FOURTH FIVE-YEAR REVIEW REPORT FOR POTTER'S SEPTIC TANK SERVICE PITS SUPERFUND SITE BRUNSWICK COUNTY, NORTH CAROLINA

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Prepared by

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8/16/17

Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FYR	Five-Year Review
HQ	Hazard Quotient
IC	Institutional Control
J	Estimated value
LTTD	Low-Temperature Thermal Desorption
µg/L	Micrograms per Liter
mg/kg	Milligram per Kilogram or Parts per Million
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
MSL	Mean Sea Level
MW	Monitoring Well
NC 2L	North Carolina Groundwater Standard
NCDEQ	North Carolina Department of Environmental Quality
NCP	National Contingency Plan
ND	Not detected above the practical quantitation limit
NPL	National Priorities List
O	Other qualifiers, provided from the laboratory to explain qualifier
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
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
TCLP	Toxicity Characteristic Leaching Procedure
UU/UE	Unlimited Use and Unrestricted Exposure
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

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 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 the EPA policy.

This is the fourth FYR for the Potter's Septic Tank Service Pits 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 or pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit (OU), which will be addressed in this FYR. OU1 addresses the soil and groundwater remedies at the Site.

The EPA remedial project manager (RPM) Beverly Stepter led the FYR. Participants included the EPA Community Involvement Coordinator L'Tonya Spencer, North Carolina Department of Environmental Quality (NCDEQ) representative Nile Testerman, and the EPA contractor support staff Sarah Alfano and Amanda Goyne from Skeo. The review began on 11/29/2016.

Site Background

The Site is located in a residential community known as Sandy Creek, in a rural section of Brunswick County, North Carolina, about 1 mile west of Maco, North Carolina. The Site is immediately south of U.S. Highway 74/76, and is divided into three lots. From 1969 to 1976, a local family owned the property and operated sludge hauling and oil spill cleanup companies in the Wilmington, North Carolina area. Septic tank sludge, oil sludge and other waste materials were deposited in shallow unlined pits or directly on the land surface at the Site. There are no records of the exact materials disposed of in the pits or on the land surface. Between 1980 and 1983, the property around the Site changed ownership and was developed and subdivided into 1- and 2-acre residential lots. The development became known as Sandy Creek Acres, and later as Sandy Creek, North Carolina.

The current and anticipated future land use for the surrounding area is residential. The land immediately northeast, north, west and south of the Site is forested. The Site consists of into three privately-owned lots that are 1 to 2 acres each, totaling about 5.3 acres. No homes or domestic wells are on these three lots. A fenced utility substation occupies about 30 feet by 30 feet immediately north of Joe Baldwin Drive on the Site.

Drainage from the Site is northeast toward Chinnis Branch, which eventually flows into Rattlesnake Branch. The Site is located on a groundwater divide. According to the 2000 Record of Decision (ROD) Amendment, groundwater at the Site is designated as Class GA, an existing or potential source of

drinking water supply for humans and Class IIB, because the aquifer is of drinking water quality but is not currently used as a source of drinking water. An intermittent clay layer about 30 to 40 feet deep divides the shallow groundwater aquifer from the deeper aquifer in the area. The groundwater beneath the clay layer is assumed to be interconnected with the Castle Hayne Limestone formation. This groundwater is classified as MA, because it is currently used as a drinking water source. The Castle Hayne is a major drinking water source for Brunswick County, North Carolina. Soils in the area are classified as Baymeade fine sand and Foreston loamy fine sand types that overlay a limestone or calcareous sandstone formation. For more site information, see Appendices A-D.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Potter's Septic Tank Service Pits		
EPA ID: NCD981023260		
Region: 4	**State:** North Carolina	**City/County:** Sandy Creek/Brunswick

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

REVIEW STATUS
Lead agency: EPA
Author name: Beverly Stepter (EPA) and Sarah Alfano (Skeo)
Author affiliation: EPA and Skeo
Review period: 11/29/2016 - 7/25/2017
Date of site inspection: 1/26/2017
Type of review: Statutory
Review number: 4
Triggering action date: 9/25/2012
Due date *(five years after triggering action date)*: 9/25/2017

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In August 1976, about 20,000 gallons of oil escaped from an unlined pit on site and flowed into Chinnis Branch, which then migrated to Rattlesnake Creek. After the spill, the U.S. Coast Guard pumped and hauled the remaining 20,000 gallons of oil off site. Contaminated soil was excavated and disposed of off-site or mixed with sand and buried on site.

In September 1983, the EPA and the Region 4 Field Investigation Team performed an electromagnetic survey of the Site, monitored the air under the home of the on-site property owner, and collected soil, surface water, and groundwater samples for laboratory analysis. In February 1984, the EPA used ground-penetrating radar to further delineate the boundaries of contamination which was removed via immediate removal action in March of that year (see Response Actions section below for details).

The EPA conducted a preliminary assessment of the Site in September 1987. The preliminary assessment revealed soil and groundwater contamination at the Site. The EPA proposed the Site for inclusion on the National Priorities List (NPL) in June 1986, and finalized the Site on the NPL in March 1989.

The EPA conducted a remedial investigations (RIs) in 1989 and 1990 to explore contamination in area soil, groundwater, Chinnis Branch surface water and stream sediment. Investigations determined that only remediation of the soil and groundwater was necessary to protect human health and the environment based on a residential land use scenario. A feasibility study (FS) was issued to the public in April 1992.

Response Actions

Because there was no willing potentially responsible party (PRP) when cleanup needed to be conducted, the EPA initially used federal funds for site cleanup activities. Later, in 2002, under a legal agreement with the EPA, the Site's PRPs settled. Currently, at this EPA fund-lead site, NCDEQ is overseeing operation and maintenance.

In March 1984, the EPA's Emergency Response and Removal Branch mobilized to the Site and removed about 1,770 tons of contaminated soil, disposing of it off site. In May 1984, the EPA installed nine monitoring wells. Some groundwater samples contained relatively high concentrations of petroleum compounds that included benzene, toluene, ethylbenzene and xylene (BTEX).

Based on RIs in 1989 and 1990, and the FS released in April 1992, the EPA selected its sitewide remedy in an August 1992 ROD. As stated in the 1992 ROD, the remedial action objectives (RAOs) for cleanup of the Site are:

- To excavate and treat soils that pose a threat to human health and groundwater.
- To restore contaminated groundwater to levels protective of human health and the environment.
- To control exposure and to control migration of contaminated groundwater.

The current soil remedy, as selected by the 1992 ROD and modified by the 1996 Explanation of Significant Differences (ESD) and the 2000 ROD amendment, is:

- Relocation of one resident.
- Excavation of all soils exceeding the soil cleanup standards.
- Treatment of contaminated soil using on-site ex-situ thermal desorption process.
- Secondary treatment of the concentrated organic contaminants.
- Sampling and analysis of the treatment residue.
- Proper transportation and storage of Resource Conservation and Recovery Act (RCRA) hazardous wastes.
- On-site disposal of the non-hazardous treated soil in the original excavated areas, backfilling with soil to grade and revegetating with native grasses.
- On-site solidification of soils containing levels of chromium, lead and zinc above cleanup standards for off-site disposal.
- Specific institutional controls to restrict the use of and access to site soils, including limits on any below-ground construction more than 25 feet deep, prohibit installation of potable wells as well as prohibiting alteration, disturbance or removal of the existing soil, landscape and contours other than erosion control measures unless approved.

Table 1 shows the soil remediation goals for soil contaminants of concern (COC) as specified in the decision documents. The protection of groundwater is the basis for the cleanup standards, except for zinc and carcinogenic polycyclic aromatic hydrocarbons (PAHs). Zinc and carcinogenic PAH cleanup standards are based on direct contact with the surface soil.

Table 1: Soil Remediation Goals

COC	Soil Remediation Goal (mg/kg)
Benzene	0.01
Toluene	3.4
Ethylbenzene	0.235
Xylenes	3.5
Naphthalene	1.8
Carcinogenic PAHs[a]	0.011
Lead	400[b]
Chromium	97.2
Zinc[a]	122

[a] Standards required the top 1 foot of soil only because cleanup standards are based on direct contact with the surface soil.

[b] The 1996 ESD changed the cleanup goal from 25 mg/kg to 400 mg/kg, which is a residential-based value demonstrated to also be protective of groundwater.

mg/kg = milligrams per kilogram

The final groundwater remedy, as designated by the 1992 ROD and modified by the 1996 ESD and the 2000 ROD amendment, is:

- Groundwater monitoring program to monitor volatile organic compound (VOC) concentrations and migration.

- Periodic sampling and analysis of groundwater to determine if contaminants have degraded or migrated.
- Installation of seven deep and five shallow zone monitoring wells to aid in monitoring efforts.
- Implementation of institutional controls via deed recordation and restrictions on use of specific areas overlying impacted groundwater. These include restrictions on the use of any surface or underground water located within the open space area for swimming, irrigation, or as a source of potable water,

Table 2 documents the groundwater cleanup goals for the final groundwater remedy. All cleanup standards are either North Carolina Groundwater Standards (those in place at the time of the remedy decision) or other health-based levels.

Table 2: Groundwater Remediation Goals

COC	Groundwater Remediation Goal (µg/L)	Rationale for Cleanup Level
Benzene	1[a]	NC 2L[e]
Ethylbenzene	29[b]	NC 2L
Naphthalene	21[c]	NC 2L
1,2,4-Trimethylbenzene	60[c]	Risk Calculation[f]
1,3,5-Trimethylbenzene	60[c]	Risk Calculation[f]
Toluene	1,000[b]	NC 2L
Xylenes	400[b]	NC 2L
1,4-Dioxane	3[d]	NC 2L
Chromium	50[b]	NC 2L
Lead	15[b]	NC 2L

[a] In 1994, the EPA updated the previously selected remediation goal for benzene in the 1992 ROD to 1 µg/L in an ESD.
[b] As designated in the 1992 ROD.
[c] As designated in the 2000 ROD Amendment.
[d] In August 2011, the EPA issued an internal memorandum to file stating that 1,4-dioxane would also be considered a COC for the Site. This contaminant did not have a ROD cleanup standard but had been detected in groundwater at the Site since at least 2007.
[e] North Carolina Administrative Code, Title 15A. Subchapter 2L, Classifications and Water Quality Standards Applicable to the Groundwater of North Carolina (NC 2L), applied during 1994 ESD.
[f] These remediation goals are based on the human health risk calculations as stated in the Supplemental Evaluation of Natural Attenuation at the Potter's Pits Site, September 2000.

Status of Implementation

In 1993, the EPA initiated the remedial design efforts to implement the source and groundwater remediation requirements of the 1992 ROD. As required by the ROD, the source remediation design included excavation of soils having contaminant concentrations above the cleanup levels, treatment of soils by low-temperature thermal desorption (LTTD), stabilization of high concentration inorganic soils, and placement of the treated soil on site in accordance with regulation and engineering guidelines.

The on-site resident was relocated before soil remediation began. Then, in June 1995, the EPA began on-site treatment of soils at the Site. As required by the ROD, contaminated soil was treated on site by LTTD to remove the volatile contaminants. Following the LTTD treatment, sampling and analysis of each day's production determined whether concentrations of COCs met Toxicity Characteristic

Leaching Procedure (TCLP) regulatory limits. During this time, the EPA determined that subsurface excavation any deeper than 14 feet below surface level (38 feet below mean sea level MSL) on the corner of Joe Baldwin and Hickory Drives was technologically infeasible due to water intrusion. For that same reason, the EPA and the state determined the area would be undevelopable in the future and that any contamination deeper than 38 feet below MSL in the area would naturally attenuate due to water intrusion and groundwater flow. By April 1996, all on-site soil with contaminant concentrations above the cleanup goals, except for soils below 38 feet below MSL (saturated zone) near the road corners, were excavated.

The EPA excavated and treated, as needed, about 32,000 cubic yards of soil from two areas north and south of Joe Baldwin Drive (see Figure 1). Excavation backfill consisted of treated soil that met the ROD-specified cleanup goals. The ROD required that treated soil with carcinogenic PAH concentrations above detection levels and zinc above the cleanup goal be placed below the top 1 foot of backfill. However, any excavated material used as backfill either met the cleanup standards or was treated until it met cleanup standards for all COCs. There was one remaining area, in the area of water intrusion, where the performance standards for the source remediation project were not met. This area was left undisturbed as directed by the EPA. Any residual benzene mass is expected to transfer from the soil to groundwater over time.

By June 1996, backfilling of the treated material was completed. About 4,000 cubic yards of clean soil was imported for the final grading. The Site was seeded and mulched.

In June 2000, the EPA released the Evaluation of Monitored Natural Attenuation at the Potter's Pits Site, which considered the effects of the soil remedial action on contaminant migration in the groundwater and natural attenuation. The evaluation supported that inorganic contaminants found in earlier investigations (lead and chromium) should not have been considered as COCs. Concentrations of lead and chromium in some groundwater samples obtained before 1998 were above drinking water MCLs. As stated in the 2000 Evaluation of Monitored Natural Attenuation at the Potter's Pits Site, groundwater samples collected in 1998 (May and December), using low-flow purging and sampling techniques, showed maximum concentrations of lead and chromium at 10 µg/L and 15 µg/L respectively. The EPA concluded that the earlier sampling data were not representative of true concentrations of mobile metals in groundwater, and discontinued sampling for lead and chromium.

In September 2000, the EPA issued a Feasibility Study Addendum, adding the evaluation of monitored natural attenuation as a potential remedy. The revised groundwater remedy was documented in the September 2000 ROD Amendment. The ROD Amendment anticipated that the amended remedy would achieve cleanup goals for benzene, ethylbenzene and naphthalene in less than four years; for 1,2,4-trimethylbenzene in about five years for areas north of Joe Baldwin Drive; and for 1,2,4-trimethylbenzene less than 15 years for areas south of Joe Baldwin Drive. The EPA initiated the Groundwater Monitoring Program in 2002, which consisted of quarterly groundwater sampling for four consecutive events (March 2002, June 2002, November 2002 and March 2003). In August 2011, the EPA issued an internal memorandum to the file stating that 1,4-dioxane would also be considered a COC for the Site. This contaminant did not have a ROD cleanup standard but had been detected in groundwater at the Site since at least 2007. 1,4-Dioxane has a NC 2L groundwater quality standard of 3 µg/L. Since 2007, 1,4-dioxane has been detected above applicable standards in MW-406 at concentrations ranging from 15 µg/L to 33 µg/L. Minor levels of 1,4-dioxane have also been historically detected in wells MW-303 and MW-401 at concentrations below the applicable standard. The Site's

current and approved Operation & Maintenance (O&M) plan requires sampling groundwater for 1,4-dioxane every five years, but the contaminant has not been officially added as a COC.

Institutional Control (IC) Review

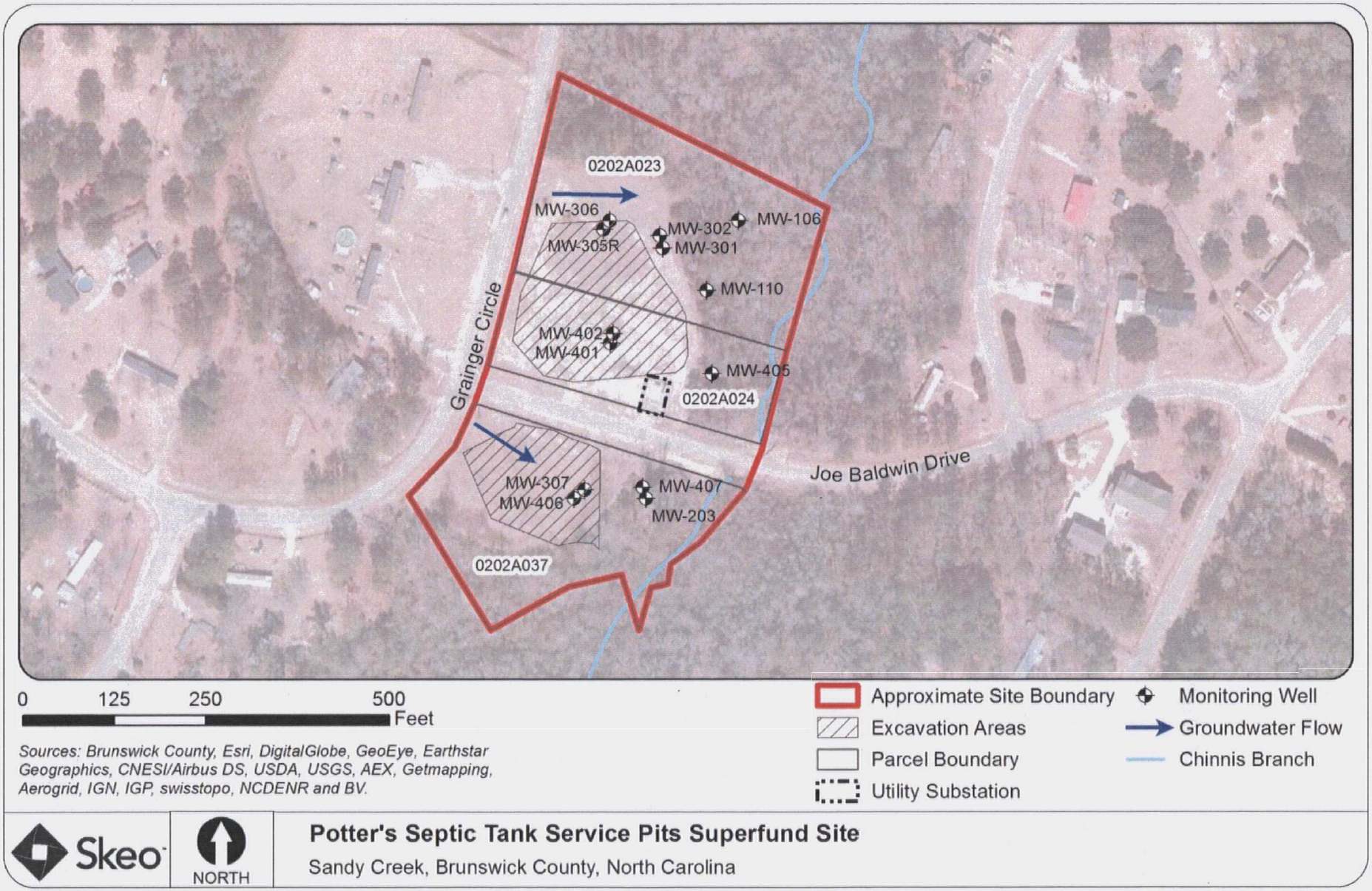
Both the 1992 ROD and the 2000 ROD Amendment require institutional controls to limit groundwater use and soil excavation until remediation is complete with cleanup goals attained. The requirements for institutional controls to restrict groundwater use are met by County Ordinance Article 1, Section 1-13-1, see Table 3, which closely regulates and restricts well installation and use where access to a municipal water supply exists. The closest active residential properties are upgradient of the Site (see Figure 1). All residences in the immediate area of the Site have access to municipal water.[1] There are no current means of exposure to contaminated groundwater or planned reuse at the Site. Institutional controls related to soil disturbance at the Site were not required following remedial efforts because cleanup achieved remedial goals. Remediation cleaned up soils to residential standards except near the corner of Joe Baldwin and Hickory Drives, where groundwater intrusion prohibited further excavation. No specific institutional controls are required for the area affected by groundwater intrusion as future excavation and reuse would be inhibited by the groundwater intrusion. A toxicity review of soil cleanup levels is in Appendix I for reference.

Table 3: Summary of Planned and/or Implemented 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)
Groundwater	Yes	Yes, until cleanup goals are met	0202A023, 0202A024 and 0202A037	Reduce the risk posed by site conditions by restricting access to the groundwater and by preventing future groundwater use that would allow repeated, frequent contact with it prior to achieving remedial goal levels. Restrictions should remain in place until data indicate that there is no further risk. Any surface or underground water located within open space area shall not be used for swimming, irrigation or as a source of potable water.	County Ordinance Article 1, Section 1-13-1
Soil	No	Yes, until cleanup goals are met	0202A023, 0202A024 and 0202A037	Institutional controls related to soil disturbance at the site were not required following remedial efforts because cleanup achieved remedial goals.	None
*As outlined in the 2000 ROD Amendment.					

[1] County Ordinance Article 1, Section 1-13-1 can be found here: https://www.municode.com/library/nc/brunswick_county/codes/code_of_ordinances?nodeId=PTICOOR_CH1-13WAWASU_ARTIINGE_S1-13-1MACO.

Figure 1: 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 the EPA's response actions at the Site.

Systems Operations/Operation & Maintenance (O&M)

The state and its contractors use the most recent version of the approved O&M manual (updated last in October 2013) for groundwater remediation. There is no ongoing O&M for the soil remedy. Ongoing O&M for the groundwater remedy consists primarily of groundwater monitoring. One recommendation in the 2012 FYR was to reduce the analyte list to benzene and 1,4-dioxane, because these are the only contaminants above their remediation goal or NC 2L drinking water standard. The EPA implemented this recommendation in the February 2013 sampling event. The 2012 FYR also recommended reducing the sampling frequency to annually and abandoning several site monitoring wells (an artesian well, MW-102, MW-202, MW-206, MW-303, MW-304, MW-410, MW-411 and MW-412). NCDEQ abandoned these wells between February and May 2013. After the February 2013 sampling event, the EPA granted permission to conduct groundwater sampling for VOCs (plus naphthalene) annually, with analysis of 1,4-dioxane every five years.

Table 4: O&M Costs over the FYR Period

Date Range	Total Cost *(rounded to the nearest $1,000)**
Jan - Dec 2012	$6,000
Jan - Dec 2013	$4,000
Jan - Dec 2014	$6,000
Jan - Dec 2015	$7,000
Jan - Dec 2016	$6,000
* NCDEQ O&M costs plus the EPA O&M costs.	

Annual O&M costs are stable and are consistent with the monitoring requirements at the Site over the last five years. The costs do not indicate any pending or current issues with the remedy.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the 2012 FYR as well as the recommendations from the 2012 FYR and the current status of those recommendations.

Table 5: Protectiveness Determination/Statement from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Short-term Protective	The remedy at the site currently protects human health and the environment in the short term because most of the soil contamination was remediated through source removal of the contaminated soils. It appears that natural attenuation of groundwater is performing as anticipated and that clean-up levels will eventually be attained. The remedy at the Site currently protects human health and the environment because the main source of contamination was remediated through source removal and no human or ecological exposure pathways exist to contaminated groundwater or soil in the short term. However, in order for the remedy to be protective in the long-term and for the completion of the requirements necessary to close out the remedy, the following action needs to be taken: Implement restrictive covenants or other appropriate institutional controls at the Site.

Table 6: Status of Recommendations from the 2012 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date
Sitewide	Institutional controls for soil and groundwater have not been fully implemented.	Institutional controls need to be fully implemented on two parcels of property at the Site.	Completed	Institutional controls have been fully implemented.	Institutional controls related to soil are not required and institutional controls related to groundwater were implemented previously through County Ordinance Article 1, Section 1-13-1. Ordinance accessed April 27, 2017.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by newspaper posting, in the Star News on Sunday, May 28, 2017, stating that there was a FYR and inviting the public to submit any comments to the EPA (Appendix F). The results of the review and the report will be made available at the Site's information repository, located at Leland Public Library, located at 487 Village Road, Leland, North Carolina 28451.

During the FYR process, an interview was conducted to document any perceived problems or successes with the remedy that has been implemented to date. An interview with NCDEQ's project manager was conducted via email after the site inspection. Overall the interviewee felt the remedy in place was functional and effective, but that institutional controls were an outstanding issue. During the FYR process, the EPA site team identified the local ordinance in place that satisfies the institutional control requirements for groundwater. The complete interview is included in Appendix J.

Data Review

This data review summarizes analytical data from groundwater samples collected in February 2013, January 2015 and March 2016. The data review focuses on benzene and 1,4-dioxane concentrations because leading up to the 2012 FYR, these were the only COCs detected above their remedial goal or NC 2L drinking water standard (Table 7).

In February 2013, samples from 21 monitoring wells were analyzed for COCs. Benzene was the only COC above its remedial goal (1 µg/L) during the sampling event. This one benzene exceedance (1.2 µg/L) occurred in MW-407; all other benzene concentrations were below the remedial goal. 1,4-Dioxane was not detected in February 2013. This is in contrast to August 2012, when four wells contained 1,4-dioxane concentrations above the NC 2L standard.

After the State assumed responsibility for O&M, the first sampling event NCDEQ conducted was in January 2015. The event sampled 15 monitoring wells for VOCs and 1,4-dioxane. No COCs were detected above remedial goals and 1,4-dioxane was not detected. According to the June 2015 Monitored

Natural Attenuation Operation & Maintenance Monitoring Well Sampling Report, no concentration trends were evident for most COCs.

The March 2016 annual sampling included 15 monitoring wells. No COCs were detected above remedial goals. Only one of the 15 monitoring wells (MW-401) contained a detectable concentration of a COC (xylenes); however, detected xylene levels in MW-401 were below the remedial goal. 1,4-dioxane was not detected. According to the May 2016 Monitored Natural Attenuation Operation & Maintenance Monitoring Well Sampling Report, analytical data from March 2016 indicated a downward trend of detected contaminants and observed concentrations for most COCs.

Table 7: Groundwater Sampling Results for Primary Analytes 1,4-Dioxane and Benzene[2]

COC	Groundwater Remediation Goal (µg/L)	2013			2015			2016		
		MW-403	MW-406	MW-407	MW-403	MW-406	MW-407	MW-403	MW-406	MW-407
Benzene	1.0[a]	0.88	0.43 J,O	**1.2**	0.61	ND	0.79	ND	ND	ND
1, 4-Dioxane	3.0[b]	ND	ND	ND	ND	ND	ND	ND	ND	ND

[a] In 1994, the EPA updated the previously selected remediation goal for benzene in the 1992 ROD to 1 µg/L in an ESD.
[b] In August 2011, the EPA issued an internal memorandum stating that 1,4-dioxane should also be a COC for the Site. This contaminant did not have a ROD cleanup standard but had been detected in groundwater at the Site since at least 2007.
Bold = exceeds cleanup goal
J = Estimated value
O = Other qualifiers, provided from the laboratory to explain qualifier
ND = Not detected above the practical quantitation limit

Site Inspection

The site inspection was conducted and the participant are as follows: Beverly Hudson-Stepter, L'Tonya Spencer, EPA; Nile Testerman and Beth Hartzell, NCDEQ; and Sarah Alfano and Amanda Goyne, Skeo. The completed site inspection checklist is available in Appendix E and site inspection photographs in Appendix G. The purpose of the inspection was to assess the protectiveness of the remedy.

The Site is fully vegetated; there is a young pine forest on the property south of Joe Baldwin Drive and a mix of cleared and forested areas north of Joe Baldwin Drive. Monitoring wells are dispersed both north and south of Joe Baldwin Drive. NCDEQ properly abandoned monitoring wells upgradient and west of Grainger Circle since the previous FYR. One monitoring well series east of the Chinnis Branch has also been properly abandoned since the previous FYR. Site inspection participants walked around the Site to inspect wells. All wells were located and appeared to be in good condition though one monitoring well, (MW-302) appeared to be unlocked. Participants also noted the historic artesian well. Participants observed the residential properties surrounding the Site and did not note any signs of vandalism on site property. Participants noted the utility substation in place on the Site, off Joe Baldwin Drive; site inspection participants noted that the facility appeared new.

[2] In 2013, the EPA and NCDEQ reduced the analyte list VOCs, with benzene and 1,4-dioxane being the primary contaminants persistently above the site cleanup goals. Monitoring wells shown in table had detectable levels of these contaminants in the last five years.

V. TECHNICAL ASSESSMENT

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

Question A Summary:

Yes. The review of documents and the site inspection indicate that implemented remedial components are functioning as intended by the Site's decision documents. The soil remedial action consisted of excavation and on-site treatment of contaminated soils. All excavated material either met the cleanup standards or was treated until it met cleanup standards and then used as backfill. Long-term monitoring of groundwater shows that MNA is occurring as required by the remedy; no groundwater COCs exceeded cleanup goals in 2015 or 2016 sampling events.

The Site is vegetated. The monitoring well system appears to be well maintained. Groundwater monitoring data are routinely submitted. Groundwater contaminant concentrations are low and have been declining over the last five years. Although contaminants have been detected in the furthest downgradient wells, concentrations remain low and the area is hydraulically contained by Chinnis Branch to the east and south. Chinnis Branch acts as a barrier between the Site and downgradient residential properties. If monitoring wells continue to show that COCs do not exceed cleanup levels, it may be appropriate to abandon the monitoring wells.

The remedy requires implementation of institutional controls to limit groundwater use and site soils until cleanup goals are met. There is a local ordinance, County Ordinance Article 1, Section 1-13-1, in place to restrict groundwater use. Groundwater sampling has not shown any COC concentrations over cleanup goals since a single exceedance for benzene in 2013. Except for the utilities substation, the Site is not in use. The groundwater is not used in the area; as local residents all have access to municipal water for potable purposes. There are no known completed exposure pathways.

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

Question B Summary:

Yes. The groundwater cleanup goals established in the 1992 ROD and 2000 ROD Amendment were based on state drinking water standard NC 2L for most COCs. NC 2L standards have become more stringent for toluene, naphthalene and chromium. Current monitoring results indicate that toluene and naphthalene concentrations have been below the more stringent levels for the last five years. Though remedial investigations at the Site showed that chromium was decreasing over time to concentrations below the ROD-specified cleanup goals and that further sampling was not necessary, the contaminant was not removed as a COC by a decision document. Because historical chromium concentrations exceeded the current NC 2L of 10 µg/L (15 µg/L in 1998), the EPA may consider whether the new state standard should be applied as the cleanup goal and whether chromium should be included in monitoring efforts to evaluate current concentrations compared to current NC 2L standards.

Based on the screening-level risk evaluation of the health-based cleanup goals, the cleanup goals for the groundwater COCs remain valid (Appendix I).

According to the 2002 FYR, soil contamination data have not been collected since completion of the soil remedial action.

The Site's RAOs and exposure assumptions remain valid. Although there are no enclosed buildings located anywhere on the Site, a residential risk-based screening-level vapor intrusion evaluation was conducted to determine if a potential exposure pathway could exist if a building were to be built on site in the future. The maximum concentrations of VOC COCs detected between 2012 and 2016 were entered into EPA's Vapor Intrusion Screening Level (VISL) calculator for this screening level risk-based analysis (Appendix I). The screening-level analysis demonstrates that the maximum concentrations detected during this FYR period resulted in potential cancer risks well within or below the EPA's risk management range of 1×10^{-4} to 1×10^{-6} and below the EPA's noncancer threshold hazard quotient of 1.0. Further, most wells sampled were below detection or near detection limits, suggesting residual VOC concentrations in groundwater are localized. This information indicates that the vapor intrusion exposure pathway would not pose any health concerns if a building was constructed on site.

The residential-based soil performance standards established in the 1992 ROD remain valid for soils meeting cleanup goals based on a residential screening level risk evaluation (Appendix I) because the ROD cleanup goal equates to a residential cancer risk below the lower bound of the EPA's risk management range of 1×10^{-4} to 1×10^{-6} and below the noncancer hazard quotient of 1.0.

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

No. No additional information, other than the information discussed above, has come to light that calls into question the current protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

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

OTHER FINDINGS

The following additional recommendations were identified during the FYR. They may provide better access to publicly available site information and improve site security. They do not affect current and/or future protectiveness:

- NCDEQ should address the on-site well, MW-302, found unlocked during the site inspection.
- EPA should determine whether the revised state groundwater standards for chromium should be adopted as the new cleanup goal and evaluate the existing groundwater remedy.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Protective
Protectiveness Statement: The sitewide remedy is protective of human health and the environment because all accessible soil above remediation goals has been removed or treated in accordance with remedial requirements, monitored natural attenuation of the groundwater has begun, and remedial activities have addressed any potential exposure pathways that could result in unacceptable risks.

VIII. NEXT REVIEW

The next FYR Report for the Potter's Septic Tank Service Pits Superfund site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Classifications and Water Quality Standards Applicable to the Groundwater of North Carolina. North Carolina Administrative Code, Title 15A Subchapter 2l. DENRDWQ January 2010.

Closeout Report for the Source Remediation of the Potter's Septic Tank Service Pits, Sandy Creek, North Carolina. Bechtel Environmental, Inc. August 1998.

Draft Remedial Action Report, Potter's Septic Tank Service Pits Site, Sandy Creek, North Carolina. Black & Veatch. September 2003.

Evaluation of Monitored Natural Attenuation at the Potter's Pits Site, Sandy Creek, North Carolina. Potter's Septic Tank Service Pits Site, Sandy Creek, North Carolina. EPA Region 4. June 2000.

Explanation of Significant Differences, Potter's Septic Tank Service Pits Site, Sandy Creek, Brunswick County, North Carolina. EPA Region 4. April 1994.

First Five-Year Review Report. Potter's Septic Tank Service Pits Site, Sandy Creek, Brunswick County, North Carolina. US Army Corp of Engineers. September 2002.

Memorandum from William O'Steen. Review of Data Summary Report, Potter's Septic Tank Service Pits Site, Sandy Creek, North Carolina. EPA Region 4. August 1, 2011.

MNA Semi-Annual Groundwater Sampling Data Summary Report, Potter's Septic Tank Service Pits Site, Sandy Creek, North Carolina. Black & Veatch. September 2011.

Preliminary Close-Out Report, Potter's Septic Tank Service Pits Site, Sandy Creek, North Carolina. EPA Region 4. October 2000.

Record of Decision, Potter's Septic Tank Service Pits Site, Sandy Creek, Brunswick County, North Carolina. EPA Region 4. August 1992.

Record of Decision Amendment, Potter's Septic Tank Service Pits Site, Sandy Creek, Brunswick County, North Carolina. September 2000.

Risk Assessment Calculations for Trimethylbenzenes, Potter's Septic Tank Service Pits Site, Sandy Creek, North Carolina. EPA Region 4. August 2000.

Third Five-Year Review Report, Potter's Septic Tank Service Pits Site, Sandy Creek, Brunswick County, North Carolina. North Carolina Department of Environment and Natural Resources Division of Waste Management. September 2012.

APPENDIX B – CURRENT SITE STATUS

Environmental Indicators
- *Current human exposures at the Site are under control.* - *Current groundwater migration is under control.*

Are Necessary Institutional Controls in Place?
☒ All ☐ Some ☐ None

Has EPA Designated the Site as Sitewide Ready for Anticipated Use?
☐ Yes ☒ No

Has the Site Been Put into Reuse?
☐ Yes ☒ No

APPENDIX C – SITE CHRONOLOGY

Table C-1: Site Chronology

Event	Date
Operators used the Site to dispose of waste petroleum and septic tank waste in unlined pits	1969-1976
Approximately 20,000 gallons of oil flowed into the Chinnis Branch and Rattlesnake Branch	1976
Operators removed 20,000 gallons of oil from the Site	1976
Investment Management purchased the Site for residential development	1980
Property owners discovered waste material in their yards	1983
State of North Carolina confirmed presence of contaminants in soil and groundwater, resulting in condemnation of the site owner's drinking water well	July 1983
The EPA and Region 4 Field Investigation Team conducted surveys to delineate extent of contamination	September 1983
The EPA and Office of Emergency and Remedial Response initiated an immediate removal action	March 21-April 2, 1984
The EPA proposed groundwater monitoring plan to determine threats to groundwater sources	May 1984
The EPA conducted preliminary assessment that revealed soil and groundwater contamination	September 1987
The EPA added Site to NPL	March 31, 1989
The EPA completed RI report	December 1991
The EPA completed FS The EPA signed ROD	August 1992
The EPA completed soil excavation	April 1996
The EPA and NCDEQ conducted final inspection of soil remediation	June 11, 1999
The EPA added addendum to FS to evaluate MNA and ICs as a remedy for groundwater contamination	August 11, 2000
The EPA signed amended ROD The EPA completed Preliminary Close-Out Report	September 27, 2000
The EPA conducted field investigation including potable water sampling	October 29, 2001
The EPA installed additional monitoring well and completed Quarterly MNA Groundwater Sampling, Second Quarter 2002	March 2002
The EPA signed first FYR	September 10, 2002
The EPA completed draft Remedial Action Report	September 2, 2003
The EPA signed second FYR	September 10, 2007
The EPA issued a memo regarding adding 1,4-dioxane as a site COC	August 1, 2011
The EPA filed memo regarding removing the erosion prevention/control IC requirement from the remedy	August 23, 2012
The EPA signed third FYR	September 25, 2012

APPENDIX D – SITE MAPS

Figure D-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 the EPA's response actions at the Site.

APPENDIX E – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Potter's Septic Tank Service Pits	**Date of Inspection:** 01/26/2017
Location and Region: Maco, North Carolina, Region 4	**EPA ID: NCD981023260**
Agency, Office or Company Leading the Five-Year Review: EPA Region 4	**Weather/Temperature:** 70s and overcast/rainy

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Soil excavation and treatment
- ☒ 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 NCDEQ
   Contact Nile Testerman (Name) | Environmental Engineer (Title) | 01/31/2017 (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: X

   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: All documents in state office				
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: All documents in state office.				
3.	**O&M and OSHA Training Records**	☒ Readily available	☐ Up to date	☐ N/A	
	Remarks: All documents in state office				
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: All documents in state office				
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: Inspections take place during annual monitoring efforts.

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: 01/01/2012 Date	To: 12/31/2012 Date	$6,000 Total cost	☐ Breakdown attached
From: 01/01/2013 Date	To: 12/31/2013 Date	$4,000 Total cost	☐ Breakdown attached
From: 01/01/2014 Date	To: 12/31/2014 Date	$6,000 Total cost	☐ Breakdown attached
From: 01/01/2015 Date	To: 12/31/2015 Date	$7,000 Total cost	☐ Breakdown attached
From: 01/01/2016 Date	To: 12/31/2016 Date	$6,000 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: _____

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): Site inspections take place during annual monitoring efforts

Frequency: Annual

Responsible party/agency: NCDEQ

Contact	Nile Testerman	Environmental Engineer	01/26/2017	919-707-8339
	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:

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

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

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

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

C. Treatment System ☐ Applicable ☒ N/A

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 major components of the selected remedy for soil, as stated in the 1992 ROD, include: excavation of all soils exceeding the soil cleanup standards; treatment of contaminated soil using on-site ex-situ thermal desorption process; secondary treatment of the concentrated organic contaminants; sampling and analysis of the treatment residue; proper transportation and storage of RCRA hazardous wastes; on-site disposal of the non-hazardous treated soil; and, on-site solidification of soils containing levels of chromium, lead, and zinc above cleanup standards for off-site disposal. The major components of the selected remedy for groundwater, as updated by the 2000 ROD Amendment, are MNA and institutional controls. All remedial components have been implemented. The source removal was completed and the monitored natural attenuation is occurring currently. Current concentrations are below detection limits.

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.

Annual sampling indicates that contaminant levels are declining and monitoring wells appear to be secured and functioning as expected.

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. No issues were observed.

D. Opportunities for Optimization

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

If monitoring wells continue to have no detections of contaminants, abandonment may be an opportunity for remedial optimization. During the last five years four shallow and four deep wells were abandoned

APPENDIX F – PRESS NOTICE

The U.S. Environmental Protection Agency, Region 4 Announces the Fourth Five-Year Review for the Potter's Septic Tank Service Pits Superfund Site, Sandy Creek, Brunswick, North Carolina

Purpose/Objective: The EPA is conducting the fourth Five-Year Review of the remedy for the Potter's Septic Tank Service Pits Superfund site (the Site) in Sandy Creek, North Carolina. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect human health and the environment.

Site Background: The 5-acre area is located immediately south of U.S. Highway 74/76 in Sandy Creek, Brunswick County, North Carolina. From 1969 to 1976, a sludge hauling and oil spill cleanup company operated on site. The facility disposed of septic tank sludge, oil sludge and other waste materials in shallow unlined pits or onto the ground at the Site. In 1976, the operators pumped 2,000 to 3,000 gallons of black oil from a pit on site and covered the pit with soil. Also in 1976, an earthen berm at the Site failed, releasing 20,000 gallons of oil from another pit. Oil flowed into Rattlesnake Creek. The U.S. Coast Guard responded to clean up the spill. Site owners pumped 20,000 gallons of oil from the remaining pits and disposed of the oil off site. They also dug up sludge and oil-stained soil, disposed of it at an off-site facility, and mixed remaining sludge with sand. Investigations found contamination in groundwater and soil that could potentially harm people in the area. Contaminants of concern include trichloroethylene, benzene, toluene, ethylbenzene, naphthalene, xylene, chromium, lead, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene. In 1989, the EPA listed the Site on the Superfund program's National Priorities List (NPL).

Cleanup Actions: The EPA selected the Site's remedy in the Site's 1992 Record of Decision (ROD). It included groundwater extraction and treatment using air stripping and chemical treatment, excavation and treatment of contaminated soil, treatment of off-gases from soil treating activities, backfilling of dug-up areas with clean soil, and stabilization of remaining contaminated soil and disposing of it at an off-site facility.

The EPA updated the Site's remedy in 2000. The amended plan includes monitored natural attenuation to address groundwater contamination, installation of additional monitoring wells, and institutional controls to restrict use of site groundwater and soil.

Five-Year Review Schedule: The National Contingency Plan requires review of remedial actions that result in any hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure every five years to ensure the protection of human health and the environment. The fourth of the Five-Year Reviews for the Site will be completed by September 2017.

The EPA Invites Community Participation in the Five-Year Review Process: The EPA is conducting this Five-Year Review to evaluate the effectiveness of the Site's remedy and to ensure that the remedy remains protective of human health and the environment. As part of the Five-Year Review process, the EPA staff is available to answer any questions about the Site. Community members who have questions about the Site or the Five-Year Review process, or who would like to participate in a community interview, are asked to contact:

Beverly Stepter, EPA Remedial Project Manager
Phone: (404) 562-8816
Email: stepter.beverly@epa.gov

L'Tonya Spencer, EPA Community Involvement Coordinator
Phone: (404) 562-8463
Email: spencer.latonya@epa.gov

Mailing Address: U.S. EPA Region 4, 61 Forsyth Street, S.W., 11th Floor, Atlanta, GA 30303-8960

Additional information is available at the Site's local document repository, located at Leland Public Library, 487 Village Road, Leland, NC 28451, and online at *https://cumulis.epa.gov/supercpad/Cursites/csitinfo.cfm?id=0403122&msspp=med*.

APPENDIX G – SITE INSPECTION PHOTOS

View of the Site, looking north

On-site municipal utility substation system

MW-307

MW-405

Unlocked MW-302

MW-301 and MW-302

APPENDIX H – DETAILED ARARs REVIEW

Applicable or Relevant and Appropriate Requirements (ARARs) Review

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

Soil ARARs

Chemical-specific ARARs were not established for soil. All of the cleanup standards are based on the protection of groundwater except for zinc and carcinogenic PAHs. The cleanup goals are further evaluated in Appendix I.

Groundwater ARARs

The 1992 ROD selected NC 2L[3] as chemical-specific ARARs for groundwater. The 1994 ESD updated the cleanup goal for benzene. The 2000 ROD Amendment reaffirmed the benzene cleanup goal and documented a change to the naphthalene cleanup goal; both followed the State of North Carolina's groundwater remediation standards. The 2000 ROD Amendment also added risk-based cleanup levels for 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene, and listed them as COCs. This FYR compared the relevant NC 2L standards used in the final remedy (most recently updated by the 2000 ROD Amendment) against the current relevant NC 2L standards for the groundwater COCs. Many of the NC 2L standards used in the 2000 ROD Amendment have changed; the NC 2L standards for naphthalene, toluene and chromium have become more stringent. Based on a review of monitoring data, naphthalene and toluene have either been below detection or the detections are below current NC 2L standards. Chromium is no longer monitored based on historical concentrations below the ROD cleanup goal of 50 µg/L. However, chromium was detected at 15 µg/L in December 1998, when monitoring of metals was discontinued according to the EPA's 2000 Evaluation of MNA. Because historical chromium concentrations exceeded the current NC 2L standard of 10 µg/L, it is recommended that chromium be included for further monitoring to confirm concentrations do not exceed the current NC 2L standard.

Table H-1: ARAR Review

Groundwater COC	Final Remedy ARAR (µg/L)	2017 State NC 2L[b] (µg/L)	ARAR Change
Benzene	1	1	no change
Ethylbenzene	29	600	Less stringent
Naphthalene	21	6	More stringent
1,2,4-Trimethylbenzene	--[a]	400	Less stringent
1,3,5-Trimethylbenzene	--[a]	400	Less stringent
Toluene	1,000	600	More stringent
Xylenes	400	500	Less stringent
Chromium	50	10	More stringent
Lead	15	15	No change
[a] MCLs had not been established for these two COCs in the 2000 AROD; however, a value of 60 µg/L was developed for both COCs based on the risk calculations as stated in the Supplemental Evaluation of Natural Attenuation at the Potter's Pits Site, September 2000.			

[3] https://ncdenr.s3.amazonaws.com/s3fs-public/documents/files/15a ncac 02l .0202.pdf

[b] NC 2L accessed at https://deq.nc.gov/document/nc-stds-groundwater-02l-0202 in February 2017.
NA = MCLs have not been established for these COCs.
Highlight = ARAR has become more stringent than remedy ARAR.

APPENDIX I – DETAILED TOXICITY REVIEW

The 1992 ROD cleanup goals for soil were based on cleanup levels established under NC 2L. As demonstrated in Table I-1, the remedial goals established in the ROD and ROD Amendment remain valid because the screening-level risk evaluating demonstrates that the relative risk associated with the goals are below 1×10^{-6}, the lower bound of the EPA's risk management range of 1×10^{-4} to 1×10^{-6}, and below the EPA's target noncancer hazard quotient (HQ) of 1.0 for residential exposure. The risks are also below NCDEQ's target level of 1×10^{-6}. Further, the lead cleanup goal of 400 mg/kg, which is based on the EPA's blood-lead model, has not changed. The current residential soil RSL is also 400 mg/kg; thus the lead cleanup goal remains valid in soil.

Table I-1: Screening-Level Risk Evaluation of Soil Cleanup Goals

COC	1992 ROD Cleanup Goals (mg/kg)	EPA Residential Soil RSLs (mg/kg)[a]		Relative Risk of 1992 ROD Remedial Goal	
		Cancer Risk 1×10^{-6}	Noncancer HQ = 1	Cancer Risk[b]	Noncancer HQ
Benzene	0.01	1.2	82	8.3×10^{-9}	0.0001
Toluene	3.4	NA	4,900	NA	0.0007
Ethylbenzene	0.235	5.8	3,400	4.1×10^{-8}	0.00007
Xylenes	3.5	NA	580	NA	0.006
Naphthalene	1.8	3.8	130	4.7×10^{-7}	0.014
Carcinogenic PAHs*	0.011	0.016[c]	NA	6.9×10^{-7}	--
Lead	400	400		--	--
Chromium[d]	97.2	NA	230	--	0.42
Zinc*	122	NA	23,000	--	0.005

* Standards will be applied to the top 1 foot of soil only because cleanup standards are based on direct contact with the surface soil.

a. The current RSLs are available at http://www.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 2/17/17).

b. Cancer risks calculated using the following equation:

Cancer risk = (Cleanup level ÷ cancer risk-based RSL) × 10^{-6}

Noncancer HQ = Cleanup level ÷ non-cancer RSL

c. Carcinogenic PAHs are represented as benzo(a)pyrene equivalent concentrations.

d. Assumed chromium is in the more toxic hexavalent form.

NA = The EPA has not yet established a toxicity value for this COC.

-- = Risk or HQ could not be calculated.

The 2000 AROD established chemical-specific ARARs as the cleanup goals for most of the groundwater COCs. However, in the absence of MCLs, health-based remediation goals were developed for 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene. To determine if these goals remain valid, a screening-level risk evaluation was conducted. The EPA has recently updated the toxicity values in the Integrated Risk Information System (IRIS) for these two COCs however, the revised toxicity values have not yet been incorporated into revised tap water RSLs. The RSL calculations are conservative as the RSLs are based on a child exposure for noncancer effects. As recommended by the EPA Region 4 scientific support section, the RSL calculator was used with the subchronic toxicity values for the two COCs assuming a child exposure and a volatilization factor that addresses both inhalation of vapors

during showing and household use (a factor of 0.13). As shown in Table I-2, the cleanup goals for 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene are each equivalent to a noncancer HQ of 0.2 , which is below the EPA's threshold of 1.0. 1,2,4-Trimethylbenzene was detected in well MW-203 in August 2012, with a concentration of 27 µg/L and sampling for 1,2,4-trimethylbenzene at MW-203 in 2015 and 2016 found concentrations below the practical quantitation limit. These results show that the cleanup goals remain valid for these two COCs and historical post-remediation concentrations have been below detection or below the calculated tap water RSLs.

Table I-2: Screening-Level Risk Evaluation of Groundwater Cleanup Goals

COC	2000 AROD Cleanup Goals (µg/L)	EPA Tapwater RSLs (µg/L)[a]		Relative Risk of 2000 AROD Remedial Goal	
		Cancer Risk 1×10^{-6}	Noncancer HQ = 1	Cancer Risk[b]	Noncancer HQ
1,2,4-Trimethylbenzene	60	NA	321	--	0.2
1,3,5-Trimethylbenzene	60	NA	361	--	0.2

a. Tap water RSLs were developed using the RSL calculator located at https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search (accessed 06/05/17).
b. Cancer risks calculated using the following equation:
Cancer risk = (Cleanup level ÷ cancer risk-based RSL) × 10^{-6}
Noncancer HQ = Cleanup level ÷ non-cancer RSL
Bold = Noncancer hazard exceeds 1.0
NA = The EPA has not yet established a toxicity value for this COC.
-- = Risk or HQ could not be calculated.

VOCs are present in groundwater underlying the Site. Therefore, vapor intrusion exposure is a potential completed exposure pathway for areas of remaining residual groundwater contamination. A screening-level vapor intrusion evaluation was conducted to determine if this potential exposure pathway requires more in-depth analysis. The evaluation used the highest concentrations of groundwater COCs from the last five years of groundwater data. The only COC exceeding the ROD cleanup goals was benzene, though all COCs were considered.

The maximum detections of COCs over the last five years were entered into the EPA's VISL calculator to evaluate this exposure pathway. As shown in Table I-3, all maximum concentrations yielded cancer risks within the EPA's risk management range of 1×10^{-4} to 1×10^{-6} and below the EPA's noncancer HQ of 1.0, individually and in total. These results indicate that the vapor intrusion exposure pathway does not require further evaluation, as the on-site concentrations continue to decline over time and all enclosed buildings and residences are off site.

Table I-3: Screening-Level Vapor Intrusion Evaluation at the Site

COC	Maximum Groundwater Concentration Detected between 2012 and 2016 (µg/L)[a]	2016 VISL Calculator[b] (Average groundwater temperature 25°C)	
		Residential Exposure	
		Cancer Risk	Noncancer HQ
Maximum in Groundwater			
Benzene	3.3 (MW-203) 2012	2.1×10^{-6}	0.024
Ethylbenzene	6.6 (MW-407) 2015	1.9×10^{-6}	0.002

COC	Maximum Groundwater Concentration Detected between 2012 and 2016 (µg/L)[a]	2016 VISL Calculator[b] (Average groundwater temperature 25°C)	
		Residential Exposure	
		Cancer Risk	Noncancer HQ
Maximum in Groundwater			
Naphthalene	1.2 (MW-203) 2012	2.6×10^{-7}	0.007
1,2,4-Trimethylbenzene	27 (MW-203) 2012	NA	0.03[c]
1,3,5-Trimethylbenzene	2.8 (MW-203) 2012	NA	NA
Toluene	2.9 (MW-407) 2015	NA	0.0002
Xylenes	21.2 (MW-203)	NA	0.06
1,4-Dioxane	ND	NA	NA

Notes:

a. Data obtained from the EPA on 2/17/2017. Samples collected in February 2013.

b. VISL calculator version 3.5.1 accessed 2/17/2017 at https://semspub.epa.gov/src/document/11/196702

c. As discussed above, toxicity values have changed for this COC. As recommended by the EPA Region 4 scientific support section, a subchronic inhalation toxicity value was used in the VISL calculator.

ND – COC not detected in the last five years.

NA – The EPA has not yet established a toxicity value for this COC.

APPENDIX J – INTERVIEW FORM

Potter's Septic Tank Service Pits Superfund Site **Five-Year Review Interview Form**

Site Name: Potter's Septic Tank Service Pits **EPA ID No.:** NCD981023260

Subject Name: Nile Testerman **Affiliation:** NCDEQ
Subject Contact Information: nile.testerman@ncdenr.gov
Date: Jan 31, 2017
Interview Format (circle one): In Person Phone Mail Other: Email

Interview Category: State Agency

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)? **The project is in good shape**.

2. What is your assessment of the current performance of the remedy in place at the Site? **The current remedy is working**.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years? **No**.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities. **Our office has performed annual groundwater sampling**.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy? **No**.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues? **Institutional controls are not in place.**

7. Are you aware of any changes in projected land use(s) at the Site? **No**.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy? **No.**