	10/29/2019	10/29/2019	10/29/2019	10/28/2019	10/28/2019	10/29/2019	10/29/2019	10/29/2019	10/29/2019
Chemical Name	**Units**											
Acenaphthene	ug/kg	310	530	230	220	460	370 J	340	760	450	560	300
Acenaphthylene	ug/kg	4600	4200	3900	3300	7000	7600	7600	9200	5400	8200	4600
Anthracene	ug/kg	6600	5900	6000	5100	8900	27000	9600	12000	30000	12000	6200
Benzo(a)anthracene	ug/kg	32000	19000	9500	12000	21000	38000	35000	42000	18000	17000	19000
Benzo(a)pyrene	ug/kg	18000	14000	12000	10000	18000	25000	21000	30000	18000	21000	20000
Benzo(b)fluoranthene	ug/kg	37000	38000	29000	29000	44000	60000	40000	74000	55000	51000	56000
Benzo(g,h,i)perylene	ug/kg	14000	12000	17000	12000	22000	21000	19000	31000	25000	26000	16000
Benzo(k)fluoranthene	ug/kg	17000	12000	9600	7400	15000	19000	17000	25000	17000	19000	18000
Chrysene	ug/kg	40000	33000	18000	18000	29000	60000	43000	55000	31000	24000	29000
Dibenz(a,h)anthracene	ug/kg	4400	4000	4100	3400	6100	6400	5700	9600	6400	8300	5700
Fluoranthene	ug/kg	70000	93000	9400	14000	28000	110000	76000	67000	27000	17000	25000
Fluorene	ug/kg	870	630	440	430	750	880	840	1400	3400	930	430
Indeno(1,2,3-cd)pyrene	ug/kg	13000	14000	15000	11000	19000	20000	19000	31000	21000	26000	19000
Naphthalene	ug/kg	730	820	780	1600	1500	1200	1200	2200	1900	3000	1000
Phenanthrene	ug/kg	4400	11000	1800	2400	4300	6400	12000	5200	8500	2900	3400
Pyrene	ug/kg	67000	62000	13000	18000	38000	110000	65000	83000	29000	24000	40000
TPAH	ug/kg	329910	324080	149750	147850	263010	512850	372280	478360	297050	260890	263630

Notes:
PAH = Polycyclic Aromatic Hydrocarbons
ug/kg = micrograms per kilogram
J = estimated result

TABLE C-4
2019 END OF SEASON SURFACE SOIL ANALYTICAL RESULTS TERRACE AREA SURFACE SOIL REMEDIATION
L.A. CLARK SUPERFUND SITE
SPOTSYLVANIA COUNTY, VIRGINIA

	Sample ID	SS-7C		SS-7C Dup		SS-8C	
	Sample Date	10/29/2019		10/29/2019		10/28/2019	
Chemical Name	**Units**						
Acenaphthene	ug/kg	340		400		350	
Acenaphthylene	ug/kg	3300		5100		6700	
Anthracene	ug/kg	4000	J	7200	J	6900	
Benzo(a)anthracene	ug/kg	16000		19000		21000	
Benzo(a)pyrene	ug/kg	17000		19000		18000	
Benzo(b)fluoranthene	ug/kg	48000		64000		47000	
Benzo(g,h,i)perylene	ug/kg	18000		19000		19000	
Benzo(k)fluoranthene	ug/kg	21000		19000		16000	
Chrysene	ug/kg	26000		30000		32000	
Dibenz(a,h)anthracene	ug/kg	6000		5500		5700	
Fluoranthene	ug/kg	29000		33000		29000	
Fluorene	ug/kg	450		620		740	
Indeno(1,2,3-cd)pyrene	ug/kg	20000		18000		18000	
Naphthalene	ug/kg	940		970		1400	
Phenanthrene	ug/kg	6800		6700		3200	
Pyrene	ug/kg	29000		35000		36000	
TPAH	ug/kg	245830		282490		260990	

Notes:
PAH = Polycyclic Aromatic Hydrocarbons
ug/kg = micrograms per kilogram
J = estimated result

APPENDIX D – PRESS NOTICE

EPA PUBLIC NOTICE

EPA REVIEWS CLEANUP
LA CLARKE AND SON SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) is reviewing the cleanup that was conducted at the L.A. Clarke and Son Superfund Site located in Spotsylvania, Virginia. EPA inspects sites every five years to ensure that cleanups conducted protect public health and the environment. EPA's 2015 review of the site concluded that the remedy was working as designed and is currently protective. Findings from the current five-year review will be available in September 2020.

To access detailed site information, including the five-year review report once finalized, visit: https://www.epa.gov/superfund/laclarke

For questions or to provide site-related information for the review, contact:
Alex Mandell, EPA Community Involvement Coordinator
215-814-5517 or mandell.alexander@epa.gov

APPENDIX E – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: L.A. Clarke and Son	**Date of Inspection:** 11/11/2019
Location and Region: Spotsylvania County, VA, Region 3	**EPA ID:** VAD007972482
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** 45 and overcast

Remedy Includes: (check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: In-situ soil remediation and landfarming
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** _____ Name _____ Title _____ Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems, suggestions ☐ Report attached: _____

2. **O&M Staff** _____ Name _____ Title _____ Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

   Agency _____
   Contact _____ Name _____ Title _____ Date _____ Phone No.
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____Name _____ Title _____ Date _____ Phone No.
   Problems/suggestions ☐ Report attached:_____

   Agency _____
   Contact _____ Name _____ Title _____ Date _____ Phone No.
   Problems/suggestions ☐ Report attached:_____

   Agency _____
   Contact _____ Name _____ Title _____ Date _____ Phone No.
   Problems/suggestions ☐ Report attached: _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone No.
Problems/suggestions ☐ Report attached: _____

4. **Other Interviews** (optional) ☐ Report attached: _____

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

2.	**Site-Specific Health and Safety Plan**	☐ Readily available	☐ Up to date	☒ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
3.	**O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Groundwater Monitoring Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: The fence only partially surrounds the Site.

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (e.g., self-reporting, drive by): _____

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ _____ _____

Name Title Date Phone no.

Reporting is up to date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A

Remarks: Institutional controls are needed to restrict land uses based on current soil contaminant levels and proposed final cleanup goals.

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☐ Settlement not evident

Arial extent: _____ Depth: _____

Remarks: _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident

Lengths: _____ Widths: _____ Depths: _____

Remarks: _____

3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable ☐ N/A	
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
C. Letdown Channels		☐ Applicable ☐ N/A	
	(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement
Arial extent: _____ Depth: _____
Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type:_____ Arial extent: _____
Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Arial extent: _____ Depth: _____
Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Arial extent: _____ Depth: _____
Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions
☐ Location shown on site map Arial extent: _____
Size: _____
Remarks: _____

6. **Excessive Vegetative Growth** Type: _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Arial extent: _____
Remarks: _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

4. **Extraction Wells Leachate**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A

☐ Siltation not evident

Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____

☐ Erosion not evident

Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☐ Functioning ☐ N/A

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps and Electrical**

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☐ Is routinely submitted on time ☐ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The OU4 soil remedy has been implemented with EPA oversight as per the 2015 ESD and the 2018 RD/RA Work Plan.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

There are no operating facilities at the Site. Current O&M activities are adequate and include OU4 RD/RA Work Plan monitoring and site inspections to monitor for trespassing and damage.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None noted

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None noted.

APPENDIX F – SITE INSPECTION PHOTOS

Fencing and signage at entrance on east side of the Site

Soil landfarming area in terrace area

Edge of landfarming area in upper terrace

Landfarming in upper terrace

Fence and signage at western side of the Site