REDACTED

RECORD OF DECISION

PETROLEUM PRODUCTS CORPORATION SUPERFUND SITE

PEMBROKE PARK, BROWARD COUNTY, FLORIDA

CERCLIS ID: FLD980798698

PREPARED BY:
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA, GEORGIA

July 2021

RECORD OF DECISION

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

ALM	Adult Lead Methodology
ARAR	Applicable or Relevant and Appropriate Requirement
BCEQCB	Broward County Environmental Quality Control Board
bls	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CTL	Cleanup Target Level
CMZ	Contaminated Media Zone
DBCP	1,2-Dibromo-3-Chloropropane
DNAPL	Dense Non-Aqueous Phase Liquid
EDB	Ethylene Dibromide
EPA	U.S. Environmental Protection Agency
EPC	Exposure Point Concentration
ESD	Explanation of Significant Difference
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FS	Feasibility Study
F.S.	Florida Statute
GAF	Gastrointestinal Absorption Factor
GCTL	Groundwater Cleanup Target Level
GR&T	Groundwater Recovery and Treatment
HAP	Hazardous Air Pollutant
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IAROD	Interim Action Record of Decision
IC	Institutional Control
ILCR	Incremental Lifetime Cancer Risk
LDA	Large Diameter Auger
LDR	Land Disposal Restriction
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
µg/kg	Micrograms per Kilogram
µg/dL	Micrograms per Deciliter

µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
mg/kg/day	Milligrams per Kilogram per Day
mg/L	Milligrams per Liter
NA	Not Applicable
ND	Not Determined
ng/kg	Nanograms per Kilogram
NAPL	Non-Aqueous Phase Liquid
NOAEL	No Observed Adverse Effect Level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPW	Net Present Worth
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PFOS/PFOA	Perfluorooctane Sulfonic Acid / Perfluorooctanoic Acid
PRG	Preliminary Remedial Goal
PRP	Potentially Responsible Party
PTW	Principal Threat Waste
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SL	Slope Factor
SCTL	Soil Cleanup Target level
Site	Petroleum Products Corporation Superfund Site
STARx	Ex Situ Smoldering
SVOC	Semi-Volatile Organic Compound
TBC	To Be Considered
TCDD	Tetrachlorodibenzo-p-dioxin
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxicity Equivalent
TOC	Total Organic Compound
UCL	Upper Confidence Limit
USACE	U.S. Army Corps of Engineers

USGS	U.S. Geological Society
VOC	Volatile Organic Compound
VOHAP	Volatile Organic Hazardous Air Pollutant
WQATF	Water Quality Assurance Trust Fund
WWF	Wastewater Factor

PART 1: DECLARATION

1.0 Site Name and Location

Petroleum Products Corporation Superfund Site OU1, OU2, OU3

Pembroke Park, Broward County, Florida

CERCLIS ID: FLD980798698

Lead Agency: U.S. Environmental Protection Agency

Support Agency: Florida Department of Environmental Protection

2.0 Statement of Basis and Purpose

This decision document presents the final selected remedy for the Petroleum Products Corporation Superfund site (Site), operable unit 1 (OU1) and OU2 and the interim remedy selected for OU3, which were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. Section 9601 et seq., and, to the extent practicable, the National Contingency Plan (NCP) 40 Code of Federal Regulations (CFR) Part 300. This decision is based on the Administrative Record for the Site, which has been developed in accordance with Section 113(k) of CERCLA, 42 U.S.C. § 9613(k). The Administrative Record is available for review online at www.epa.gov/superfund/petroleum-products-corporation. It is also available for review at the EPA Region 4 Superfund Records Center, located at 61 Forsyth Street in Atlanta, Georgia, and at the local site information repository, Broward County Public Library, located at 100 South Andrews Avenue in Fort Lauderdale, Florida.

The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), is the support agency. In accordance with 40 CFR § 300.430(e)(9)(iii)(H), the FDEP has provided input during the remedy selection process, including review and comment on the remedial investigation/feasibility study (RI/FS), and concurs with the selected remedy.

3.0 Assessment of the Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances to the environment, and from actual or threatened releases of pollutants or contaminants from the Site that may present an imminent and substantial endangerment to public health or welfare.

4.0 Description of Selected Remedy

This ROD sets forth the selected final remedy for OU1/OU2 (Unsaturated Zone and Main Source Area) and the selected interim remedy for OU3 (Extended Plume). The contaminated media at the Site includes non-aqueous phase liquid (NAPL) and sludge-impacted soil from past facility processes, releases and disposal that are sources of groundwater contamination as well as present a risk to human health from direct exposure. NAPL is considered a principal threat waste (PTW) under EPA guidance "A Guide to Principal Threat and Low-Level Threat Wastes" (Office of

Solid Waste and Emergency Response [OSWER] 9380.3-06FS – 1991). PTW is source material that is considered highly toxic or would present significant risk to human health should exposure occur, or it acts as reservoir for mobile contaminants and there is an expectation in the NCP to treat such wastes wherever practicable unless the EPA determines that such wastes can be reliably contained. Sludge and highly contaminated soil are also PTW. The selected remedy for OU1/OU2 will eliminate direct contact with source material considered PTW in the Unsaturated Zone and Main Source Area and will reduce the leaching of contaminants of concern to the Biscayne Aquifer. The interim selected remedy for OU3 (Extended Plume) will address residual groundwater contamination following containment of source materials under the OU1/OU2 remedy.

The selected remedy for the Site is:

- OU1: In-Situ Stabilization/Solidification with Limited Soil Excavation and Off-Facility Disposal.
- OU2: In-Situ Stabilization/Solidification with Large Diameter Augers (LDAs).
- OU3: Groundwater Recovery and Treatment (GR&T).

Common elements of the selected remedy are:

- Bamboo Mobile Home Park excavation and temporary relocation.
- Building demolition and relocation of businesses and tenants overlying the Main Source Area.
- Shallow (0 – 5 ft bgs) excavation under buildings.
- Institutional controls (ICs) to prevent well installation and any use of contaminated groundwater, to provide increased public awareness and restrict disturbance of the in-situ treated waste that remains at the Site as well as interference with other remedy components such as existing or future remediation system and/or monitoring wells. Land use at the Site (other than Bamboo Mobile Home Park which is currently residential) will be restricted to remain industrial/commercial use.
- Long-term groundwater monitoring to assess remedy performance.
- Site reviews at a minimum of every five years to assess the protectiveness of the remedy (Five-Year Reviews).

5.0 Statutory Determinations

Based on the information currently available, the EPA believes the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. In compliance with CERCLA Section 121(b) and Section 121(d), the selected remedy is protective of human health and the environment, complies with federal and state environmental requirements that are applicable or relevant and appropriate to the remedial actions, is cost effective, and utilizes permanent solutions and treatment technologies to the maximum extent practicable.

The selected in-situ stabilization/solidification remedy for NAPL and sludge-impacted soil in the Main Source Area and Unsaturated Zone (OU1 and OU2) satisfies the statutory preference for remedies that employ treatment to reduce toxicity or volume or mobility as a principal element. Isolation/containment reduces mobility but will not reduce toxicity or volume of the contaminated soil and NAPL. However, it does eliminate the risk exposure pathways of ingestion or inhalation to humans.

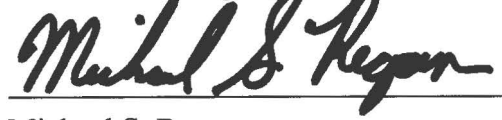
Because this remedy will result in hazardous substances, pollutants or contaminants remaining on site above levels that would allow for unlimited use and unrestricted exposure, a CERCLA Section 121(c) statutory review will be conducted every five years after initiation of the remedial action to ensure that the remedy remains protective of human health and the environment. If results of the Five-Year Reviews reveal that remedy integrity is compromised and protection of human health is insufficient, then more remedial actions will be considered and evaluated by the EPA and the FDEP.

6.0 Data Certification Checklist

The following information is included in the Decision Summary Section of this ROD. More information can be found in the Site's Administrative Record file.

- Chemicals of concern (COCs) and their respective cleanup levels (Section 7 and Section 8, Table 1 and Table 3).
- Baseline risk represented by the COCs (Section 7, Tables 4 through 11).
- Cleanup levels established for COCs and the basis for these levels (Section 8, Table 12 and Table 14).
- How source materials constituting principal threats are addressed (Section 11).
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD (Section 6).
- Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy (Section 6).
- Estimated capital, annual operation and maintenance, total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 12, Table 17).
- Key factors that led to selecting the remedy (i.e., how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (Section 12 and Section 13).

7.0 Authorizing Signature



AUG 12 2021

Michael S. Regan
EPA Administrator

Date

PART 2: THE DECISION SUMMARY

1.0 Site Name, Location and Brief Description

This ROD is for the Petroleum Products Corporation Superfund site (Site; EPA ID: FLD980798698) in Pembroke Park, Broward County, Florida. The Site is about 8 acres in size and is bounded by Pembroke Road to the north, SW 31st Avenue to the east, Carolina Street to the south and South Park Road to the west (Figure 1). The facility is a former processor and broker of waste oil and other petroleum products in a moderately dense commercial, industrial, and residential district (Figure 2). The Site includes several commercial properties containing mini warehouses that are used for commercial and private storage and small businesses (e.g., a shooting range, a restaurant, paint and repair shops, cabinet makers, woodworking facilities, manufacturing facilities). The southeast corner of the property contains a fenced area where a former bioslurper treatment system was located. The adjacent properties around the facility include a public golf course to the north, mobile home/trailer parks to the south and west, and light industrial/commercial businesses to the east and west. The Site has been heavily impacted by development.

Contamination within the property boundary includes two waste oil sludge pits that partially underlie some commercial warehouses and asphalt-covered access roads. The NAPL and sludge-impacted soil extend beneath additional adjacent commercial and industrial warehouses. A broad range of chemicals of concern (COCs) are present within the property boundary because of the former petroleum operations, notably several volatile organic compounds (VOCs), some semi-volatile organic compounds (SVOCs) and lead. Contamination outside the property boundary includes petroleum contamination in shallow soil around a residential mobile home in the Bamboo Mobile Home Park, located south of the southeast corner of the property.

The EPA anticipates that the cleanup of the Site will be funded by the Site's potentially responsible parties (PRP Group).

2.0 Site History and Enforcement Activities

2.1 Site Operational History

The Petroleum Products Corporation was founded in Pembroke Park, Florida, in 1958. The facility also operated under the names International Petroleum Corporation and the National Oil Service of Florida, Inc. The Petroleum Products Corporation facility operated from about 1958 to 1971 as a processor and broker of waste oil and other petroleum products, including the reprocessing of used oil using a sulfuric acid-clay refining process. This process generated sulfuric acid sludge and spent clay containing petroleum hydrocarbons and metals contamination. The sludge waste and spent clay was disposed of at the Petroleum Products Corporation property in excavated, unlined pits, about 2 acres in size. Excavation of the Primary Sludge Pit included removal of limestone bedrock using a dragline. The Secondary Sludge Pit may have been a pond that was filled in with sludge and fill (and potentially some of the excavated limestone) as opposed to a new excavation. Petroleum Products Corporation operators also received other types of hydrocarbon waste containing polychlorinated biphenyls (PCBs) and chlorinated solvents that were also disposed of in the unlined pits.

Due to the shallow groundwater table and high amounts of precipitation, the sludge pits would overflow and spread oil and sludge across the property. In addition, poor management practices during Petroleum Products Corporation operations resulted in oil and sludge being spread across much of the property. Most of the sludge material is buried below the groundwater table, where it is in constant contact with groundwater, subsequently promoting leaching of contaminants into the Biscayne Aquifer, a federally designated sole-source aquifer used as a drinking water supply.

Historical records indicate that Petroleum Products Corporation oil reprocessing operations occurred primarily from 1966 to 1968. At that time, the facility had about 22 aboveground storage tanks and the Primary Sludge Pit was in full operation (Figure 3). It was during this period that residents in the Bamboo Mobile Home Park on the south side of the Site began complaining to Petroleum Products Corporation and local authorities about overflows of oil from the disposal pits. In 1970, Petroleum Products Corporation modified its operation due to an overflow of liquid in the disposal pits that spread contamination into the mobile home park to the south.

Oils recycled at the Site include petroleum fuel oils, motor oils, boiler fuel, gear oil and other petroleum products from a variety of local sources, including federal entities, county and city fleet maintenance, car dealers, automotive shops and industrial/commercial facilities. Daily refinery work sheets indicated the use of sulfuric acid, with typical usage between 350 to 500 gallons per day.

The actual treatment processes used at the Site are not well documented. The facility used an acid-clay refining process. The sludge was characterized by the facility owner as a Fuller's earth. Fuller's earth typically consists of attapulgite or bentonite (montmorillonite, kaolinite) clays that have an affinity for removing oily impurities. A typical clay-refining process generates skimmed oil, wastewater, filter residues, tank bottoms, oily acid sludge and spent clay. Impurities in the oil being refined, such as metals, are also typically found in the waste residues.

Between 1970 and 1971, Petroleum Products Corporation sold parts of the facility property. The waste pits were covered with fill material, and there are indications contaminated sludge/soil was spread across the surface of the property. Petroleum refining operations ended in 1971. By 1972, the warehouse complex (currently known as the Pembroke Park Warehouses) was constructed on the former Petroleum Products Corporation property.

Other petroleum-related operations at the facility continued from 1971 to 1985. They were primarily restricted to the southeast corner of the Site, where a petroleum storage and distribution facility operated. Petroleum storage and distribution operations ceased in 1985. Buildings were constructed along the west side of southwest 31st Avenue, along the east side of the former Primary Sludge Pit, in 1984 and 1985.

2.2 Regulatory and Investigation History

This section summarizes pertinent federal, state and local site investigations and regulatory activities from the 1970s through 2019. In 1979, the Broward County Environmental Quality Control Board (BCEQCB) completed an inspection of the facility and subsequently issued multiple warnings concerning oil and wastewater discharges from a bermed tank farm area and seepage of oil from filled pits. These warnings were followed by letters from the BCEQCB concerning complaints of oil seeping through warehouse foundations and asphalt throughout the property. In 1983, the Florida Department of Environmental Regulation (predecessor to the FDEP) issued a notice of violation requiring Petroleum Products Corporation to remove waste oil tanks from the property in preparation for further investigations. In 1984, an initial investigation by Petroleum Products Corporation confirmed the presence of groundwater contamination and NAPL.

In the early 1980s, the BCEQCB received funding from the State of Florida Water Quality Assurance Trust Fund (WQATF) to investigate the extent of soil and groundwater contamination at the property to determine the impact on nearby municipal well fields. The Hollywood municipal well field is located 1.5 miles north of the property and the Hallandale municipal well field is located about 0.5 miles to the east. In June 1984, the State of Florida initiated a lawsuit against Petroleum Products Corporation for violations of state statutes concerning the handling and disposal of hazardous materials. This lawsuit included a cost-recovery contingency claim to cover any allocated WQATF monies. In October 1984, the State of Florida retained Environmental Science and Engineering, Inc. to investigate and determine the extent of NAPL on the property. These investigations found that NAPL covered an area of about 40,000 square feet (0.92 acres), with a maximum measured thickness in the wells of about 30 inches. The investigation also concluded that the NAPL was slowly migrating to the east-southeast in the direction of the Bamboo Mobile Home Park. Analytical results indicate that oil and grease were the major contaminants, although significant levels of heavy metals and other organic contaminants were present.

In 1985, the EPA collected samples that showed significant levels of hazardous compounds, including chlorinated solvents and heavy metals. As a result, the EPA issued an Administrative Order on Consent (AOC) under CERCLA authority for Petroleum Products Corporation to conduct an emergency removal action at the property. Under EPA oversight, Petroleum Products Corporation hired a contractor that removed, analyzed, and disposed of oil, water and sludge in 262 waste drums in accordance with regulations. The contractor disposed of or recycled all wastes. Petroleum Products Corporation dismantled and removed all structures and tanks that were stored on the property. The top 6 inches of contaminated soil was removed from the tank area and the excavation was backfilled with clean sand fill from an off-site source.

The EPA added the Site to the Superfund program's National Priorities List (NPL) in July 1987. In 1989, the EPA assumed lead responsibility for the RI/FS for OU1 at the Site. The RI confirmed elevated concentrations of lead and chromium in soils. These contaminants were identified as two primary inorganic "indicator" contaminants and focused on the nature and extent of these metals. Composite soil samples from 0 to 10.5 feet below land surface (bls) had

lead concentrations as high as 22,400 milligrams per kilogram (mg/kg) and total chromium concentrations as high as 38.5 mg/kg. The Secondary Sludge Pit had not yet been identified at the time of this investigation. Soil analytical results from the central area of the property indicated that the depth of contamination had not been determined. Elevated concentrations of lead and chromium in groundwater were confirmed and data indicated that the chromium plume extended off facility to the southeast.

The RI continued from August 1989 through June 1990 to further define the nature and extent of groundwater contamination, and to collect data on the NAPL (NAPL) plume. The investigation concluded that areas of oil and oily-sludge contamination extended through the southeast Primary Sludge Pit and west-central Secondary Sludge Pit. The RI Report also concluded that some heavy metals had become sorbed to the relatively immobile sludge matrix, whereas others were migrating downgradient via advection, desorption/resorption and diffusion.

The EPA issued an Interim Action ROD for OU1 in 1990. The selected remedy was intended to contain contamination sources until additional remedial alternatives could be assessed. Remedial components included abandonment of non-operating wells, closure of storm drain wells discharging to the Biscayne Aquifer, a private well survey to identify groundwater users, and modifications to the groundwater recovery system, originally installed by Petroleum Products Corporation in 1985, to improve efficiency of waste oil removal and contain future migration of contamination. The EPA issued Explanations of Significant Differences (ESDs) in March 1991 and 1998. The 1991 ESD deferred the closeout of the surface drainage system until the completion of OU2 remedy. The second ESD documented the significant differences between recovery technologies in the original remedial design (groundwater extraction and treatment with air stripping and activated carbon) and the modified design (implementation of a bioslurper system). The PRP Group, implementing the remedy under a 1991 Consent Decree, opted to try a different remedial technology to optimize free product recovery because the original remedial design, which had been operating at the Site since 1994, operated below the rate recommended in the remedial design.

The PRP Group installed a bioslurping system (vacuum enhanced recovery of waste oil) at the Site in 1998. In 2001, the PRP Group expanded this system to collect oil from most areas around the Site. The collected oil accumulated in storage tanks that were shipped off site for treatment and disposal. The bioslurper operated through October 2012, when the FDEP authorized suspension of operation due to inefficiency in free product extraction and high operating costs. At that time, the bioslurper system was reported to have recovered an estimated 30,695 gallons of free product and 3,715 gallons of emulsified oil.

In February 2011, the PRP Group excavated 330 cubic yards of shallow, contaminated, petroleum-impacted soil in the Bamboo Mobile Home Park, south of the former facility. This excavation took place in the vicinity of Carolina Street and included excavation, off-site disposal, backfilling and surface restoration work. The depth of the excavation was about 4 to 4.5 feet to the top of the groundwater table. The area of the excavation covered 2,538 square feet.

The excavated soils were disposed of at a treatment facility. The excavated area was backfilled with clean fill material. The surface areas were restored by placement of sod and shrubs.

The EPA completed an updated RI in 2016 to address data gaps and confirm the extent of soil contamination.

Below are activities conducted at the Site from 1970 through 2019:

- 1970: Petroleum Products Corporation covered disposal pits with fill.
- 1985: PRP Group removed 262 drums of sludge.
- 1985: PRP Group installed a 30-inch diameter, 23-foot-deep free product recovery well with an oil skimming unit along with a pump (about 7,000 gallons of oil was removed).
- 1995: PRP Group completed installation of OU1 NAPL removal system.
- 1999: The EPA documented the groundwater remedial technology modification in the 1999 OU1 ESD.
- 2003: PRP Group excavated and transported 256 tons of soil off facility to allow for installation of stormwater main.
- 2009: PRP Group removed 400 gallons of NAPL from Warehouse Bay 261.
- 2011: PRP Group performed a partial removal of soil to the water table (to a depth of 4.5 feet) on two residential mobile home properties, extending east into SW 31st Avenue.
- 2016: The EPA completed the RI and the Supplemental Human Health Risk Assessment (HHRA).
- 2019: The EPA completed the FS.

3.0 Community Participation

Site documents, including the RI/FS Reports and Proposed Plan, were made available to the public on January 11, 2021, in the Administrative Record repositories. The Administrative Record repositories are located at the EPA Region 4 Superfund Records Center (61 Forsyth Street, Atlanta, GA 30303) and the local site repository, Broward County Public Library, located at 100 South Andrews Avenue in Fort Lauderdale, Florida. A Notice of Availability was published in the *Sun-Sentinel Newspaper* on January 10, 2021. A public comment period on the Proposed Plan was held from January 11, 2021, to February 19, 2021.

On January 19, 2021, the EPA hosted a virtual Proposed Plan meeting via Zoom, due to the COVID-19 public health emergency. During the meeting, the EPA presented a description of the Proposed Plan and schedule for remedy implementation and asked nearby residents and interested parties to comment and ask questions of EPA officials. About 45 people attended the meeting. Appendix B includes a transcript of the meeting.

There were several comments and questions raised during the public meeting and EPA representatives responded to them during the meeting. EPA responses to written comments

received during this comment period are included in the Responsiveness Summary, Part 3, of this ROD.

4.0 Scope and Role of the Response Action

The Site is divided into three OUs:

1. OU1 includes soil and groundwater impacted by NAPL or free product.
2. OU2 includes soil and groundwater impacted by oil/sludge.
3. OU3 includes contaminated groundwater and adsorbed phase contamination external to OU1 and OU2.

These OUs have been further divided into contaminated media zones (CMZs):

1. Unsaturated Zone – CMZ 1.
2. Main Source Area – CMZ 2.
3. Extended Plume – CMZ 3.

The EPA issued an Interim Action ROD for OU1 in 1990 to recover free product NAPL in the Unsaturated Zone. The EPA modified the OU1 interim remedy in 1991 and 1998. The selected final remedy for the Unsaturated Zone and Main Source Area (OU1/OU2) documented in this ROD will eliminate direct contact with source material constituting PTW (contaminated soil, sludge and NAPL) and reduce the leaching of COCs from this source material to the Biscayne Aquifer. The selected interim remedy for the Extended Plume (OU3) documented in this ROD will address residual groundwater contamination following containment of source materials under the OU1/OU2 remedy. The OU3 interim remedy is not expected to restore groundwater to its beneficial use as a drinking water source. Consistent with the EPA's groundwater restoration policy, remedial alternatives to restore groundwater at and beyond the boundary of the waste management area (stabilized source material in the Unsaturated Zone and Main source Area) will be developed after the effectiveness of the final OU1/OU2 remedy and interim OU3 remedy has been evaluated.

5.0 Site Characteristics

5.1 Conceptual Site Model

Figure 4 is a general simplified and idealized Conceptual Site Model developed for the Site. The model depicts important site features, the subsurface lithology, known sources of contamination, and aspects of contaminant degradation and migration. The Conceptual Site Model is not drawn to either a vertical or horizontal scale, but instead represents important relationships in the subsurface to the extent they are presently understood.

The Conceptual Site Model shows that several routes of potential contamination migration from the Site are present. The primary source of COCs and NAPL is the sludge that extends across the Site. The sludge is mostly a continuous layer with two distinct deep areas representing the former

Primary Sludge Pit and Secondary Sludge Pit. The Primary Sludge Pit was located in the southeast corner of the Site, near the main Petroleum Products Corporation operations. The Primary Sludge Pit appears to have been an open unlined pit with an earthen berm that was excavated to a depth of about 20 feet bls to increase capacity for storage of liquid waste. The horizontal extent of the Primary Sludge Pit appears to have been irregular in shape, with portions extending to the north and south.

The Secondary Sludge Pit was in the central area of the Site, between the current location of warehouses 3130 and 3140. The Secondary Sludge Pit appears to have been excavated as a long narrow trench-oriented north-south and may have had a raised berm. A prior surface water pond may have been used or expanded for this disposal pit. The purpose of the Secondary Sludge Pit is unknown. It may have been excavated to receive oily waste and sludge at a time when the Primary Sludge Pit was reaching capacity. However, the presence of a fairly consistent sludge layer across much of the Site possibly indicates chronic overflow of oily sludge from both pit areas. After site closure in the 1970s, it appears the pits were covered by fill material that may have been partially mixed with residual oily sludge and spread across portions of the property. No record of the date, duration or volume of specific releases of oil or sludge from process units has been documented.

The sludge in the pits appears to be relatively stable and has not migrated significantly. Limited migration of subsurface NAPL and ongoing dissolution of NAPL has been occurring since deposition. The sludge consistency varies across the Site. However, many areas are saturated with NAPL. Due to the nature and low permeability of the sludge, NAPL is slowly released above and below the sludge layer, serving as a constant source of oil for the Unsaturated Zone and Main Source Area (OU1). The sludge acts as a barrier to the horizontal and vertical movement of groundwater due to its oily nature and very low permeability. As groundwater interacts with the edges of the sludge, organic and inorganic constituents in the sludge slowly dissolve and are transported along with the groundwater. The surficial Biscayne Aquifer is characterized by very high hydraulic conductivity albeit low groundwater flow velocities which prevent extensive movement of contaminated groundwater. The sludge (OU2) will continue to serve as a source for NAPL (OU1) and dissolved COCs in the groundwater (OU3) until this selected remedy is implemented.

5.2 Overview of the Site

5.2.1 Geologic, Hydrogeologic and Topographic Information

The Site is in an area of south Broward County characterized by low topographical relief, about three miles west of the Atlantic Ocean. Land elevations at the Petroleum Products Corporation facility are generally flat, at about 6-to-8-feet above mean sea level. Ground surfaces in the area of the Site are mostly covered by asphalt, concrete and commercial structures. A significant portion of the land area has been reworked and filled by spoils excavated from borrow pits throughout the area. The former borrow pit areas are now retention ponds south and west of the

Site. Prior to excavation and filling, the area was largely low-lying marsh with elevations a few feet above sea level.

Hydrogeological Setting

The Site is in southeastern peninsular Florida underlain by a series of carbonate and clastic sedimentary units, which overlie an igneous and metamorphic basement at great depth. The surface and subsurface units in southeast Florida make up the highly productive Biscayne Aquifer. The Biscayne Aquifer is a federally designated sole-source aquifer that supplies drinking water to the South Florida population. The FDEP classifies shallow groundwater at the Site as Class G-I and G-II (Florida Administrative Code [FAC] 62-520.410).The aquifer consists of a highly permeable sequence of carbonate and siliciclastic sediment that is about 200 feet thick in southeast Broward County. The Biscayne Aquifer is underlain by a 500-to-600-foot-thick section of Miocene-age marls and clay separating it from the Floridan Aquifer. The Biscayne Aquifer exists under water table conditions (unconfined) and is recharged by the direct infiltration of rainfall. Water levels are generally within 5 feet of the land surface. Water table isopleth maps developed by the United States Geological Survey (USGS) in 2004 for the Biscayne Aquifer in southeast Broward County indicate a regional hydraulic gradient to the east and northeast, with distinct cones of depression associated with the Hollywood and Hallandale well fields. Prior gradients in the early 1990s indicated a southeasterly flow direction.

The City of Hallandale, Florida, indicates that its well field is located about 1,800 feet from the Site, and the wells are screened at about 160 feet bgs, near the base of the Biscayne Aquifer. This well field pumps about 6.2 million gallons per day, according to the City of Hallandale's 2013 Beach-Water Supply Strategy. Regional hydraulic gradients are very low, rarely exceeding 0.0002 even where well pumping effects are most pronounced. The Biscayne Aquifer is highly productive, with transmissivities generally exceeding 1 million gallons/day*foot (Wedderburn, 1982). Specific yield is usually estimated at 0.20 to 0.25, and wells completed in the Biscayne Aquifer can generally be expected to yield up to 7,000 gallons per minute. Pumping at the Hallandale Well Field is on the order of 5 to 7 million gallons per day and on the order of 17 to 20 million gallons per day at the Hollywood Well Field. Studies have shown that saltwater intrusion is an increasing problem in this area due to groundwater pumping volumes.

Groundwater modeling by the Broward County Planning and Environmental Regulation Division indicates that the Site is within the 2-foot drawdown contour and less than 1,000 feet from the 270-day travel time contour for the Hallandale Well Field. Figure 5 shows the 270-day travel time contour for the Hallandale Well Field.

The well fields appear to have an effect on contaminant migration. Groundwater removal from the well fields is the primary factor controlling deeper flow (below 40 feet), whereas the other factors interact to produce extremely variable and rapid changes in shallow flow conditions. During the RI, it was noted that, across the Site, groundwater was often encountered perched on the sludge layer whereas the underlying sludge may be moist, oily, or even dry. In most areas, groundwater saturated soils were encountered below the sludge layer and the groundwater

returned to static level in or above or within the sludge layer. This indicates that the sludge layer acts as a partial hydraulic barrier to groundwater flow at the Site.

Site-Specific Geology

The Site has been covered by a significant amount of fill material to bring the area to useable grade. In addition, the surficial area underlying the Site has been significantly disturbed by operations at the former oil reprocessing facility, including excavation of sludge disposal pits and disposal of oil-contaminated soil across the Site. No areas of native surface soil are essentially present at the Site. What is presumed to be native material, consisting mostly of sandy limestone (organic peat in the shallow subsurface of the west part of the Site), is encountered at depths up to about 20 feet. The boundary between disturbed/contaminated material and native soil is easily discernible in drilled soil core sections. Portions of the north warehouse area were found to contain significant amounts of construction-related fill material such as concrete rubble and broken brick in the shallow subsurface. This material appeared to be mixed with hydrocarbon-stained dark soil. Some limited areas of fill and small debris were also encountered in the south portion of the Site.

Site-specific lithology (exclusive of sludge and oil) recorded from soil borings generally consist of layers of fine sand, silty sand and peat (up to 7-feet thick) overlying greyish white limestone with sand. Isolated layers of white silty clay and gravelly sand were also noted above the limestone. Surficial fill with or without sludge may include isolated concrete fragments and debris, gravel, wood debris, glass debris and rubber tire material.

5.3 Sampling Strategy

Multi-media sampling was guided by the Conceptual Site Model, which was refined as understanding of the Site increased over time. Samples were collected to fill data gaps in knowledge identified by previous site investigations and to provide a current view of site contamination. Samples of soil, sediment, sludge, surface water and groundwater were collected and evaluated to determine the nature and extent in these media, support assessment of risks, and improve the hydrogeologic understanding of the Site. Samples have also been collected to assist in the evaluation of potential remedy alternatives and treatment options.

The following activities were completed during the 2016 RI:

- Completion of 136 soil borings, including 34 borings to define the Secondary Sludge Pit, 24 borings to define the Primary Sludge Pit, 40 soil borings to delineate the horizontal extent along the site boundary, 12 soil borings to delineate dioxin contamination, 5 borings to investigate 1,4-dioxane contamination and 21 borings during the installation of groundwater monitoring wells.
- Installation of 37 groundwater monitoring wells, including 21 shallow monitoring wells, 13 intermediate screened monitoring wells with 5-foot screened intervals ranging from 30 to 50 feet bls, and three deep groundwater monitoring wells screened 70 to 75 feet bls.

- Laboratory analysis of 103 subsurface soil samples, nine surface soil samples and nine background soil analyses.
- Sampling and analysis of all groundwater monitoring wells, annually from 2009 to 2013.
- Geotechnical analysis of four undisturbed sludge samples.
- Laboratory analysis of oil seep samples.

5.4 Known or Suspected Sources of Contamination

The observed contamination at the Site is attributable to one or more of the following known or suspected sources in the Unsaturated Zone and Main Source Area:

- NAPL in the subsurface as a result of the on-site waste disposal into the Primary Sludge Pit and Secondary Sludge Pit on site.
- Discharges from process tanks/lines from the former oil recycling operations at the Site.

Several contaminant migration pathways shown in Figure 4 have previously contributed and/or continue to result in contaminant migration:

- On-site sludge, mobile NAPL and residual NAPL represent an ongoing release of contamination for soil and groundwater.
- On-site soil with adsorbed phase contamination is a source of leachate for groundwater.
- Historical water table fluctuations have contributed to oily waste overflows that have migrated off-facility, including toward the Bamboo Mobile Home Park to the south.
- Prior stormwater runoff and airborne transport of contaminated fugitive dust from the Site may have carried low-level contamination to adjacent properties.
- Stormwater transport of contamination off-facility has been minimized via stormwater engineering controls. However, the presence of ongoing seeps (daylighting sludge) and the condition of the asphalt cover present an ongoing mechanism for off-facility transport and/or redistribution of contamination.
- Direct contact of the local community or site workers with sludge, oil or contaminated surficial and subsurface soil is also a receptor concern.

5.5 Nature and Extent of Contamination

The nature and extent of contamination of the COCs identified by the RI and risk assessment processes is summarized below for each environmental medium.

5.5.1 Nature and Extent of Sludge Contamination

The physical characteristics and volumetric extent of the sludge pits are an integral factor for the distribution and transport of COCs to different media. The sludge is principally within the assumed perimeter for the Primary Sludge Pit and Secondary Sludge Pit. It is also present at shallower depths across a large portion of the Site. The sludge is bound within a predominantly sand-and-silt mixture. The sludge material consists of a black oily material that includes used oil sludge, residual waste from the clay-acid refining process formerly used at the property, and a

mixture of native soils and fill. The Unsaturated Zone and Main Source Area include the sludge found within the Primary Sludge Pit and the Secondary Sludge Pit; the main differentiator between the two zones is depth. The Unsaturated Zone is the 0-to-5-foot depth interval. The Main Source Area is the 5-to-24-foot depth interval.

The texture of the sludge material is very heterogeneous throughout the Primary Sludge Pit. At some locations, the sludge material exhibits a hard, dry, tacky, rubbery texture with a strong petroleum odor. At other locations, the sludge had a much softer, muddy texture, and seemed to be saturated with NAPL. The nature of the sludge consistency varies across the Site, from a solid and viscous liquid to areas saturated with NAPL. NAPL is present above and below the sludge layer. The sludge acts as a barrier to the horizontal and vertical movement of groundwater due to its oily nature and very low permeability.

The extent of sludge was evaluated through a large array of soil borings. Near the surface, at intervals of 2-to-6-feet bls, the sludge is more widespread than the original pit locations. As depth increases, the sludge is more concentrated in the areas of the Primary Sludge Pit and the Secondary Sludge Pit. Below a depth of 17 feet, the occurrence of sludge is significantly smaller than the footprint of the Primary Sludge Pit and Secondary Sludge Pit. After facility closure in the 1970s, the Site was covered by fill material that may have been partially mixed with residual oily sludge and spread across portions of the property. In addition, due to the shallow groundwater table and frequent rain events, the sludge pits have overflowed and spread thin layers of sludge materials outside of the pits, where it would accumulate in shallow depressions across the Site. A summary of the area and volume of sludge and NAPL material for the combined Primary Sludge Pit and Secondary Sludge Pit is shown below. Areas and volumes down to 6 feet bls are combined as they cannot be distinguished by the sludge pit source.

Sludge – Volumetric Summary

Depth (feet bls)	Thickness (feet)	Impacted Soil Area (feet^3)	Impacted Soil Volume (cubic yards)	Interval Delineation Confidence
CMZ 1 – Unsaturated Zone (0 to 5 feet bls)				
0 – 1	1	NA		very good
1 – 2	1	136,357	5,050	very good
2 – 4	2	223,959	16,590	very good
4 – 5	1	ND		-
CMZ 2 – Main Source Area (5 to 24 feet bls)				
5 – 6	1	336,537	12,464	very good
6 – 7	1	ND		-
7 – 8	1	240,045	8,891	good
8 – 9	1	ND		-
9 – 10	1	176,885	6,551	good
10 – 11	1	ND		-
11 – 12	1	111,220	4,119	good

Sludge – Volumetric Summary

Depth (feet bls)	Thickness (feet)	Impacted Soil Area (feet^3)	Impacted Soil Volume (cubic yards)	Interval Delineation Confidence
12 – 13	1	ND	ND	-
13 – 14	1	92,195	3,415	good
14 – 16	2	ND	ND	-
16 – 17	1	45,080	1,670	fair
17 – 18	1	ND	ND	-
18 – 19	1	18,242	676	fair
19 – 20	1	ND	ND	-
20 – 21	1	10,093	374	fair
21 – 23	2	16,950	628	Fair

Notes:

Areas are interpolated and represent an approximation. The areas and volumes represent the extent of sludge and NAPL impacted soil, not the estimated area/volume of sludge itself. Areas denoted as "ND" were not contoured and hence a specific area and volume is not identified. These areas are expected to be approximately equivalent to the average extent of the immediately overlying and underlying areas.

ND = not determined

NA = not applicable

A subjective determination of the delineation data confidence for the interval is indicated. With increasing depth, some data confidence is lost as not all borings reached the same depths. It should be noted that there is a (relative) lack of sludge data in the central/northern interior of the Primary Sludge Pit as depth increases. There is no indication of sludge material being present within the limestone layers at any depth. NAPL oil associated with the sludge has been noted within limestone at several borings.

Sample analysis of the sludge indicates that a variety of contaminants are present in the sludge pits. SVOCs and polycyclic aromatic hydrocarbons (PAHs) are the most prevalent compounds, as would be expected. Lead was found at concentrations as high as 19,000 mg/kg in the unsaturated zone. The FDEP industrial soil cleanup target level (SCTL) for lead is 1,400 mg/kg. Other metals (e.g., aluminum, chromium, zinc) are present, but at much lower concentrations.

PCBs are present at concentrations from 1.4 mg/kg to 21 mg/kg. Dichlorobenzenes, acetone, 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113), 1,2-dibromo-3-chloropropane (DBCP), 1,2-dibromoethane (EDB), ethyl benzene, toluene, xylenes and other VOC compounds were detected. Low concentrations of perfluorooctane sulfonic acid/perfluorooctanoic acid (PFOA/PFOS) (less than 27 micrograms per kilogram [µg/kg]) and dioxins (less than 240 nanograms per kilogram [ng/kg] as toxicity equivalent) were also detected.

The analytes detected are found in both the Unsaturated Zone and the Saturated Zone. However, the concentrations are more elevated in the Unsaturated Zone. Concentrations of the detected

analytes in many cases are greater than the risk-based levels calculated in the HHRA and FDEP SCTLs. This information is documented in the 2016 RI Report and the 2019 FS Report.

Due to elevated levels of Resource Conservation and Recovery Act (RCRA) hazardous constituents, including lead, some of the sludge and NAPL may be considered a RCRA characteristic waste due to toxicity [40 CFR 261.24]. Any extracted multi-phase NAPL fluids could also be considered a characteristic hazardous waste. The toxicity characteristic is meant to identify those hazardous wastes which, if disposed of in the environment, have the potential of leaching specific hazardous constituents in levels at or above regulatory thresholds. These constituents include eight heavy metals, four insecticides, two herbicides and 25 other organic compounds. The required laboratory test for evaluating wastes under the toxicity characteristic is the toxicity characteristic leaching procedure (TCLP). The maximum concentration of contaminants for the toxicity characteristic are provided in Table 1 of 40 CFR 261.24. For example, the maximum concentration for lead (D008 waste code) is 5 milligrams per liter (mg/L) TCLP. TCLP analysis of 10 subsurface samples from the Primary Sludge Pit ranged from <1 mg/L to 20 mg/L TCLP (SB020), indicating some of the waste to be removed from the Site may exceed the maximum concentration of contaminants for the toxicity characteristic and be classified as a RCRA toxicity characteristic waste.

5.5.2 Nature and Extent of NAPL Contamination

NAPL is present on site as a pore space adherent to the sludge matrix and as a mobile and residual phase product within the native sand matrices outside the Primary Sludge Pit and Secondary Sludge Pit. The NAPL is colored dark brown to black, similar to the sludge. NAPL is present within, above and below the sludge layers. Oil was noted in the Unsaturated Zone in several borings. Oil and or NAPL noted in the Unsaturated Zone is considered waste source material for the Unsaturated Zone. As a primary source contaminant, the transport characteristics of this NAPL, within the high-permeability lithology for the Site, are an integral factor for the distribution of COCs. Due to elevated levels of RCRA hazardous constituents, including lead, some of the sludge and NAPL may be considered a RCRA characteristic waste due to toxicity [40 CFR 261.24]. Any extracted multi-phase NAPL fluids could also be considered a characteristic hazardous waste.

Mobile NAPL will tend to move laterally in coarser, more-permeable portions of heterogeneous media, avoiding the finer-grained zones which provide greater capillary resistance to entry. As a result, mobile NAPL is present as globules connected along fractures, macropores and the larger pore openings. Water occupies the smaller pores and tends to be retained as a film between the nonwetting NAPL globules and media solids. At residual saturation, NAPL occurs as disconnected singlet and multi-pore globules within the larger pore spaces. NAPL can also be present below the water table due to its origin (i.e., buried oily sludge) or due to water-table fluctuations that trap NAPL residually in pores. NAPL below the water table is considered source material for the Main Source Area.

The relatively high viscosity of the NAPL, ongoing sludge/source leaching of oil and persistence of the NAPL in the subsurface has allowed a long period of time for NAPL movement in the subsurface following the sludge placement in the Primary Sludge Pit and Secondary Sludge Pit or past disposal practices of oil spills and surface disposal. Many of the compounds in the oil mixture are typically hydrophobic; they tend to sorb strongly to the subsurface soils and are retained as residual NAPL. Residual saturation conditions reflect a stable equilibrium (no new hydrostatic forces), with complete drainage of mobile NAPL along preferential pathways. Any applied forces, such as a hydrostatic change induced by hurricane flooding, could cause movement of NAPL. Ultimately, the NAPL in the soil matrix will undergo dissolution into groundwater and represents an ongoing, long-term source of dissolved phase contamination.

Five waste oil samples were submitted for laboratory analysis from wells and seeps on the Site. The waste oil samples were analyzed for VOCs, SVOCs, metals and PCBs. Analytical results identified several compounds present. One analyte (PCBs) exceeded the Florida soil commercial/industrial cleanup target levels (CTLs) for direct exposure. The compounds with high concentrations include 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, trichloroethene, 1,1-biphenyl, 2-methylnaphthalene, benzo(a)anthracene, bis(2-ethylhexyl) phthalate, chrysene, naphthalene, phenol, PCB-1242, PCB-1260 and lead. Contaminants detected in the five NAPL samples are summarized below.

NAPL Analytical Testing – Select Results

Chemical	Unit	Minimum Value Detected	Maximum Value Detected	Average Value	FDEP Commercial/ Industrial Soil CTL[1]
1,2-Dichlorobenzene	mg/kg	1.0	60	20.98	5,000
1,2,4-Trimethylbenzene	mg/kg	0.240	190	77.0	95
1,3,5-Trimethylbenzene	mg/kg	1.4	100	38.85	80
Trichloroethene	mg/kg	1.4	14	6.87	9.3
Xylenes, Total	mg/kg	0.180	89	32.26	700
Total VOCs	mg/kg	-	-	**206.4**	-
1,1'-Biphenyl	mg/kg	9.5	19	13.17	34,000
1-Methylnaphthalene	mg/kg	30	100	65	1,800
2-Methylnaphthalene	mg/kg	8.0	100	54	2,100
3 & 4 Methylphenol	mg/kg	29	29	29	3,400
Benzo[a]anthracene	mg/kg	2.0	2.0	2.0	
Bis(2-ethylhexyl) phthalate	mg/kg	39	39	39	390
Chrysene	mg/kg	2.5	11	5.95	
Fluoranthene	mg/kg	3.4	5.1	4.25	59,000
Naphthalene	mg/kg	4.0	72	40.75	300
Phenanthrene	mg/kg	3.5	38	20.12	36,000
Pyrene	mg/kg	2.7	8.4	4.82	45,000
Phenol	mg/kg	110	110	110	220,000

NAPL Analytical Testing – Select Results

Chemical	Unit	Minimum Value Detected	Maximum Value Detected	Average Value	FDEP Commercial/ Industrial Soil CTL[1]
Total SVOCs	mg/kg	-	-	**184.0**	-
1,2-Dibromoethane (EDB)	mg/kg	1.4	1.4	1.4	200
PCB (Aroclors 1242)	mg/kg	16	72	41	2.6
PCB (Aroclors 1260)	mg/kg	3.9	17	10.28	
Chromium (total)	mg/kg	1	44	12	470
Lead	mg/kg	110	440	258	1400
Titanium	mg/kg	6	80	24	-
Zinc	mg/kg	8	71	35	630,000

Notes:

[1] Based on FDEP soil CTLs for commercial/industrial direct exposure, FAC Chapter 62-77, Table II. February 2005.

µg/kg = micrograms per kilogram

Near the surface, at intervals of 2-to-6-feet bls, the NAPL is more widespread than the original pit locations. As depth increases, the NAPL is more concentrated in the areas of the Primary Sludge Pit and the Secondary Sludge Pit. Below a depth of 17 feet, the occurrence of NAPL is significantly less than the footprint of the Primary Sludge Pit and the Secondary Sludge Pit. The covering of the pits in the early 1970s assumes the relocation and transport of oily sludge and NAPL across portions of the Petroleum Products Corporation property. NAPL has most likely spread through pond overflows from high water tables and storm events, stormwater flows and past surface seeps. The deepest observed NAPL impact in limestone is 22 feet bls. Several borings between 23 and 26.5 feet bls (such as PSP-1 and PSP-4) indicated a slight petroleum odor, although no residual or mobile NAPL or significant staining was noted.

5.5.3 Nature and Extent of Soil Contamination

Soil analyses were performed from most borings, including intervals above or below isolated occurrences of NAPL and/or sludge. Following a 2011 removal action, a small inaccessible area of contaminated, petroleum-impacted soil remains under a residential mobile home and will be addressed by this action.

5.5.3.1 Surface Soil – CMZ 1 (Unsaturated Zone)

The Unsaturated Zone encompasses the significantly contaminated soil in the Unsaturated Zone from 0-to-5-feet bls. This zone includes the former Primary Sludge Pit and Secondary Sludge Pit, and several areas believed to be impacted by overflows from the pits and relocation of sludge and NAPL as fill on site. This CMZ was configured to represent the largest mass of significantly contaminated soil containing both potentially mobile and residual NAPL and sludge that could be easily excavated due to unsaturated conditions. Remediation of this zone is principally

focused on protection of human receptors from direct contact with seeps and soil, treatment of PTW, and prevention of leaching of COCs into groundwater.

Analytical results from sampling between 2009 and 2012 confirmed the presence of elevated COC concentrations in site surface soil from 0 to 2 feet bls. Analytical results identified several compounds exceeding FDEP SCTLs for direct contact and leachability, including SVOCs, VOCs, PCBs, dioxins, lead and arsenic. SB018 (1 to 2 feet bls) and SPP-11 (1 to 3 feet bls) had the highest COC concentrations. SB018 and SSP-11 are located in the Primary Sludge Pit and the Secondary Sludge Pit, respectively.

The predominant surface soil contaminant is lead, with sample SSS-7 (22,000 mg/kg, 0 to 0.5 feet bls), exceeding the FDEP industrial/commercial direct contact SCTL of 1,400 mg/kg. SSS-7 is located within the footprint of the former tank farm.

Soil sample SSS-3 (20 mg/kg) exceeded the direct contact SCTL for arsenic of 12 mg/kg. Sample SSS-3 is located within the footprint of the former tank farm.

Dioxin toxicity equivalent and benzo(a)pyrene toxicity equivalent exceedances were also present in multiple samples. SB019 exceeded the 30 nanograms per kilogram (ng/kg) dioxin toxicity equivalent FDEP direct contact SCTL with the highest detection of 240 ng/kg, collected from 4 to 5 feet bls. SB019 is located within the boundary of the Primary Sludge Pit.

SSP-11 exceeded the benzo(a)pyrene toxicity equivalent FDEP leachability SCTL of 8,000 µg/kg, with the highest detection of 20,530 µg/kg, collected from 1 to 3 feet bls. SSP-11 is located along the western boundary of the Secondary Sludge Pit.

5.5.3.2 Subsurface Soil – CMZ 2 (Main Source Area)

The Main Source Area encompasses the significantly contaminated soil in the Saturated Zone from 5 to about 21 feet bls (with a maximum extent of 24 feet bls). This zone includes the former Primary Sludge Pit and Secondary Sludge Pit, and areas believed to be impacted by overflows from the pits and relocation of sludge and NAPL as fill on site. This CMZ was configured to represent the bulk of sludge/NAPL mass that lies deeper within the Saturated Zone. Remediation of this zone is principally focused on treatment of PTW to protect groundwater from soil leachate.

Subsurface soil contamination extends over a broad range both contiguous with the extent of sludge and NAPL, extending beyond the extent of the OU3 Extended Plume. The soil analytical results were compared to FDEP SCTLs for ingestion/contact and leachability. Analytical results identified several compounds exceeding these limits, including VOCs, SVOCs (inclusive of PAHs), PCBs, dioxins, lead and arsenic.

The distribution of lead in subsurface soils is extensive. The average lead concentration for samples exceeding the industrial FDEP leachability SCTL is 8,350 mg/kg. Several samples were elevated for lead concentrations: SSP-9 (22,000 mg/kg, 15 to 17 feet bls) and SSP-20 (23,000 mg/kg, 10 to 12 feet bls). Samples SSP-9 and SSP-20 are both located within the boundary of the Secondary Sludge Pit.

Three samples exceed the chromium FDEP leachability goal of 38 mg/kg. Two subsurface soil results, COEMW-1 and SBB-22 exceeded the 12 mg/kg arsenic industrial FDEP leachability SCTL. One sample has a chromium detection of 100 mg/kg (SSP-13). This sample was collected at the water table interface from 4 to 6 feet bls. Sample SSP-13 is located just north of the boundary of the Secondary Sludge Pit. Among the VOCs detected are benzene, toluene, ethylbenzene and xylene (BTEX). VOC exceedances include chlorinated ethenes, chlorinated ethanes, BTEX, 1,4-dioxane, chlorobenzenes and others. Elevated total VOC values were recorded at PSP-9 and SB019 (within and adjacent to the Primary Sludge Pit).

Several soil samples exceeded FDEP leachability SCTLs for VOCs, SVOCs, PCBs, dioxin and metals. Dioxin toxicity equivalent and benzo(a)pyrene toxicity equivalent exceedances were present in multiple samples. The sample with the highest dioxin detection, SSP-31 (610 ng/kg) from the 19-to-20-foot bls interval, exceeded the 30 ng/kg dioxin toxicity equivalent FDEP leachability SCTL. Boring COEMW-1 recorded the highest benzo(a)pyrene toxicity equivalent detection of 9,434 micrograms per kilogram (µg/kg), exceeding the FDEP leachability SCTL of 8,000 µg/kg.

5.5.4 Nature and Extent of Groundwater Contamination

The groundwater data allows an evaluation of the interaction with various media at the Site. The groundwater contaminant plumes are centered across the Site and extend out to the northwest and southeast near the vicinity of Park Road, with the highest contaminant concentrations in the areas of the Primary Sludge Pit and the Secondary Sludge Pit. High concentrations often correlate to the Primary Sludge Pit and Secondary Sludge Pit OU2 (Main Source Area) and OU3 (Extended Plume CMZ 2 (Main Source Area) and CMZ 3 (Extended Plume) include the groundwater contamination. The main difference between the two zones is the concentrations of COCs detected. Groundwater in the Main Source Area is contaminated with COCs very similar to the COCs in the source material. Sludge and NAPL are in contact with the groundwater. Some observations of highly variable groundwater concentration results, such as lead for example, may be a result of small droplets of NAPL or microparticles of sludge or sludge-sediment composites in the sample.

The highest concentration of lead detected during the 2018 sampling event (47 micrograms per liter [µg/L]) was recorded at COEMW-14A, three times the FDEP MCL of 15 µg/L (FAC Chapter 62-550.310, Table 1). During the 2013 sampling event, lead was recorded at a concentration of 190 µg/L at COEMW-14A. COEMW-14A is located within the boundary of the former tank farm and is screened from 4.5 to 19.5 feet bls. Samples collected in 2013 and 2018 at the deeper paired wells COEMW-14B and COEMW-14C were below the FDEP MCL. The

highest lead detection during the 2013 sampling event was 8,400 µg/L at well COEMW-15A. COEMW-15A is located within the boundary of the Secondary Sludge Pit. COEMW-12C, also located within the boundary of the Secondary Sludge Pit, exceeded the target levels for both manganese and 1,4-dioxane.

Arsenic exceeds the FDEP MCL (10 µg/L) at monitoring well PMW19A, near Park Road at the western boundary of the Site. COEMW-14A contained the highest detection of arsenic (65 µg/L) in the 2013 sampling event. COEMW-14A is located within the boundary of the former tank farm and is screened from 4.5 to 19.5 feet bls.

The 2018 groundwater results indicate that both benzo(b)fluoranthene and indeno(1,2,3-cd) pyrene exceed or are equal to the FDEP GCTL (0.05 µg/L) at monitoring well IMW-B, located near Pembroke Road at the northern boundary of the Site (CMZ3). Monitoring well IMW-B is 51.5 feet in depth. The 2013 groundwater data defines the southern boundary of the dissolved plume within the Bamboo Mobile Home Park, located south of the facility. Arsenic and lead were both detected in monitoring well MW-A, both at levels above the MCL values of 10 µg/L and 15 µg/L, respectively. Monitoring well MW-A has a depth of 10.9 feet. Monitoring well PMW-03A, located south of MW-A, exceeded the FDEP GCTL (3.2 µg/L) for 1,4-dioxane. Monitoring well PMW-03A has a depth of 18.9 feet. Both MW-A and PMW-03A are located south of the facility, in the Bamboo Mobile Home Park (Extended Plume).

A shallow well, BBLPMW-1A, was sampled in 2018, with a total depth of 6.7 feet bls. BBLPMW-1A is located in the northwest corner of the Site. BBLPMW-1A recorded several detections with exceedance levels for SVOC analytes: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene. Each of these analytes exceeded their respective FDEP GCTL.

The Extended Plume encompasses all dissolved- and adsorbed-phase contamination outside of the Main Source Area and extends to as deep as 75 feet bls over a wide area. A broad range of COCs are present in this zone, notably several VOCs, some SVOCs and lead. This CMZ represents the very large volumetric extent of contamination that does not contain NAPL or sludge. Remediation of this zone is principally focused on protection of groundwater and containment of the dissolved plume. This zone is being evaluated as an interim remedial action.

6.0 Current and Potential Future Land and Water Uses

6.1 Land Uses

The Petroleum Products Corporation property includes a mixture of land uses, including light industrial, mobile home/trailer parks, and municipal and private recreation facilities. The current land use for most of the Site is industrial/commercial use. A portion of the Site, the Bamboo Mobile Home Park (located immediately south of the main portion of the Site), is zoned for residential use.

Most of the property is occupied by a self-storage facility (Figure 2). The Site also includes several commercial properties containing mini warehouses used for commercial and private storage and small businesses (e.g., a shooting range, a restaurant, paint and repair shops, cabinet makers, woodworking facilities, manufacturing facilities). The adjacent properties include a public golf course to the north, mobile home/trailer parks to the south and west, and light industrial/commercial businesses to the east and west. Several large manmade retention ponds are located north, south and west of the Site, Figure 1. The Hollywood, Florida municipal wellfield is located 1.5 miles north of the Site and the Hallandale, Florida municipal wellfield is located about 0.5 miles to the east.

The reasonably anticipated future land use for most of the Site is industrial/commercial use. A portion of the Site, the Bamboo Mobile Home Park, is currently zoned for residential use. It is anticipated that it will remain zoned for residential use in the future.

6.2 Ground and Surface Water Uses

The groundwater beneath the Site and the surrounding area is the Biscayne Aquifer, which is federally designated sole-source aquifer that supplies drinking water to the South Florida population. In particular, the Biscayne Aquifer is the primary supply of all fresh groundwater in Broward County, Florida. The FDEP classifies groundwater at the Site as Class G-I and G-II (FAC 62-520.410).

Surface water drainage pathways have been paved and sealed to prevent inadvertent infiltration of surface contamination into the shallow aquifer and there are no permanent surface water features at the Site. However, the paved surface of the Site is hummocky and cracked, with numerous large depressions that hold water resulting from precipitation. Observations made during fieldwork at the Site suggest that standing water drains through cracks and unsealed openings into the subsurface. Permanent surface water features in the area adjacent to the Site include a retention pond about 30 acres in size located due west of the Site across South Park Road. Several small retention ponds (1-2 acres in size) are located directly south of the Site, in the Bamboo Mobile Home Park.

7.0 Summary of Site Risks

As part of the RI/FS, a baseline risk assessment was conducted to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land uses. The baseline risk assessment includes a human health risk assessment and an ecological risk assessment. It provides the basis for taking a CERCLA response action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessment for the Site.

7.1 Baseline Ecological Risk Assessment

The Baseline Ecological Risk Assessment determined that the contamination at the Site did not pose any unacceptable adverse ecological impacts. This determination was made due to the Site's location in a highly developed commercial/industrial area where there was a lack of vegetation with very little habitat to support wildlife. Most of the property is paved or covered with warehouse buildings. The surrounding area includes residential and commercial/industrial areas. The Site and surrounding areas provide marginal habitat for a small number of urban-adapted species. Given the limited areal extent of exposed surface soil, exposures of wildlife to chemicals in surface soil are likely to be minimal, and adverse impacts are unlikely. Birds and small mammals foraging for food in these areas could ingest contaminated soil/sediment. Given the limited availability of food resources at the Site, and the availability of numerous other foraging areas scattered throughout the urban area, exposures are likely to be infrequent and insignificant. Ecological exposures within the site boundary were considered infrequent and the potential for adverse ecological impacts is considered unlikely.

7.2 Human Health Risk Assessment

The EPA completed human health risk assessments for the Site in 1992 and 2016. Following additional site investigations in 2017 and 2018, the analytical data were evaluated to determine if more risk characterization was warranted. It was determined that constituent concentrations in the 2017 and 2018 samples were consistent with the data used in the 2016 Supplemental Human Health Risk Assessment (HHRA). Therefore, it was concluded that further risk characterization was not warranted.

The HHRA follows a four-step process:

1) *Hazard Identification:* identifies those hazardous substances which, given the specifics of the Site, are of significant concern.
2) *Exposure Assessment:* identifies actual or potential exposure pathways, characterizes the potentially exposed populations, and determines the extent of possible exposure.
3) *Toxicity Assessment:* considers the types and magnitude of adverse health effects associated with exposure to hazardous substances.
4) *Risk Characterization and Uncertainty Analysis:* integrates the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates.

7.2.1 Hazard Identification

The chemicals of potential concern (COPCs) were selected based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. They can be found in the baseline 2016 Supplemental HHRA. From this, a subset of the chemicals was identified as presenting current or future unacceptable risk and/or were identified at the Site in excess of the chemical-specific ARAR value. This ROD refers to these chemicals as the Site's COCs. Tables 1 through 3 list the site COCs identified in surface soil (Unsaturated Zone), subsurface soil (Main Source Area) and groundwater (Dilute Plume).

A subset of COCs, classified as "risk drivers", is listed by media below.

Site COCs, by Media

Surficial Soil[1]	Subsurface Soil	Groundwater[2]	
SVOCs	**VOCs**	**VOCs**	**Metals**
Benz(a)anthracene	1,2-Dibromoethane/ethylene dibromide (EDB)	Benzene	Antimony
Benzo(a)pyrene	**SVOCs**	cis-1,2-Dichloroethene	Arsenic
Benzo(b)fluoranthene	Benz(a)anthracene	Trichloroethene (TCE)	Lead
Dibenz(a,h)anthracene	**Other**	Vinyl chloride	Vanadium
Indeno(1,2,3-cd)pyrene	PCB (Arochlor 1016)	**SVOCs**	
Other	PCB (Arochlor 1248)	Naphthalene	
PCB (Arochlor 1016)	PCB (Arochlor 1260)	1,4-Dioxane	
PCB (Arochlor 1248)	PCB (Arochlor 1254)	**Other**	
PCB (Arochlor 1260)	Dioxin TEQ	PCB (Arochlor 1242)	
Dioxin toxicity equivalent (TEQ)	**Metals**	PCB (Arochlor 1260)	
Metals	Arsenic	Dioxin TEQ	
Arsenic	Lead		
Lead			

Notes:

[1] Surficial soils considered to be those soils 1-to-2-feet bls.

[2] COCs from all groundwater sources (i.e., groundwater with sludge and groundwater without sludge.

7.2.2 Exposure Assessment

Exposures to COPCs were estimated quantitatively or qualitatively through the development of several different exposure scenarios. Exposure scenarios were developed based on the nature and extent of contamination, the location of the Site, current and future potential use of the Site, and identification of potential receptors and exposure pathways. Potentially complete exposure pathways and populations included:

- Incidental ingestion, dermal contact with surface soil (tenants, residents, indoor/outdoor workers, construction workers).
- Incidental ingestion and dermal contact with subsurface soil (residents, outdoor workers, construction workers).
- Incidental ingestion of groundwater, dermal contact with groundwater (tenant, residents, indoor/outdoor workers, construction workers).
- Incidental ingestion of sludge/seepage (older child tenant).

Figure 6 shows the HHRA's Conceptual Site Model with completed exposure pathways for the Site. Exposure point concentrations (EPCs) are the COPC concentrations that a receptor is assumed to encounter during exposure to contaminated site media. Generally, the 95% upper confidence limit (UCL) of the arithmetic mean concentration is used as the EPC for both central tendency exposure and reasonable maximum exposure (RME) scenarios. The RME is the maximum exposure that is reasonably expected to occur for a given exposure pathway at a Site and is intended to account for both uncertainty in the contaminant concentration and variability in the exposure parameters. Only the RME scenario was evaluated in the 2016 Supplemental HHRA. Based on the EPCs, estimates of human intake, expressed in terms of mass of chemical per unit body weight per time (milligrams per kilogram per day [mg/kg/day]), were calculated differently depending on whether the COPC is a non-carcinogen or a carcinogen. For non-carcinogens, intake was averaged over the duration of exposure. For carcinogens, intake was averaged over the average lifespan of a person (70 years). The equations, input parameters and chemical EPCs for the noncancer and cancer evaluations are provided in the 2016 Supplemental HHRA. Tables 4 through 11 list the EPCs.

7.2.3 Toxicity Assessment

The toxicity assessment identifies the cancer and noncancer effects that may arise from exposure to chemicals at the Site. Chronic toxicity values are used to evaluate potential unacceptable risks. The toxicity values were obtained using the most current toxicity data available in accordance with the EPA's hierarchy of human health toxicity values generally recommended for use in risk assessments. The toxicity values used in the 2016 Supplemental HHRA were:

- Chronic reference dose (RfD) for non-carcinogenic effects. Chronic RfDs were derived from the no-observed-adverse-effect-level (NOAEL) for the critical toxic effect and were developed to be protective over an exposure period of seven years to a lifetime.
- Oral cancer slope factors (SFs) for carcinogenic effects.

In the derivation of a dermal RfD, the oral RfD was multiplied by the gastrointestinal absorption factor (GAF). The dermal SF was derived by dividing the oral SF by the GAF. The oral toxicity factors were only adjusted if the GAF for the specific chemical was less than 50% or 0.50.

Since lead toxicity values are not available, the EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model was used to evaluate lead uptake in children (e.g., a resident child and tenant). The Adult Lead Methodology (ALM) was used to evaluate lead uptake in adults (e.g., adult tenants, indoor workers, outdoor workers, adult residents and construction workers).

7.2.4 Risk Characterization

Risk characterization integrates the results of the exposure assessment and toxicity assessment to estimate the probability or potential that adverse health effects may occur if no action were to be taken at a site. Noncancer health effects were evaluated for all COPCs (i.e., including carcinogens) for which noncancer toxicity values are available. Carcinogenic risks were

calculated for those COPCs with evidence of carcinogenicity and for which cancer toxicity values are available.

7.2.4.1 Noncancer Health Effects

Noncarcinogenic effects were quantified by comparing the estimated dose (i.e., ingested or dermally absorbed) of the COPCs with the RfDs (i.e., the chemical-specific toxicity value used for expressing noncarcinogenic effects). The hazard quotient (HQ) associated with the incidental ingestion of affected media (i.e., surface/subsurface soil or groundwater) was calculated using the following equation:

$$HQ = \frac{Id}{RfDo}$$

where:

HQ = hazard quotient (unitless)
Id = ingested or dermally absorbed dose of COPC in media (mg/kg-day)
RfDo = oral reference dose (mg/kg-day)

To characterize the overall potential for non-carcinogenic effects associated with exposure to multiple chemicals, the EPA uses a hazard index (HI) approach. Since a potential receptor is likely to be exposed to more than one chemical by more than one exposure route, an estimate of total noncarcinogenic hazard was performed by summing the HQ values across different chemicals and across different exposure pathways. The sum of the HQs is termed the HI. It is calculated as follows:

$$HI = HQ1 + HQ2 + \ldots + HQith\ toxicant$$

Calculation of an HI in excess of 1 indicates the potential for adverse health effects.

Summary of the Reasonable Maximum Exposure Noncancer Hazard for All Receptors

Receptor			Total Noncancer HI	Highest Target Organ Noncancer HI	Notes
Tenant	Young Child	Current	10	**5**	Incidental ingestion of surface soil; respiratory
		Future	640	**447**	Incidental ingestion of groundwater; renal, hepatic, neurological
	Older Child	Current	1	NA	NA
		Future	345	**244**	Incidental ingestion of groundwater; renal, hepatic, neurological
	Adult	Current	1	NA	NA

Summary of the Reasonable Maximum Exposure Noncancer Hazard for All Receptors

Receptor			Total Noncancer HI	Highest Target Organ Noncancer HI	Notes
		Future	240	**168**	Incidental ingestion of groundwater; hepatic, neurological
Occupational	Indoor Worker	Current	0.5	NA	
Occupational	Indoor Worker	Future	114	**81**	Incidental ingestion of groundwater; renal, hepatic, neurological
Occupational	Outdoor Worker	Current	2	< 1	NA: Total HI > 1, but all target organ HIs < 1
Occupational	Outdoor Worker	Future	105	**73**	Incidental ingestion of groundwater; hepatic, neurological
Resident	Child and Adult (age adjusted)	Future	491	**326**	Incidental ingestion of groundwater; hepatic, neurological
Commercial/ Industrial	Construction Worker	Future	92	**65**	Incidental ingestion of groundwater; renal, hepatic

Notes:

For each receptor, the current exposure scenario includes exposure to surface soil. The future exposure scenario includes exposure to surface soil as well as exposure to groundwater (assuming that site groundwater is used as the source of drinking water).

NA = not applicable

The cumulative HI exceeds 1 for the current and future young child tenant and future outdoor worker, the future older child and future adult tenant, future indoor worker, and future resident and future construction worker scenarios. No unacceptable noncancer hazards were identified for the other receptor scenarios.

Tables 4 through 11 show noncancer hazards to surface soil were unacceptable only for residents and tenant child (HIs ranging from 1 to 3). Noncancer hazards to subsurface soil were unacceptable only to residents (HI = 3). Noncancer hazards to groundwater without sludge pits were unacceptable for residents, outdoor workers, tenant children and construction workers (HIs ranging from 5 to 41), with construction workers having with the lowest hazard and tenant children having the highest hazard.

7.2.4.2 Cancer Health Effects

Carcinogenic risk is expressed as a probability of developing cancer as a result of lifetime exposure and is expressed as the incremental lifetime cancer risk (ILCR) to an individual or

population exposed to contaminants at a site and were quantified as the product of the estimated dose (i.e., ingested or dermally absorbed) of the COPCs multiplied by the SFs. For a given chemical and route of exposure, excess lifetime cancer risk was calculated as follows:

$$ILCR = Id \times SFo$$

where:

ILCR = incremental lifetime cancer risk (unitless)

Id = ingested or dermally absorbed dose of COPC in media (mg/kg-day)

SFo = oral slope factor $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that are generally expressed in scientific notation (e.g., 1E-06 or $1x10^{-6}$). For exposures to multiple carcinogens, the EPA assumes that the risk associated with multiple exposures is equivalent to the sum of their individual risks. Increased cancer risks less than $1x10^{-6}$ indicate no action is required. Cancer risks between $1x10^{-6}$ and $1x10^{-4}$ generally do not warrant cleanup unless dictated by site-specific circumstances or other considerations. Increased cancer risks greater than $1x10^{-4}$ indicate some type of action needs to be considered.

Summary of the Reasonable Maximum Exposure Carcinogenic Risks for All Receptors

Tenant	Young Child	**3×10^{-4}**	**1×10^{-2}**
	Older Child	9×10^{-5}	**2×10^{-2}**
	Adult	1×10^{-4}	**3×10^{-2}**
Worker	Indoor	7×10^{-5}	**1×10^{-2}**
	Outdoor	1×10^{-4}	**1×10^{-2}**
Resident	Child and Adult (age adjusted)	NA	**7×10^{-2}**
Commercial/Industrial	Construction Worker	NA	**5×10^{-4}**
Notes: NA = not applicable			

Total ILCR exceeds the target risk range of $1x10^{-6}$ to $1x10^{-4}$ for the current and future young child tenant, the future older child and future adult tenant, the future indoor and outdoor worker, and the future resident and future construction worker scenarios. The calculated cancer risks for other receptors are in the acceptable risk range.

At the time, the 2016 Supplemental HHRA was finalized, the EPA was using a blood-lead target of 10 micrograms per deciliter (µg/dL) in the IEUBK model and ALM. An assessment of a surface soil lead EPC of 7,621 mg/kg results in an unacceptable risk (greater than 5% probability of exceeding the blood-lead target) to an on-site worker and a hypothetical future resident. Since

that time, the EPA has considered lowering the blood-lead target when assessing lead contamination. Using any lower blood-lead target would still equate to an unacceptable risk for both an on-site worker and a hypothetical future resident. The groundwater lead concentration is above the FDEP MCL of 15 mg/L that is a Chemical-specific ARAR.

The cumulative cancer risk for exposure to surface soil was unacceptable only for resident (incremental lifetime cancer risk of 3E-04) and tenant child scenarios (incremental lifetime cancer risk of 2E-04) while exposure to subsurface soil posed unacceptable risk only to the residents (incremental lifetime cancer risk of 2E-04). Risk from exposure to groundwater without the sludge pits was unacceptable for the resident, tenant child and outdoor worker scenarios, with residents exposed to the highest risks (incremental lifetime cancer risk of 4E-03).

The cumulative HIs and cancer risks for all other current and current and future receptor scenarios are in the 2016 Supplemental HHRA.

7.2.5 Uncertainties

The uncertainty analysis describes the uncertainty associated with each step of the risk assessment process. Since it is impossible to eliminate all uncertainty, it is critical to identify the level of uncertainties in the risk assessment to understand and use the results for risk management purposes. Such uncertainties include, but are not limited to, the variations in sample analytical results, the values of variables used as input parameters, the development of the exposure scenarios, and the high-to-low dose and interspecies extrapolations for dose-response relationships in toxicity data. In addition, the use of chronic toxicity data instead of sub-chronic toxicity data for the construction worker added a level of uncertainty to the risk assessment. In general, these uncertainties in risk assessment are largely overcome by conservative estimates of chemical concentrations and exposure parameters to ensure that potential exposure and risk are not underestimated.

The estimate of noncarcinogenic hazards and carcinogenic risks in the Supplemental HHRA was based on many assumptions and, therefore, involved a significant degree of uncertainty. This uncertainty is inherent in the risk assessment process within the current constraints of scientific knowledge regarding human health risk factors. The HI approach assumes that all noncancer adverse effects to the same organ or systems are additive. Therefore, the HI approach is appropriate for assessing chemicals that have similar modes of action and act on the same target organ. However, it may not be appropriate when there are different modes of action. It is important for risk managers to consider these uncertainties when interpreting the site risk assessment results to determine appropriate remedial alternatives based on the risk assessment conclusions.

8.0 Basis for Action

The remedial action selected in this ROD is necessary to protect public health and the environment from actual or threatened releases of hazardous substances, contamination and pollutants into the environment.

9.0 Remedial Action Objectives

Remedial action objectives (RAOs) consist of media-specific goals for protecting human health and the environment that are developed during the RI/FS process to guide evaluation of remedial alternatives and must be met by the selected remedy. The RAOs were developed for COCs in the media of concern, the exposure routes and receptors, and the acceptable contaminant levels or range of levels for each exposure route. The RAOs developed to address the human health risks posed by the contamination at the Site are presented below:

Source Material NAPL and Sludge (CMZs 1 and 2)

- Prevent leaching from COC source material from the subsurface to groundwater above levels that are protective for beneficial use (i.e., drinking water use).
- Prevent human exposure to COCs in site soils through direct contact above levels protective of residential and industrial use.

Groundwater (CMZ 3)

- Prevent human exposure to COCs in groundwater through ingestion, and dermal contact above levels that are protective for beneficial use (i.e., drinking water use).
- Prevent migration of COCs in groundwater above levels that are protective for beneficial use (i.e., drinking water use).

Soil (CMZs 1 and 2)

- Former Facility Property:
  - Prevent leaching of COCs from soil to groundwater above levels that are protective for beneficial use (i.e., drinking water use).
  - Prevent human exposure to COCs in surface and subsurface soil through ingestion and dermal contact above levels protective of commercial/industrial use.
- Bamboo Mobile Home Park:
  - Prevent human exposure to COCs in subsurface soil through ingestion and dermal contact above levels protective of residential use.

Tables 12 and 14 list the COCs for soil and groundwater, respectively, and their associated cleanup level. Cleanup levels were mainly based on chemical-specific ARARs, including FDEP SCTLs and GCTLs (that include MCLs), as indicated in the tables referenced above. Groundwater cleanup levels are used to measure performance of the interim remedy for the Extended Plume.

10.0 Description of Alternatives

To develop and focus the remedial alternative process in the FS, soil and groundwater contamination at the Site were classified into three CMZs. A CMZ represents a portion of the site contamination that has a particular characteristic that defines the optimal remediation approach. Defining characteristics can include one or more parameters such as lithology, COCs, depth, areal extent, and/or presence of sludge or NAPL. Classification of the Site into CMZs allowed remedial alternatives to be tailored to these conditions, resulting in a more economical and focused remedy.

10.1 Description of the Common Elements

10.1.1 Institutional Controls

Institutional controls (ICs) will be required as part of the selected remedy. ICs are nonengineered instruments, such as administrative and legal controls, that help to minimize the potential for exposure to contamination and/or protect the integrity of a response action. ICs are typically divided into four categories: proprietary controls (e.g., recorded restrictive covenant); governmental controls (e.g., zoning or local ordinances); enforcement and permit tools with IC components (e.g., construction permit requirements; use restrictions in lease between landowner and lessees); and informational devices (e.g., recorded Notice).The objectives of the ICs for implementation at the Site are:

- Prohibit disturbance of the in-situ treated waste that remains at the Site and interference with the integrity of any existing or future remediation system and/or monitoring wells without prior EPA and FDEP approval. This objective can be achieved by using a recorded Notice and restrictive covenant executed by the property owner(s) and approved by the EPA and the FDEP and construction permit requirements and leases between landowner and lessees.
- Prohibit groundwater well installation and all uses of groundwater use at the Site including but not limited to human consumption, dewatering, irrigation, heating/cooling purposes and industrial processes (unless prior approval is obtained from EPA and FDEP). This objective can be achieved by using local zoning/ordinances, construction permit requirements, and leases between landowner and lessees.
- Prohibit residential, and recreational future use of the property (other than Bamboo Mobile Home Park which is currently residential). This objective can be achieved by using a recorded restrictive covenant executed by the property owner(s) and approved by the EPA and the FDEP.

10.1.2 Unsaturated Zone

Two remedial components are included in the overall remedial effort for the Unsaturated Zone. These elements are considered common, as each alternative will include these components. A comparative analysis of the common elements was not completed because these alternatives were deemed to be the most beneficial with no practical alternatives.

As part of excavation and demolition components, tenants, residents, and businesses currently located within the boundaries of the affected areas (defined as the extent of CMZ-1 and CMZ-2) will need to be temporarily or permanently relocated to off-site locations. Relocation of businesses, tenants and residents will be performed pursuant to or consistent with the Uniform Relocation Assistance and Real Property Acquisition Act, 42 U.S. Code §§ 4601 et seq., and regulations promulgated pursuant thereto at 49 CFR. Part 24, depending on whether the EPA or the PRP Group is the lead to perform the relocation activities.

10.1.3 Common Element 1 – Bamboo Mobile Home Park Excavation and Relocation

Estimated Capital Costs: $141,500
Estimated Annual Operation and Maintenance (O&M) Costs: $0
Estimated Present Worth Costs: $142,000
Estimated Construction Timeframe: less than 1 month
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

This common element consists of the excavation of contaminated soil from one residential area at the Bamboo Mobile Home Park. The mobile home and its tenants would be temporarily relocated so that area could be excavated down to the top of the water table (between 4.5 and 5 feet bls). The sides of the excavation would be sloped as necessary to permit safe excavation. The base of the excavation is estimated to be about 2,285 square feet. The FDEP residential SCTLs are relevant and appropriate chemical-specific requirements that are the basis for the soil cleanup levels for the Bamboo Mobile Home Park property. Clean soil would be placed into the excavation area; compacted and include a vegetation or gravel cover to match previous site conditions.

As part of excavation and demolition components of the common remedies, tenants and businesses currently located within the boundaries of the affected areas will need to be temporarily or permanently moved to off-site locations. Relocation of businesses, tenants and residents will be performed pursuant to or consistent with the Uniform Relocation Assistance and Real Property Acquisition Act, 42 U.S. Code §§ 4601 et seq., and regulations promulgated pursuant thereto at 49 CFR. Part 24, depending on whether the EPA or the PRP Group is the lead to perform the relocation activities.

Batches of the excavated soil will be sampled and TCLP analyzed to determine if the excavated soil is a RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches that are found to be characteristic hazardous waste will require treatment off-site to meet RCRA alternative land disposal restriction (LDR) requirements for contaminated soil prior to disposal in an off-site permitted RCRA Subtitle C landfill approved by the EPA..

10.1.4 Common Element 2 – Building Demolition and Relocation of Businesses and Tenants Overlying the Main Source Area

Estimated Capital Costs: $1,691,000
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $1,691,000
Estimated Construction Timeframe: 1 month
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

This common element consists of the demolition of five buildings (Figure 7) in the center of the Site that overlie the former Primary Sludge Pit and the Secondary Sludge Pit where extensive sludge and NAPL contamination extends to 24 feet bls. Debris from the warehouses, their underlying concrete slabs and the adjacent asphalt overlying the Main Source Area will be sampled so that the materials can be characterized. The characterized debris will be cleaned as necessary and sent to the local RCRA Subtitle D landfill as construction debris. If debris is designated as a RCRA hazardous debris, it will be sent to an off-site RCRA Subtitle C landfill for treatment and disposal. As part of excavation and demolition components of the common remedies, tenants and businesses currently located within the boundaries of the affected areas will need to be temporarily or permanently moved to off-site locations. Relocation of businesses/tenants will be performed pursuant to the Uniform Relocation Act, 42 U.S. Code §§ 4601 et seq., and regulations promulgated pursuant thereto at 49 C.F.R Part 24.

A fair market value appraisal of the five buildings completed in mid-2019 determined that the estimated value of the buildings was $9.5M.

10.1.5 Common Element 3A – Shallow Excavation Under Buildings – Retain Existing Buildings

Estimated Capital Costs: $4,572,000
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $4,572,000
Estimated Construction Timeframe: 6 months
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

Shallow (0 to 5 feet bls) sludge/NAPL contamination exists under more buildings on the Site, as shown on Figure 6. (These six buildings for Common Element 3 are in addition to the five buildings identified for Common Element 2) There are an estimated 7,200 cubic yards of contaminated soil beneath these six buildings. More detailed sampling will be conducted during the remedial design to delineate the full extent of the contamination under the buildings. Although not anticipated, if contamination under the buildings is more extensive than planned or it is found to be infeasible to perform shallow excavation while retaining the buildings, any or all of the six buildings may be demolished, as needed to achieve the RAOs.

This remedial component requires excavation of contaminated material beneath the six buildings up to a depth of 5 feet bls and backfilling with clean soil. Initially, excavation of soil to a depth

of 2 feet around the perimeter of the building will be conducted and may be backfilled with soil or flowable concrete fill. Temporary shoring (such as I-beams, timber, jacks and/or pneumatic pillows) will be used to support the footer during excavation. Once the shoring is in place, the soil beneath the building(s) can be excavated, possibly pneumatically. Excavation beneath the buildings will be excavated in sections to ensure building stability. After the contaminated soil has been excavated clean compacted soil fill will be used to backfill the excavation.

Batches of the excavated soil will be sampled and TCLP analyzed to determine if the excavated soil is a RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches that are found to be characteristic hazardous waste will require treatment off site to meet alternative LDR requirements for soil prior to disposal in an off-site permitted RCRA Subtitle C landfill approved by the EPA.

10.1.6 Common Element 3B – Shallow Excavation Under Buildings – Demolish Existing Buildings

Estimated Capital Costs: $5,635,000
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $5,635,000
Estimated Construction Timeframe: 2 months
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

Shallow (0 to 5 feet bls) sludge/NAPL contamination exists under six more buildings on the Site, as shown on Figure 6. (These six buildings for Common Element 3 are in addition to the five buildings identified for Common Element 2.) There are an estimated 7,200 bank cubic yards of COC-contaminated soil beneath these six buildings. During the remedial design, an investigation will need to be completed to determine the full extent of the contamination under the buildings. This alternative assumes that the contamination under the buildings will be extensive or it will be found to be unfeasible to perform shallow excavation below the buildings while maintaining the buildings intact, so these six buildings will have to be demolished. As part of excavation and demolition components of the common remedies, tenants and businesses currently located within the boundaries of the affected areas will need to be temporarily or permanently moved to off-site locations. Relocation of businesses, tenants and residents will be performed pursuant to or consistent with the Uniform Relocation Assistance and Real Property Acquisition Act, 42 U.S. Code §§ 4601 et seq., and regulations promulgated pursuant thereto at 49 CFR. Part 24, depending on whether the EPA or the PRP Group is the lead to perform the relocation activities.

The buildings will be demolished first. Debris from the demolished warehouses, their underlying concrete slabs and the adjacent asphalt will be managed like the demolished warehouses in Common Element 2.

After the buildings have been demolished, the excavation will proceed. The initial excavations will be around the perimeters of the demolished buildings. After the contaminated soil has been excavated, clean compacted soil fill will be used to backfill the excavation.

Batches of the excavated soil will be sampled and TCLP analyzed to determine if the excavated soil is a RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches that are found to be characteristic hazardous waste will require treatment off-site to meet alternative LDR requirements for soil prior to disposal in an off-site permitted RCRA Subtitle C landfill approved by the EPA.

10.2 Description of the Unsaturated Zone Remedy Alternatives

Unsaturated sludge/NAPL source material in the Unsaturated Zone is a PTW. Currently, the shallow sludge and NAPL are a long-term source of leachate for underlying groundwater. The Unsaturated Zone represents the largest areal extent of sludge and NAPL on-facility and includes the former shallow extent of the sludge pits and significant areas impacted from overflow of the ponds or sludge/NAPL redistribution from site fill/grading activities. The entire surface of the Unsaturated Zone is overlain by the warehouse buildings with active tenants, asphalt, utilities and vehicles. Five remedial alternatives were developed and evaluated for the Unsaturated Zone.

10.2.1 Unsaturated Zone Alternative 1: No Action

Estimated Capital Costs: $0
Estimated Annual O&M Costs: $86,100
Estimated Present Worth Costs: $86,100
Estimated Construction Timeframe: not applicable
Estimated Time to Achieve RAOs/Cleanup Levels: greater than 30 years

NCP Section 300.430(e)(6) directs that a "No Action Alternative" be evaluated to provide a baseline scenario to compare all other alternatives against. Under the No Action Alternative, no funds would be expended to address the risks posed by the contamination in this area. Funds are required for the statutory Five-Year Reviews of the Site, site visits, review of regulatory changes and report preparation.

Under the No Action Alternative, the Unsaturated Zone would remain in its present condition. Minimal periodic sampling and analysis of COCs in soil would be used to track contaminant concentrations over the course of a 30-year monitoring period. The collected sample data will facilitate evaluation of the conditions in the Unsaturated Zone for the Five-Year Reviews.

10.2.2 Unsaturated Zone Alternative 2: Excavation and Off-Facility Disposal in Landfill

Estimated Capital Costs: $14,372,100
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $14,372,100
Estimated Construction Timeframe: 6 months
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

This alternative consists of excavation of the contaminated soil within the Unsaturated Zone, along with the necessary sidewall slope volumes to allow the excavation. A shallow (10 feet bls) sheet pile wall will be installed around the area of the five demolished buildings (Common Element 2) to protect the buildings on the periphery of the Unsaturated Zone excavation and will minimize the side slope soil removal. About 49,300 cubic yards of soil would be excavated to About 5 feet bls to remove COC-contaminated soil. PTW is represented by the sludge and NAPL and is expected to be encountered during this action. Clean compacted soil fill will be used to backfill the excavation areas.

Batches of the excavated soil (including any NAPL or sludge) will be sampled and TCLP analyzed to determine if the excavated soil is a RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic hazardous waste will be disposed of in an off-Site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches that are found to be characteristic hazardous waste will require treatment off site to meet alternative LDR requirements for soil and LDR treatment standards for waste (i.e., NAPL/sludge) prior to disposal in an off-site permitted RCRA Subtitle C landfill approved by the EPA.

10.2.3 Unsaturated Zone Alternative 3: Excavation, Ex-Situ Stabilization/Solidification and Disposal

Estimated Capital Costs: $12,785,000
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $12,785,000
Estimated Construction Timeframe: 6 months
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

This alternative consists of excavation of contaminated soil within the Unsaturated Zone, along with the necessary sidewall slope volumes to permit excavation. As in Unsaturated Zone Alternative 2, a 2 shallow (10 feet bls) sheet pile wall will be installed around the area where the five demolished buildings (Common Element 2) to protect the buildings on the periphery of the Unsaturated Zone excavation and will minimize the side slope removal. About 49,300 cubic yards of soil would be excavated to a depth of about 5 feet bls to remove COC-contaminated soil. PTW is represented by the sludge and NAPL and is expected to be encountered during this action.

Batches of the excavated soil will be sampled and TCLP analyzed to determine if the excavated soil is a RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic

hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches that are found to be characteristic hazardous waste will require treatment off site to meet alternative LDR requirements for contaminated soil.

Excavated soil would be stabilized/solidified above grade to meet alternative LDR treatment standards. Following ex-situ stabilization/solidification treatment, the soil will be placed in an on-site engineered disposal unit that complies with identified RCRA ARARs. The treated soil disposed of in the engineered unit will be covered with a multi-layered cap that complies with identified RCRA Subtitle C or D landfill final cover requirements. The capped area would need to be specifically designed and constructed with adequate strength to support the anticipated use of the property including constructed buildings while ensuring the performance of the remedy.

To keep land surface as close as possible to existing grade, any excess soil (stabilization/solidification often causes an increase in volume) will be characterized using TCLP to determine if considered RCRA hazardous waste due to exhibiting the characteristic of toxicity. Soil batches that are not characteristic hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA.

10.2.4 Unsaturated Zone Alternative 4: In-Situ Stabilization/Solidification with Limited Soil Excavation and Off-Facility Disposal

Estimated Capital Costs: $12,339,800
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $12,339,800
Estimated Construction Timeframe: 5 months
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

The primary treatment portion of this alternative consists of the use of in-situ stabilization/solidification to isolate and stabilize the sludge and NAPL (considered a PTW) and contiguous soil contamination within the Unsaturated Zone down to 5 feet bls. In-situ stabilization/solidification would treat about 21,800 bank cubic yards over 4.5 acres. The in-situ treated waste/soils will be covered with at least a 2-foot-thick, clean compacted soil fill. The in-situ stabilization/solidification areas would need to be specifically designed and constructed with adequate strength to support the anticipated use of the property including constructed buildings while ensuring the performance of the remedy.

About 18,440 cubic yards of the stabilized soils and non-stabilized soils from 0 to 2 feet bls will be excavated. Batches of the excavated soil will be sampled and TCLP analyzed to determine if the excavated soil is considered RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches that are found to be characteristic hazardous waste will require treatment to meet alternative LDR treatment standards. Treated soil that meets LDRs and is no longer toxicity characteristic waste (using TCLP) may be disposed of in an off-site

permitted RCRA Subtitle D landfill. Treated soil that is still considered toxicity characteristic waste must be disposed in an off-site permitted RCRA Subtitle C landfill approved by the EPA.

10.2.5 Unsaturated Zone Alternative 5: Excavation, Ex-Situ Thermal Treatment and Stabilization/Solidification with Disposal

Estimated Capital Costs: $15,610,100
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $15,610,100
Estimated Construction Timeframe: 6 months
Estimated Time to Achieve RAOs/Cleanup Levels: Less than 1 year

This alternative consists of excavation of contaminated soil within the Unsaturated Zone, along with the necessary sidewall slope volumes to permit excavation. As in Unsaturated Zone Alternatives 2 and 3, a shallow (10 feet bls) sheet pile wall will be installed around the area where the five buildings are demolished (Common Element 2) to protect the buildings on the periphery of the Unsaturated Zone excavation and will minimize the volume of side slope removal. About 49,300 bank cubic yards of soil would be excavated to a depth of about 5 feet bls.

The excavated soils would be treated ex situ with a STARx batch smoldering process enclosed within a new fabricated steel building. The STARx process will remove more than 99% of the organic contamination in the excavated soils. The STARx-treated soils are expected to need further off-site ex-situ treatment to manage the metals contamination that will remain after STARx treatment. To treat the residue of metals contamination, following the STARx process, the treated soil would be stabilized/solidified above grade to meet alternative LDR treatment standards. Following ex-situ stabilization/solidification treatment, the soil will be placed in an on-site engineered disposal unit that complies with RCRA ARARs. The treated soil will then be disposed of in the on-site engineered unit and covered with a multi-layered cap that complies with identified RCRA Subtitle C landfill final cover requirements. The capped area would need to be specifically designed and constructed with adequate strength to support the anticipated use of the property including constructed buildings while ensuring the performance of the remedy.

10.3 Description of the Main Source Area Remedy Alternatives

Unsaturated sludge/NAPL source in the Main Source Area is deemed an extensive area of PTW within the aquifer. Currently, the deeper sludge and NAPL are a significant long-term source of leachate for contiguous groundwater. The main source area represents the largest volume of sludge and NAPL on-facility and includes the full depth of the former sludge pits, and sludge/NAPL redistribution from site fill/grading activities. In addition to sludge and mobile NAPL, the Main Source Area includes soil impacted with residual NAPL levels and adsorbed phase contamination of a variety of COCs. The entire surface of the main source area is overlain by the warehouse buildings with active tenants, asphalt, utilities and vehicles.

After further evaluation by the EPA, Main Source Area Alternative 4 (Excavation, Ex-Situ Thermal Treatment and Stabilization with On-Site Disposal) developed in the FS was later determined by the EPA to be either too costly as result of regulatory requirements or impractical from an engineering perspective and in consideration of the intended land use at the Site. As a result, the ROD only presents the remedial alternatives that are considered for remedy selection. Accordingly, the remedial alternatives retain the original number in the FS and are not necessarily in numerical sequence. Four remedial alternatives were developed and evaluated for the Main Source Area.

10.3.1 Main Source Area Alternative 1: No Action

Estimated Capital Costs: $0
Estimated Annual O&M Costs: $86,100
Estimated Present Worth Costs: $86,100
Estimated Construction Timeframe: Not Applicable
Estimated Time to Achieve RAOs/Cleanup Levels: greater than 30 years

NCP Section 300.430(e)(6) directs that a "No Action Alternative" be evaluated to provide a baseline scenario to compare all other alternatives against. Under the No Action Alternative, no funds would be expended for control or remediation of the contaminated soils and PTW.

Under the No Action Alternative, the Main Source Area would remain in its present condition. Minimal periodic sampling and analysis of COCs in soil would be used to track contaminant concentrations over the course of a 30-year monitoring period. The collected sample data will facilitate evaluation of the conditions in the Unsaturated Zone for the Five-Year Reviews.

10.3.2 Main Source Area Alternative 2: Excavation and Off-Facility Disposal in Landfill

Estimated Capital Costs: $28,437,700
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $28,437,700
Estimated Construction Timeframe: 7 months
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

This alternative consists of excavation of contaminated soil within the Main Source Area, along with the necessary sidewall slope volumes to permit excavation. Use of a traditional sheet pile wall installation to protect adjacent buildings would be untenable due to the presence of limestone. Therefore, excavation would be accomplished using an engineered system such as a slide rail shoring box system or interlocking steel sheet pile and hydraulic walers to isolate segments of soil and to minimize dewatering. About 116,300 bank cubic yards of soil would be excavated to a depth of about 21 feet bls (varying as deep as 24 feet bls) to the Main Source Area limits to remove the COC-contaminated soil. Clean compacted soil fill would be used to backfill the excavation.

Batches of the excavated soil will be sampled and TCLP analyzed to determine if the excavated soil is considered RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches that are found to be characteristic hazardous waste will require treatment to meet alternative LDR treatment standards. Treated soil that meets LDRs and is no longer toxicity characteristic waste (using TCLP) may be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Treated soil that is still considered toxicity characteristic waste must be disposed in an off-site permitted RCRA Subtitle C landfill approved by the EPA.

10.3.3 Main Source Area Alternative 3: In-Situ Stabilization/Solidification with LDAs

Estimated Capital Costs: $11,611,000
Estimated Annual O&M Costs: $0
Estimated Present Worth Costs: $11,611,000
Estimated Construction Timeframe: 8 months
Estimated Time to Achieve RAOs/Cleanup Levels: less than 1 year

This remedy is analogous to Unsaturated Zone Alternative 4, In-Situ Stabilization/Solidification and Limited Soil Excavation and Off-Site Disposal. This alternative consists of the use of in-situ stabilization/solidification to isolate and stabilize the sludge and NAPL and contiguous soil contamination within the Main Source Area down to about 21 feet bls (as deep as 24 feet bls). The in-situ stabilization/solidification tooling can cut through limestone rock and can remediate NAPL at locations where it is bound in the limestone. The estimated target volume for in-situ stabilization/solidification is about 116,300 bank cubic yards over an area of 4.5 acres. This alternative would not require a surrounding sheet pile to protect adjacent buildings as no soil excavation is required.

Samples will be collected from the soils treated with in-situ stabilization/solidification. These samples will be TCLP analyzed to confirm that the in-situ treated soils meet the cleanup requirements. Volumes that do not meet cleanup requirements will be retreated.

Stabilization/solidification treatment usually causes an increase in the final treated soil volume from being mixed and from the addition of the stabilization/solidification treatment chemicals. To keep the post-remediation land surface as close as possible to existing grade, any excess soil volume will be excavated. Clean compacted soil fill would be used to backfill the excavation areas. The in-situ stabilization/solidification areas would need to be specifically designed and constructed with adequate strength to support the anticipated use of the property including constructed buildings while ensuring the performance of the remedy.

Batches of the treated excavated soil will be sampled and TCLP analyzed to determine if the excavated soil is a RCRA toxicity characteristic hazardous waste. Soil batches that are not characteristic hazardous waste will be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Soil batches found to be characteristic hazardous waste will require treatment to meet alternative LDR treatment standards. Treated soil that meets LDRs and

is no longer toxicity characteristic waste (using TCLP) may be disposed of in an off-site permitted RCRA Subtitle D landfill approved by the EPA. Treated soil that is still considered toxicity characteristic waste must be disposed in an off-site permitted RCRA Subtitle C landfill approved by the EPA.

10.3.4 Main Source Area Alternative 4: Excavation, Ex-Situ Thermal Treatment and Stabilization/Solidification with On-Site Disposal

This alternative, as developed in the FS, is not considered for remedy selection.

10.3.5 Main Source Area Alternative 5: In-Situ Thermal Treatment (Conductive Heating) with Chemical Reduction

Estimated Capital Costs: $19,841,000
Estimated Annual O&M Costs: $3,828,400
Estimated Present Worth Costs: $23,699,100
Estimated Construction Timeframe: 24 months
Estimated Time to Achieve RAOs/Cleanup Levels: 10 years

Common Element 2, the demolition of the five buildings, would not need be completed before the Main Source Area Alternative 5's in-situ treatment begins, although implementation would be enhanced if they were demolished. This alternative assumes that the buildings would remain in place. However, tenants would need to be relocated for up to a year due to the hazards from volatilization of COCs created by the in-situ heating below the buildings.

This alternative entails the in-situ thermal conductive heating of the sludge and NAPL-impacted soils followed by the injection (via multi-phase extraction wells) of either reducing or sequestering amendments to fix the lead and other metals to the soil and prevent leaching. Main Source Area Alternative 5 is an entirely in-situ remedy and does not involve any excavation.

A traditional sheet pile wall would be installed surrounding the Main Source Area to prevent groundwater flow from quenching heat within treatment areas and minimize excursions of contaminated groundwater and vapors.

Thermal conductive heating is capable of remediating 95% to 99% of organic VOCs and lighter carbon SVOCs, rendering the soil essentially free of petroleum leachate. Heated groundwater and vapor from the thermally treated area would be captured and routed to a treatment plant. The plant would be constructed inside a steel building to house the separation and treatment equipment. Due to the various types of COCs that would be in captured groundwater and vapor, the process train for the extracted total fluids could be complex and involve several steps. The treated effluent would be discharged, either to infiltration galleries constructed west of the facility or to a series of injection wells and/or surface water in compliance with identified ARARs.

While thermal conductive heating will remove essentially all the organic contamination in the Main Source Area it does not address the metal COCs. Therefore, after the in-situ thermal conductive heating treatment of the sludge and NAPL impacted soils is completed, in-situ reduction or stabilization using injected amendments would be needed to stabilize lead and other metals in the soil matrix.

10.4 Description of the Extended Plume Remedy Alternatives

The Extended Plume consists of groundwater on the periphery of the source areas that are impacted above cleanup levels (MCLs or FDEP GCTLs identified as chemical-specific ARARs) with generally low concentrations of VOCs, select SVOCs, 1,4-dioxane, lead, chromium and other COCs. The diverse mixture of COCs limit the options for remediation, as different physicochemical processes are needed for the unique COCs. The RAO for this zone is focused on preventing the further vertical and horizontal migration of contaminated groundwater above these levels. This approach is consistent with the EPA expectation in the NCP to prevent further migration of the plume, prevent exposure to the contaminated groundwater and evaluate further risk reduction (40 CFR Section 300.430 (a)(1)(III)(F).

Remedial alternatives for the Extended Plume are interim and the EPA expects to select a final remedial action for groundwater in a separate ROD that includes an RAO to restore groundwater to its beneficial use as a drinking water consistent with the FDEP classification of G-I and G-II. Therefore, attainment of MCLs or more stringent FDEP GCTLs is not required for this interim remedy. The remedial alternatives for the Extended Plume are predicated on the assumption that remediation of contaminant sources in the Unsaturated Zone and Main Source Area CMZs is undertaken.

Four remedial alternatives were developed and evaluated for the Extended Plume.

10.4.1 Extended Plume Alternative 1: No Action

Extended Plume Alternative 1: No Action
Estimated Capital Costs: $0
Estimated Annual O&M Costs: $86,100
Estimated Present Worth Costs: $0
Estimated Construction Timeframe: Not Applicable
Estimated Time to Achieve RAOs/Cleanup Levels: greater than 30 years

The Extended Plume No Action Alternative is equivalent to the Unsaturated Zone and Main Source Area No Action alternatives.

10.4.2 Extended Plume Alternative 2: Groundwater Recovery and Treatment

Estimated Capital Costs: $919,250
Estimated Annual O&M Costs: $3,172,000
Estimated Present Worth Costs: $4,090,900
Estimated Construction Timeframe: 3 months
Estimated Time to Achieve RAOs/Cleanup Levels: 15 years

This alternative includes installing about six groundwater recovery wells across the dissolved plume and perpendicular to groundwater flow to hydraulically contain and prevent the lateral migration of contaminants. The recovery wells will also provide limited COC mass removal. The actual number of wells, their location and the extraction flow rates would be determined by groundwater modeling during the remedial design.

The recovered water would be treated with a complex treatment train consisting of oil/water separation, air stripping, metal sequestration/adsorption, filtration, pH adjustment, ex-situ oxidation and carbon filtration. Preferentially, the treated effluent would be discharged to infiltration galleries constructed west of the facility. Conversely, a series of injection wells and/or direct discharge to the surface water retention pond located west of the Site could be used for effluent disposal. In the event of discharge into surface water is necessary, then it will meet the substantive requirements of a National Pollutant Discharge Elimination System (NPDES) permit, including effluent limits that are identified as ARARs.

Groundwater samples would be collected and analyzed for COC levels against MCLs or more stringent FDEP GCTLs to gauge the effectiveness of hydraulic containment in reducing the migration of the Extended Plume COCs downgradient. The samples would be collected from monitoring wells located throughout the Extended Plume. Groundwater levels would also be collected and used to determine the degree of the hydraulic containment of the Extended Plume. Process samples would be collected after each of the treatment trains steps to ensure that each step was operating correctly and reducing the contaminants in the extracted water. Samples would also be collected before the treated water is discharged to confirm that it meets discharge effluent limits or injection standards including meeting MCLs and more stringent GCTLs.

10.4.3 Extended Plume Alternative 3: In-Situ Carbon Injection and In-Situ Reduction Permeable Barriers

Estimated Capital Costs: $2,855,400
Estimated Annual O&M Costs: $3,018,000
Estimated Present Worth Costs: $5,873,400
Estimated Construction Timeframe: 4 months
Estimated Time to Achieve RAOs/Cleanup Levels: 15 years

This alternative uses in-situ injections of various chemicals to treat the Extended Plume's COCs. Two injection well arrays would be placed near the downgradient edge of the dissolved plume along the eastern and northern edges of the Extended Plume. The injection treatment barriers

would be used to apply in-situ carbon adsorption and metal/fixation amendments to create passive treatment zones.

Initially, an injectable colloidal carbon composed of microscale particles of activated carbon suspended in water through the use of organic polymer chemistry would be injected. The injected carbon should also function as a colloidal biomatrix binding to the aquifer matrix, providing both direct carbon adsorption and enhancing biodegradation of dissolved COCs. The same injection wells will be used to inject a reducing agent or sequestering agent such as calcium polysulfide or a soluble phosphate-based fixation/sequestering agent such as monopotassium phosphate. For both the colloidal carbon and the metal reducing/sequestering chemical, the injection flows and pressures would be devised to achieve an approximately 15-foot distribution of these suspensions.

Groundwater samples would be collected and analyzed for COC levels to gauge the effectiveness of carbon capture and metal sequestering mechanisms. The samples would be collected from monitoring wells located throughout the Extended Plume. If necessary, direct push soil sampling may be conducted to confirm that in-situ chemical distribution is being achieved.

10.4.4 Extended Plume Alternative 4: Monitored Natural Attenuation

Estimated Capital Costs: $0

Estimated Annual O&M Costs: $330,000

Estimated Present Worth Costs: $329,800

Estimated Construction Timeframe: Not Applicable

Estimated Time to Achieve RAOs/Cleanup Levels: 30 years

This alternative, monitored natural attenuation, uses the natural biotic degradation or natural abiotic degradation (e.g., due to reduced iron species, soil attenuation, advection, dispersion, dilution) for contaminant reduction. The diverse array of COCs within the Extended Plume will limit the effectiveness of monitored natural attenuation as an interim remedy. The different COCs require different physical conditions to support either biotic or abiotic decay. For example, the largely aerobic groundwater conditions on site may limit natural biodegradation for some COCs (such as chlorinated ethenes) that preferentially degrade in anaerobic geochemistry. Some COCs in the Extended Plume (such as 1,4-dioxane) are recalcitrant to biotic degradation. The current geochemistry is not sufficiently reduced to transform dissolved metals into less soluble sulfides. Natural abiotic degradation is assumed to also be a limited but active degradation mechanism.

The difference between monitored natural attenuation and an active bioremediation or redox remedy is that no effort is made to enhance the existing biotic or abiotic mechanisms. Monitored natural attenuation may be a viable supplemental alternative for the Extended Plume when used in conjunction with treatment of the source areas/higher COC concentration areas. The effectiveness of monitored natural attenuation for the Extended Plume will be largely dependent

on the aggressiveness of the treatment options selected for the Unsaturated Zone and the Main Source Area. Monitored natural attenuation will be ineffective without source area treatment and will require an extended time to achieve restoration (estimated at 10 to 30 years) throughout the plume, even if source area remedies are conducted.

11.0 Comparative Analysis of Alternatives

The NCP establishes a framework of nine criteria for evaluating remedial alternatives. These nine criteria were used to evaluate the remedial alternatives individually and against each other to identify the selected remedy. If an alternative does not meet the first two threshold criteria, Overall Protection of Human Health and the Environment, and Compliance with ARARs, the EPA does not consider the alternative for further evaluation. The FS used a comparative analysis to assess the relative performance of each alternative in relation to the nine criteria (excluding the two modifying criteria, State Acceptance and Community Acceptance). The purpose of this analysis was to identify the advantages and disadvantages of each alternative relative to the other alternatives. Analysis of alternatives was conducted separately for each CMZ.

11.1 Unsaturated Zone

11.1.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment in the short- and long-term by eliminating, reducing or controlling exposures to levels established during development of cleanup levels. This criterion draws on long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. and describes how risks pose through exposure pathway are eliminated, reduced or controlled, through treatment, engineering controls and or ICs.

Alternative 1, the No Action alternative, is not protective of human health and the environment and will not be carried forward. Alternative 2 through 5 actions are protective of human health and the environment.

11.1.2 Compliance with ARARs

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate Federal and more stringent state requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4). Applicable requirements are those cleanup standards, standards of control and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance,

pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. This criterion assesses whether an alternative attains ARARs or provides grounds for invoking one of the ARAR waivers.

For the purpose of ease of identification, the EPA has created three categories of ARARs: chemical-specific, location-specific and action-specific ARARs. Under 40 CFR §300.400(g)(5), the lead and support agencies shall identify their specific ARARs for a site and notify each other in a timely manner, as described in 40 CFR §300.515(d).

Chemical-specific ARARs include the FDEP SCTLs in Table II of FAC Chapter 62-770 for contaminated soil as well as FDEP MCLs or FDEP GCTLs for contaminated groundwater in FAC Chapter 62-770, Table I. The FDEP GCTL Table I incorporates the MCLs from Florida primary drinking water standards at FAC 62-550.310 for some of the listed chemicals. The more-stringent level is identified as the cleanup level for a particular COC, consistent with the NCP and EPA guidance. These levels are used to evaluate the effectiveness of the interim remedy for the Extended Plume that includes hydraulic containment of groundwater migration above the MCLs and/or GCTLs.

The primary action-specific ARARs include RCRA requirements for characterizing, staging, treating and disposing of hazardous waste. Other action-specific ARARs include requirements for construction and operation and closure of monitoring and injection wells.

All CMZ alternatives, except the No Action alternatives, are expected to meet the chemical-specific and action-specific ARARs through treatment, containment, or removal and proper disposal of the contaminants, engineering controls and/or ICs. The ARARs tables for all remedial alternatives are available in the appendix of the Site's 2019 FS Report, starting with Table 5-1.

11.1.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence assess the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of containment controls and institutional controls.

Alternatives that physically remove contaminants from the site media (especially Alternative 2) provide the most protection for the longest period and preclude COC rebound or residuals. Alternative 5, the thermal/stabilization combined remedy, would provide a uniform treatment and eliminate the sludge and NAPL components from the Main Source Area while leaving a stabilized metal residual in an on-site engineered disposal unit that complies with identified RCRA ARARs. With the highest mass destruction potential, it would also have a low occurrence

for contaminant rebound. Stabilization/solidification alternatives, Alternatives 3 and 4, will indefinitely contain COCs and will require only minor long-term groundwater performance monitoring. The ex-situ process for Alternative 3 will allow a very uniform treatment with high assurance of meeting leachate limits. The in-situ isolation based remedial alternative, Alternative 4 will meet this criterion if the engineered remedy is stable and constructed with no defects. The stabilization/solidification alternatives also have a lower ranking due to potential concerns with performance monitoring indicating the need for expanded treatment and the need for long-term monitoring. The likelihood of all alternatives to meet performance standards in the near term is high.

In-situ alternatives are preferred as they add an extra component of climate resilience. As hurricanes frequently pass through this area, in-situ Alternative 4 (stabilization/solidification) is more effective in the long term with no on site above ground components. Complete removal of the contaminated media via Alternatives 2, 3 and 5 would also achieve long-term climate resilience.

Alternatives 2 through 5 provide some degree of long-term protection. Reviews at least every five years, as required, would be necessary to evaluate the effectiveness of all of the alternatives.

11.1.4 Reduction of Toxicity, Mobility or Volume through Treatment

This criterion assesses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principle threats posed by the site.

Alternative 3 (ex situ) and Alternative 4 (in situ) treat the contaminated soil through stabilization/solidification and are expected to reduce the mobility of the contaminants through treatment. Toxicity and volume would not be reduced as contaminants are not destroyed. Alternative 5 incorporates thermal treatment that would reduce the toxicity and volume of the contaminants in the soil prior to stabilization/solidification to reduce their mobility. Alternative 2 (off-site disposal) is expected to provide for some treatment of the contaminated media that contain RCRA Hazardous waste to meet the RCRA LDRs prior to disposal.

11.1.5 Short-Term Effectiveness

Short-term effectiveness assesses the period of time needed to implement a remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

The No Action alternative for all three CMZs is expected to provide the highest level of relative overall short-term effectiveness as these alternatives do not require any remediation of the Site and so pose no short-term threats to workers, the community, or the environment. The comparative analysis results for this criterion were similar as all the active alternatives are fairly disruptive to the tenants and community for up to a year. Alternative 4 was ranked high because

it should have the smallest impact on the local community and construction workers. The excavation components of the other active alternatives increase the potential for impacts to the community and workers, although these issues can be effectively managed.

11.1.6 Implementability

Implementability assesses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternatives 2 through 5 are considered to have good implementability. Due to the shallow depth of the Unsaturated Zone and technology reliability, alternatives that included excavation, Alternative 2, Alternative 3, and Alternative 4, scored highest; it will be easier to monitor these remedies for remedial effectiveness and make remedial modifications with minor site disruption. In comparison, the use of LDAs at shallow depths will be more complex (Alternately, the in-situ mixing could be accomplished with or in conjunction with excavators or shallow soil mixing tools such as a Lang or Allu tool). The thermal and stabilization alternative (Alternative 5) is less implementable due to a more complex treatment train for operation.

11.1.7 Cost

The cost criterion involves an evaluation of the capital costs, the annual operations and maintenance (O&M) costs, and a present worth analysis. The cost estimates are order-of-magnitude level estimates, which are defined by the American Association of Cost Engineers as approximate estimates made without detailed engineering data. It is normally expected that an estimate of this type would be accurate to +50 percent to -30 percent. The actual costs of the project would depend on the final scope of the remedial action, the schedule of implementation, actual labor, material costs at the time of implementation, competitive market conditions, and other variable factors that may impact the project costs. The net present worth (NPW) for each alternative was developed using the modified uniform present value method. In accordance with current EPA guidance (OSWER Directive 9355.0-75, July 2000), a discount rate of 7 percent before taxes and after inflation (for a non-Federal facility) was used to account for the time value of money.

Costs for the implementation of statutory Five-Year Reviews and groundwater monitoring are included as the sitewide costs. These costs were estimated separately as they apply to all remedy alternatives since waste will remain in place at the Site with every alternative.

There are no capital costs associated with the No Action Alternatives; present worth costs for this alternative include the costs to conduct long term monitoring of field parameters, COCs, and natural attenuation parameters every five years for 30 years (six events). The total NPW costs are estimated at $86,000.

Costs for the Alternatives 2 through 5 varied widely, reflecting the differential between disposal, containment, and treatment options. Alternative 5 has the highest projected cost at $16M, owing partially to the need to treat the soil thermally followed by a stabilization phase. Alternative 2 (Excavation and Off-Facility Disposal in Landfill) has an equivalent cost of $14M to Alternative 5 with the high cost associated. The stabilization/solidification alternatives have comparable costs with the ex-situ stabilization/solidification alternative (Alternative 3) being marginally higher at $13M and the in-situ alternative (Alternative 4) being $12M.

11.2 CMZ 2 – Main Source Area

11.2.1 Overall Protection of Human Health and the Environment

Overall Protection of human health and the environment assess whether an alternative adequately protects human health and the environment, in the short- and long-term by eliminating, reducing, or controlling exposures to levels established during development of cleanup levels. This criterion draws on long-term effectiveness and permeance, short-term effectiveness, and compliance with ARARs.

Alternative 1, the No Action alternative is not protective of human health and the environment and will not be carried forward. Alternatives 2 through 5 will be protective of human health and the environment. Each alternative would reduce the threat of sludge and NAPL mobility either though stabilization/isolation, partial treatment, or direct removal. Alternative 2 (Excavation and Off-Facility Landfill Disposal) removes all source area contamination from the Main Source Area in about 7 months. Alternative 3 does not provide a treatment reduction in concentration as the other active remedies can provide. Alternative 5 (In-Situ Thermal Treatment with Chemical Reduction) has the highest risk and uncertainty; it lacks adequate treatability testing and is highly contingent on sub surface heterogeneity and conditions.

11.2.2 Compliance with ARARs

This criterion assesses whether an alternative attains ARARs or provides grounds for invoking one of the ARAR waivers. Alternatives 2, 3 and 5 meet the chemical-specific and action-specific ARARs. The ARARs tables for all alternatives can been found in the appendix of the 2019 FS Report, starting with Table 5-1.

11.2.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence assess the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of containment controls and institutional controls.

Alternative 2 (Excavation and Off-Facility Disposal in an appropriate permitted landfill) is expected to offer the best long-term effectiveness as all site contamination is removed. In-situ stabilization will combine a proven soil mixing approach along with a bench-scale proven

stabilization/solidification mixture; long-term expectations for this remedy are also high. Alternative 5 (In-Situ Thermal Treatment with Chemical Reduction) for the Main Source Area was ranked lower as the in-situ thermal and injected stabilization approach has a higher chance of inefficiencies and may leave residual areas not thoroughly treated with either thermal conductive heating or stabilization. Alternatives 3 and 5 require long-term stabilization of COCs. However, all stabilization/solidification approaches should be irreversible.

In-situ alternatives are preferred as they add an extra component of climate resilience. As hurricanes frequently pass through this area, Alternative 3 (In-Situ Stabilization/Solidification) is more effective in the long term, with no above-ground components on site. Thermal treatment Alternative 4 (Ex Situ with Stabilization/Solidification) and Alternative 5 (In-Situ) would have an above-ground component for a short period; this would not affect their long-term climate resilience. Complete removal of the contaminated media via Alternative 2 would also achieve long-term climate resilience.

11.2.4 Reduction of Toxicity, Mobility or Volume through Treatment

This criterion assesses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility or volume, including how treatment is used to address the principal threats posed by the Site.

The alternatives have considerable differences in their reductions of contaminant toxicity, mobility, and volume. Alternative 2 provides complete removal but does represent a transference of waste to another location without treatment for toxicity if required. Alternative 3 is expected to provide strong assurance of mobility reduction to prevent leachate that would exceed groundwater cleanup levels off site. Alternative 3 requires long-term stabilization of COCs on site. However, all stabilization/solidification approaches should be irreversible.

11.2.5 Short-Term Effectiveness

Short-term effectiveness assesses the period of time needed to implement a remedy and any adverse impacts that may be posed for workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

All Main Source Aera alternatives have similar expectations for short-term effectiveness. The in-situ options, Alternative 5 and Alternative 3, have less potential for site and neighborhood disruption, as they do not involve excavation or trucking. The large-diameter auger soil mixing alternative, Alternative 3, should have minimal dust and odor issues as vapors can be collected in a shroud. Alternative 5 has a longer period before RAOs are completed and requires air-phase treatment controls. While most of the MSA alternatives require less than a year to reach RAOs, Alternative 5 is estimated to take up to 10 years to reach RAOs. Alternative 2 will provide a substantial disruption to the Site and local traffic, due to the number of trucks necessary to haul the contaminated soil to a landfill.

11.2.6 Implementability

Implementability assesses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternatives 2, 3 and 5 evaluated for the Main Source Area are implementable with only minor issues and there is little differentiation. Alternative 3 (LDA Stabilization/Solidification) should be a straightforward application in shallow soils with the buildings removed. The excavation and dewatering scenarios can be executed but are expected to be arduous, due to the shallow water table. Alternative 5 (In-Situ Thermal Treatment [Conductive Heating] with Chemical Reduction) has no implementation concerns for drilling and construction. Operation of the system is less sure, largely due to the potential impact of non-uniform distribution of the reduction/sequestration injectate and increased reliance on less defined performance monitoring data.

11.2.7 Cost

This criterion assesses capital costs, the annual O&M costs, and a present value of capital and O&M costs (present worth analysis). The cost estimates are order-of-magnitude level estimates, which are defined by the American Association of Cost Engineers as approximate estimates made without detailed engineering data. It is normally expected that an estimate of this type would be accurate to +50% to -30%. The actual costs of the remedy would depend on the final scope of the remedial action, the schedule of implementation, actual labor, material costs at the time of implementation, competitive market conditions and other variable factors that may impact the project costs. The NPW for each alternative was developed using the modified uniform present value method. In accordance with current EPA guidance (OSWER Directive 9355.0-75, July 2000) a discount rate of 7% before taxes and after inflation (for a non-federal facility) was used to account for the time value of money.

Costs for the implementation of statutory Five-Year Reviews and groundwater monitoring are included as the sitewide costs. These costs were estimated separately as they apply to all remedy alternatives since waste will remain in place at the Site.

Costs for Alternatives 2, 3 and 5 are high, ranging from $11.6M to $28.4M. The in-situ stabilization alternative, Alternative 3, has the lowest estimated NPW cost. The large volumetric extent of sludge and NAPL, all representative of PTW, is the primary driver for the high cost of all these alternatives. Alternative 2, though the highest cost estimate, has a higher percentage of fixed and predictable pricing apportioned as transport and disposal. Detailed costs for all alternatives are available in Appendix E in the Site's 2019 FS Report (2019).

11.3 CMZ 3 – Extended Plume

11.3.1 Overall Protection of Human Health and the Environment

The Overall Protection of Human Health and the Environment criterion assesses whether an alternative adequately protects human health and the environment in the short term and long term by eliminating, reducing or controlling exposures to levels established during development of cleanup levels. This criterion draws on long-term effectiveness and permeance, short-term effectiveness and compliance with ARARs.

Alternative 1 (No Action) is not protective of human health and the environment and will not be carried forward. Alternatives 2 through 3, along with ICs, will be protective of human health and the environment in the short term. Alternative 2 (GR&T) provides hydraulic containment and long-term mass reduction. Alternative 3 (In-Situ Carbon Injection and In-Situ Reduction Permeable Barriers) creates a passive treatment wall that will treat groundwater as it continues to flow downgradient. Alternative 3 will effectively limit any significant dissolved-phase contamination from migrating past the barrier but will not accelerate the mass recovery and subsequent treatment equivalent to the GR&T alternative.

11.3.2 Compliance with ARARs

This criterion assesses whether an alternative attains ARARs or provides grounds for invoking one of the ARAR waivers. Alternatives 2 through 3 will meet the chemical-specific and action-specific ARARs. Given that the remedy for contaminated groundwater is interim and that a final remedy will be selected in a separate ROD that includes objective for restoration to beneficial use a Class I or Class II groundwater, attainment of chemical-specific ARARs, including MCLs or FDEP GCTLs, is not required at this time. These levels are being used to evaluate the effectiveness of remedial alternatives in preventing further migration of contaminated groundwater. All other action-specific ARARs, including those for installation, operation and closure of monitoring and injection wells, will be complied with during remedy implementation.

11.3.3 Long-Term Effectiveness and Permanence

The Long-Term Effectiveness and Permanence criterion assesses the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of containment controls and institutional controls.

Alternative 2 (GR&T) will have better long-term effectiveness by providing a mixture of mass reduction and containment. The groundwater treatment system will be more complex but will use proven and reliable technology with adequate and reliable controls. Alternative 3 involves a fixation mechanism that needs site-specific pilot-scale testing to validate the expected effectiveness. GR&T will be more effective as a containment remedy than the Alternative 3 treatment barrier, even if the barrier performs at optimal effectiveness. All alternatives will require long-term monitoring. Alternative 3 does offer a low complexity long-term operation

relative to GR&T and can be designed conservatively to function as a contaminant flux barrier. Alternative 2 and Alternative 3 are not expected to have significant issues with residual risks or treatment irreversibility. Both remedies are susceptible to long-term O&M costs events if Main Source Area remediation does not adequately limit the incoming flux of COCs – Alternative 2 through continued operating costs and Alternative 3 through reinjections of substrate. Alternative 3 is dependent on direct hydraulic contact that could be limited in the heterogeneous lithology. Alternative 2 relies on long-term back diffusion of COCs from soil.

11.3.4 Reduction of Toxicity, Mobility or Volume through Treatment

This criterion assesses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility or volume, including how treatment is used to address the principal threats posed by the Site.

Alternative 2 (GR&T) will have the highest rate of mass reduction and will shrink and contain the plume. Alternative 3 (treatment barrier) will reduce toxicity in the long term and will contain the plume on site at startup. Alternative 3 does not reduce the volume of the plume.

11.3.5 Short-Term Effectiveness

The Short-Term Effectiveness criterion assesses the time needed to implement a remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Neither Alternative 2 or Alternative 3 will have a distinguishable difference in community impacts or worker protection. All options are generally protective of the community. The two active alternatives (Alternative 2 and Alternative 3) provide good short-term effectiveness and are protective of workers and the community during remedial action. Alternative 2 (GR&T) should be more effective at meeting RAOs in a shorter timeframe.

11.3.6 Implementability

The Implementability criterion assesses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

All of the alternatives evaluated for the Extended Plume are implementable with only minor issues. Alternative 2 (GR&T) is more complex due to the reliance on establishing and maintaining reduced conditions and achieving a uniform distribution of soluble carbon. Alternative 2 (GR&T) is an easily implemented approach, although the long piping runs will provide some disruption at the Site. The number of trucks needed (about 4,100) to transport the large soil volume for Alternative 2 would be a burden to the community, as well. Operation of the GR&T system is expected to be labor intensive and require extensive remote monitoring.

Alternatives 2 and 3 offer reliable and proven technology that is easy to implement, though the GR&T system is more easily modified.

11.3.7 Cost

This criterion assesses capital costs, annual O&M costs, and a present value of capital and O&M costs (present worth analysis). The cost estimates are order-of-magnitude level estimates, which are defined by the American Association of Cost Engineers as approximate estimates made without detailed engineering data. It is normally expected that an estimate of this type would be accurate to +50% to -30%. The actual costs of the remedy would depend on the final scope of the remedial action, the schedule of implementation, actual labor, material costs at the time of implementation, competitive market conditions and other variable factors that may impact the project costs. The NPW for each alternative was developed using the modified uniform present value method. In accordance with current EPA guidance (OSWER Directive 9355.0-75, July 2000), a discount rate of 7% before taxes and after inflation (for a non-federal facility) was used to account for the time value of money.

Costs for the implementation of statutory Five-Year Reviews and groundwater monitoring are included as the sitewide costs. These costs were estimated separately as they apply to all remedy alternatives since waste will remain in place at the Site.

Costs for the active remedial alternatives for the Extended Plume zone ranged from $4.1M to $5.9M. Projected costs for Alternative 2 (GR&T) are high due to high capital and operation and maintenance costs. Projected costs for Alternative 3 (treatment barrier) are high due to the drilling and chemical costs and potential re-injection of amendments.

12.0 Principal Threat Waste (PTW)

The NCP establishes an expectation that the EPA will address the principal threats posed by a Site through treatment wherever practicable (NCP §300.430(a)(1)(iii)(A)). The EPA guidance "A Guide to Principal Threat and Low Level Threat Wastes" (Office of Solid Waste and Emergency Response [OSWER] 9380.3-06FS – 1991) defines principal threat waste (PTW) as source material considered to be highly toxic or highly mobile that generally cannot be reliably contained or that would present significant risk to human health or the environment should exposure occur. PTW is defined on a site-specific basis for source material that acts as a reservoir for migration of contaminants or acts as a source for direct exposure. In general, the priority for treatment for PTW is placed on source materials considered to be liquid, highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur.

The soil containing visual evidence of NAPL is considered PTW at the Site. Currently, the sludge and NAPL is also PTW and is a long-term source of leaching of contaminants for surrounding groundwater. The former sludge pits (primary and secondary pits) represent the largest extent of sludge and NAPL on-facility and the extent also includes significant areas impacted from overflow of the ponds or sludge/NAPL redistribution from site fill and grading

activities. There are an estimated 165,570 cubic yards of sludge- and NAPL-impacted soil in the Main Source Area.

13.0 Selected Remedy

13.1 Summary of the Rationale for the Selected Remedy

The selected remedy for the Site is:

- OU1 (Unsaturated Zone): In-Situ Stabilization/Solidification with Limited Soil Excavation and Off-Facility Disposal.
- OU2 (Main Source Area): In-Situ Stabilization/Solidification with LDAs.
- OU3 (Extended Plume): GR&T.

Common Elements are:

- Bamboo Mobile Home Park excavation and relocation.
- Relocation of businesses, tenants and residents prior to building demolition in the Main Source Area.
- Shallow excavation under buildings.
- ICs to prohibit well installation and any use of contaminated groundwater, to provide increased public awareness and restrict disturbance of the in-situ treated waste that remains at the Site as well as interference with other remedy components such as existing or future remediation system and/or monitoring wells. Land use at the Site (other than Bamboo Mobile Home Park which is currently residential) will be restricted to remain industrial/commercial use.
- Monitoring, including long-term groundwater monitoring, to assess remedy performance.
- Site reviews at a minimum of every five years to assess the protectiveness of the remedy (Five-Year Reviews).

Any businesses still operating on the Site within the boundaries of the affected areas (defined as the extent of CMZ and CMZ 2) at the commencement of the remedial action shall be permanently relocated and the structures used by them vacated and demolished as they physically block and will interfere with the selected remedy. Relocation of businesses, tenants and residents will be performed pursuant to or consistent with the Uniform Relocation Assistance and Real Property Acquisition Act, 42 U.S. Code §§ 4601 et seq., and regulations promulgated pursuant thereto at 49 CFR. Part 24, depending on whether the EPA or the PRP Group is the lead to perform the relocation activities.

These alternatives were chosen based on the comparative analysis of all the alternatives. The Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. The EPA and the FDEP determined that the Preferred Alternative presented in the Proposed Plan best satisfies the nine criteria of the NCP as compared to the other alternatives. Figure 8 summarizes the selected remedy.

Based on the information available at this time, the EPA and the FDEP have determined that the selected remedy combination satisfies the following statutory requirements of CERCLA Section 121(b) and Section 121(d): 1) protects human health and the environment; 2) complies with ARARs (and does not require a waiver); 3) is cost effective; 4) utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfies the preference for treatment as a principal element. In combination, Unsaturated Zone Alternative 4, Main Source Area Alternative 3 and Extended Plume Alternative 2, will achieve substantial risk reduction to all potential exposure routes in a reasonable timeframe.

The modifying criteria of State Acceptance and Community Acceptance have been incorporated into the selected remedy. The State of Florida, as represented by the FDEP, has been the support agency during the RI/FS process. The FDEP provided input during the process in accordance with 40 CFR §300.430 and concurs with the selected remedy (Appendix D). The community has participated in the review of the Proposed Plan and, based on comments received, supports the selected remedy (Appendix B).

13.2 Description of the Selected Remedy

13.2.1 OU-1: Unsaturated Zone Alternative 4 – In-Situ Stabilization/Solidification with Limited Soil Excavation, and Off-Site Disposal

The shallow, unsaturated soil depth makes stabilization/solidification soil treatment relatively easy and allows the true extent of sludge and NAPL contamination to be visually observed. The shallow soil excavation under buildings will complement the stabilization/solidification treatment of the Unsaturated Zone soils above the Main Source Area. Alternative 4 is expected to cost about $2M less than if the Unsaturated Zone soils were excavated and then transported and disposed of in a landfill (Alternative 2). The number of trucks needed (about 4,100) to transport the large soil volume for Alternative 2 would be a burden to the community. Stabilization/solidification results from bench-scale testing were very positive, even for conservatively (higher than anticipated in the field) rich in sludge/NAPL treatability test samples.

This remedy will have some off-site landfill disposal for the soils under the shallow buildings and for the top 2-foot layer of treated soil over the Main Source Area. Clean compacted soil fill (at least 2 ft. thick) will be placed into the excavated areas, including the residential property in the Bamboo Mobile Home Park, to provide complete assurance of meeting the direct contact soil cleanup levels based on chemical-specific ARARs. The in-situ stabilization/solidification areas would need to be specifically designed and constructed with adequate strength to support the anticipated use of the property including constructed buildings while ensuring the performance of the remedy.

This alternative provides the highest potential for discovery and treatment of all contaminated soil in the Unsaturated Zone via stabilization/solidification and will prevent direct contact with

any seeps or with COC-laden soil. This alternative will be readily implementable, uses proven technologies (in-situ mixing with LDAs, in-situ stabilization/solidification, excavation, and off-site treatment and disposal in a permitted landfill), and can be implemented in a short timeframe (less than one year) with minimal disruption to the community. Alternative 4 also has the shortest expected construction time, five months, of all the Unsaturated Zone alternatives.

13.2.2 OU2: Main Source Area Alternative 3, In-Situ Stabilization/Solidification with LDAs

Alternative 3 will provide complete isolation and containment of the sludge and NAPL. It has the lowest NPW cost of the three active Main Source Area alternatives. Alternatives 2, 3 and 5 were very close in their likely remedial outcomes, indicating that any of the alternatives would be a good choice for protection of human health and the environment. The overall cost for Alternative 3, $11.6M, compared to about $28.4M for Alternative 2 (Excavation and Off-Site Disposal in Landfill) was a differentiating factor. Both Alternative 2 and Alternative 3 are protective. Alternative 3 costs about $17M less than if the soil was taken off site for disposal. Alternative 5, In-Situ Thermal Treatment (Conductive Heating) with Chemical Reduction, had the same relative likelihood of successfully remediating the Site and would be an equally acceptable approach, but was about 70% more costly ($19.8M) than Alternative 3.

Bench-scale stabilization/solidification testing results were very positive, even for the highly contaminated treatability test samples (higher than anticipated in the field).

Demolition of the Main Source Area buildings will allow enough space for the LDA rigs. Another advantage to in-situ stabilization/solidification with the LDAs is the ability of the LDAs to penetrate, mix and treat the upper layers of limestone where residual NAPL is trapped. Alternative 3 also does not require expensive deep shoring or sheet pile walls and can be used in relatively proximity to existing buildings. Alternative 3 will be moderately easy to implement, uses proven technologies (LDA mixing and stabilization/solidification) that have been bench tested using site materials, and can be implemented in a short timeframe (less than one year) with minimal disruption to the community.

Stabilization/solidification treatment usually causes an increase in the final treated soil volume from being mixed and from the addition of the stabilization/solidification treatment chemicals. To keep the post-remediation land surface as close as possible to existing grade, any excess soil volume will be excavated. Clean compacted soil fill would be used to backfill the excavation areas. The in-situ stabilization/solidification areas would need to be specifically designed and constructed with adequate strength to support the anticipated use of the property including constructed buildings while ensuring the performance of the remedy.

13.2.3 OU3: Extended Plume Alternative 2, Groundwater Recovery and Treatment

As discussed in the comparative analysis of the alternatives, Alternative 2 had a higher expected remedial performance and lower costs than Alternative 3, In-Situ Carbon Injection and In-Situ

Reduction Permeable Barriers. The overall costs for Alternative 2 are about 44% less and Alternative 2 can provide ongoing containment and mass removal throughout the Extended Plume. The annual O&M costs were derived for a 10-year period with an additional five years of performance monitoring. These annual costs are high if extrapolated for a longer (i.e., 30-year) timeframe, but are realistic for an interim action dissolved-plume remedy coupled with aggressive source isolation, which is planned for the Site. Of the Extended Plume alternatives, Alternative 2 will combine the best with the selected Main Source Area alternative, because the locations and depths of Alternative 2's well screens could be adjusted to be clear of the Main Source Area in-situ stabilization/solidification matrix. This alternative will be easy to construct (i.e., installation of groundwater extraction wells), uses proven technologies (hydraulic containment and water treatment), and can be implemented in a short timeframe with minimal disruption to the community.

13.2.4 Common Elements and Sitewide Costs

Three Common Elements will be implemented before the Unsaturated Zone and Main Source Area remedies are conducted. These elements – Bamboo Mobile Home Park excavation and relocation (Common Element 1), building demolition and relocation of businesses, tenants and residents overlying the Main Source Area (Common Element 2), and shallow excavation under buildings – retain existing buildings (Common Element 3A), are recommended for protection of human health and the environment. In addition to the Common Elements, the selected remedy also includes implementation of ICs to prevent unacceptable exposure to treated waste or residual contamination (including contaminated groundwater), to provide increased public awareness of residual contamination that remains at the site and restrict disturbance of the in-situ treatment areas and groundwater recovery and treatment system. It also includes conducting Five Year Reviews to ensure that the remedy remains protective and long-term groundwater monitoring to ensure that contaminant levels in groundwater are decreasing.

13.3 Cost Estimate for the Selected Remedy

The estimated total NPW cost for the Selected Remedy is $57.1M for all three CMZs, including the Common Elements. The cost estimate for the Selected Remedy is included in Table 17. Detailed cost breakdown sheets of the components for each alternative are included in Appendix C. The cost estimate is based on the available information regarding the anticipated scope of the remedial action. Changes in the cost elements are likely to occur as a result of new information and data collected during the remedial design phase. Major changes may be documented in the form of a memorandum to the Administrative Record file, an ESD or a ROD Amendment. The projected cost is based on an order-of-magnitude engineering cost estimate that is expected to be within +50% or -30% of the actual project cost. Costs are based on the conservative estimate of a 30-year timeframe until all cleanup levels are met.

13.4 Estimated Outcomes of the Selected Remedy

The Selected Remedy will provide protection of human health and the environment by eliminating, reducing or controlling risks at the Site through in-situ stabilization/solidification treatment of PTW (sludge, NAPL and high-concentration contaminated soils); excavation and

off-facility treatment and disposal of soils as necessary; off-facility disposal of excess soils; the installation of at least 2-ft clean compacted soil fill in all the excavated portions of the property; hydraulic containment and treatment of the Extended Plume; long-term monitoring of the remediated Site; and implementation of the ICs. ICs will prevent unacceptable exposure to residual waste and contamination (including contaminated groundwater), provide increased public awareness of residual contamination that remains at the site and restrict disturbance of in-situ treatment areas and the groundwater recovery and treatment system. Future land use of the Site property is anticipated to continue to be industrial/commercial and residential for the Bamboo Mobile Home Park.

Implementation of the selected remedy and achievement of the cleanup levels for source materials, soils, and groundwater will achieve the RAOs identified for the Site. The cleanup levels determined for this remedy are shown in Tables 12 through 14. The selected interim remedy for groundwater uses FDEP MCLs/GCTLs for monitoring purposes to assess effectiveness of the remedy in preventing further migration of groundwater above these levels.

14.0 Statutory Determination

Based on the information currently available, the EPA believes the selected remedy for each of the CMZs meets the threshold criteria and provides the best balance of tradeoffs between the selected alternative and the other alternatives with respect to the balancing and modifying criteria. The EPA expects the selected remedy will satisfy the following statutory requirements of CERCLA Section 121(b):

- Be protective of human health and the environment.
- Comply with ARARs (unless a waiver is justified under Section 121(d)(4)).
- Be cost effective.
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

14.1 Protection of Human Health and the Environment

Protection of human health and the environment will be achieved by the in-situ stabilization/solidification of the sludge/NAPL in the Unsaturated Zone and the Main Source Area; excavation and off-facility disposal of excess contaminated Unsaturated Zone soils; installation of at least 2-foot-thick, clean compacted soil fill over the treated Unsaturated Zone and Main Source Area soils and materials; and hydraulic containment and groundwater treatment of the Extended Plume. In addition, implementation of ICs will prevent unacceptable exposure to residual waste and contamination (including contaminated groundwater), provide increased public awareness of residual contamination that remains at the Site and restrict disturbance of in-situ treatment areas and the groundwater recovery and treatment system. These remedial actions should prevent any exposure to site contaminants and so should reduce the risks from the contamination at the Site to protective levels.

14.2 Compliance with ARARs

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate federal and more stringent state requirements, standards, criteria and limitations that are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4). The selected remedy will comply with all identified ARARs and To Be Considered (TBC) guidance presented in Tables 14 and 15.

The in-situ stabilization/solidification of the sludge/NAPL and other COCs in the contaminated Unsaturated Zone and the Main Source Area, along with the excavation and off-site disposal of contaminated Unsaturated Zone soils will attain the identified ARARs, including, but not limited to, RCRA requirements for characterization and management of hazardous waste. Hydraulic containment of the Extended Plume includes treatment of the recovered groundwater to levels that allow the treated water to be discharged or injected in compliance with chemical-specific ARARs and comply with Clean Air Act requirements for emissions of VOCs identified as action-specific ARARs.

The scope of the selected interim action for Extended Plume groundwater does not include restoration to beneficial use as a drinking water resource. The MCLs and GCTLs (identified as Chemical-specific ARARs) are being used to assess remedy effectiveness of the interim remedy. Also, the GR&T system shall attain MCLs or more stringent FDEP GCTLs prior to re-injection of treated groundwater to comply with underground injection requirements. All other action-specific requirements for remedy for the Extended Plume will be met, including requirements for construction, operation, and closure of groundwater monitoring and injection wells.

14.3 Cost Effectiveness

The EPA has determined that the selected remedy is cost effective, and that the overall protectiveness of the remedy is proportional to the overall cost. As specified 40 CFR §300.430(f)(1)(ii)(D), the cost-effectiveness of the selected remedy was assessed by comparing the protectiveness of human-health and the environment in relation to three balancing criteria: long-term effectiveness and permanence, reduction in toxicity, mobility and volume, and short-term effectiveness, with the other alternatives considered.

While more than one remedial alternative can be considered cost effective, CERCLA does not mandate the selection of the most cost-effective or least-expensive remedy. The estimated total cost (i.e., capital plus present worth of O&M costs) of the selected remedy is $57.1M at a 7% discount rate.

14.4 Use of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at the Site.

Of those alternatives that are protective of human health and the environment and comply with ARARs, the EPA has determined that the Selected Remedy provides the best balance of tradeoffs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element, bias against off-site treatment and disposal, and considering state and community acceptance.

EPA recommends development of at least one alternative that would eliminate the need for long-term O&M at the Site. The selected remedy should eliminate the need for long-term management at the Site. The stabilization/solidification treatment proposed for the source area PTW is irreversible. After the treatment, the treated materials (NAPL/sludge) and contaminated soils will be contained in a very low permeability matrix that will limit COC migration to the groundwater that would exceed cleanup levels for groundwater. The groundwater recovery and treatment of the Extended Plume should contain further migration of contaminated groundwater. The stabilization/solidification treatment of the Unsaturated Zone and the placement of the clean cover over the treated wastes and soils, along with the ICs, should allow normal use of the Site for its current and reasonably anticipated future use (commercial/industrial use).

Long-term effectiveness and permanence will be attained by long-term containment/isolation and treatment of the NAPL/sludge PTWs and the contaminated soil. The in-situ stabilization/solidification technologies are proven remedial treatment methods for this type of waste, have been verified by successful bench-scale treatability testing, and have long life cycles.

14.5 Preference for Treatment as a Principal Element

The NCP at 40 CFR §300.430(a)(I)(iii)(A) establishes an expectation that treatment will be used to address PTW posed by a site wherever practicable. In general, the priority for treatment for PTW is placed on source materials considered to be liquid, highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. NAPL and DNAPL is considered a PTW under EPA guidance and there is an expectation in the NCP to treat such wastes wherever practicable unless the EPA determines that such wastes can be reliably contained. Highly contaminated soil can also be PTW when considered highly toxic or would present significant risk to human health should exposure occur, or it acts as reservoir for mobile contaminants. The soil containing visual evidence of NAPL and sludge is considered PTW as well.

As stated in the preamble to the NCP (55 FR at 8703, March 8, 1990) and in Superfund Publication 9380.3-06FS, A Guide to Principal Threat and Low Level Threat Wastes), there may be situations where wastes identified as constituting a PTW may be effectively contained (e.g., isolated) rather than treated due to inherent difficulties in treating the wastes. Thus, this allows for situations where the same containment remedy will be selected for both PTWs and low-level threat wastes.

The selected remedy satisfies the statutory preference for remedies that employ treatment to reduce toxicity or volume as a principal element. The stabilization/solidification treatment of the

source materials, sludge and NAPL in the Unsaturated Zone and the Main Source Area will treat some of the metals contamination, making these COCs less toxic. The stabilization/solidification treatment will also bind the organic and metal COCs and the sludges and NAPL into a very low permeability matrix that will reduce the COCs mobility to groundwater. The recovery and treatment of the groundwater will reduce the toxicity and volume of contaminated groundwater. The recovery system will also contain the contaminated groundwater, preventing further migration of COCs.

14.6 Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants or contaminants remaining on the Site above levels that would allow for unlimited use and unrestricted exposure, a CERCLA Section 121(c) statutory review will be conducted every five years after initiation of the remedial action to ensure that the remedy remains protective of human health and the environment. The statutory Five-Year Reviews will be conducted in accordance with EPA policy and guidance.

15.0 Documentation of Significant Changes

Pursuant to CERCLA 117(b) and NCP §300.430(f)(3)(ii), the ROD must document any significant changes made to the Preferred Alternative discussed in the Proposed Plan. The Proposed Plan, which was released for public comment in January 2021, identified the remedial alternatives described in this document and identified the preferred alternatives.

The EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate as a result of public comments.

The Proposed Plan identified several preliminary remedial goals (PRGs) for groundwater including, EPA MCLs, FDEP GCTLs and risk-based levels, but it was not entirely clear in the document which of these applied to the particular COCs and how they would be met for an interim remedy. This ROD identifies FDEP MCLs (which are the same or for certain chemicals more stringent than EPA MCLs in the Safe Water Drinking Act regulations) and the FDEP GCTLs in FAC Chapter 62-777, Table I, as chemical-specific ARARs for contaminated groundwater. FDEP GCTL Table I incorporates the MCLs from Florida primary drinking water standards at FAC Chapter 62-550.310 for some of the listed chemicals. The more-stringent level is identified as the cleanup level for a particular COC consistent with the NCP and EPA guidance. Since restoration of the groundwater throughout the plume was not part of the objective of this interim remedy, attainment of identified MCLs and GCTLs is not required under this ROD. Instead, the MCLs/GCTLs are used for monitoring purposes to assess effectiveness of the remedy in preventing further migration of groundwater above these levels. A final remedial action for the Extended Plume will be documented in a separate ROD that includes the objective to restore the groundwater throughout the plume to attain MCLs and GCTLs within a reasonable timeframe.

The use of the term "Common Alternative" was switched to "Common Element" to clarify that these elements will be implemented regardless of which alternatives are chosen.

EPA is currently evaluating its existing policy on human health risks from lead contamination in soil. Should EPA change its lead policy, EPA will determine if changes to the cleanup levels for lead in soil are needed at this Site. Changes to the lead cleanup levels are not likely to affect the remedial footprint as the lead contamination is co-located with other COCs.

16.0 References

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PART 3: RESPONSIVENESS SUMMARY

The Responsiveness Summary for the Site has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the NCP, 40 CFR §300.430(f)(3)(i)(F) and CFR §300.430(f)(5)(iii)(B). The EPA's responses to comments received on the Proposed Plan during the public comment period are included in Appendix A.

The Proposed Plan for the Site was issued on January 11, 2021. On January 19, 2021, the EPA hosted a virtual Proposed Plan meeting via Zoom due to the COVID-19 public health emergency. Site documents, including the RI Report, FS Report and Proposed Plan for the Site were made available to the public on January 11, 2021, in the Administrative Record repositories. The Administrative Record repositories are located at the EPA Region 4 Superfund Records Center (61 Forsyth Street, Atlanta, GA 30303) and the EPA local repository, located at Broward County Public Library (100 South Andrews Avenue, Fort Lauderdale, Florida). A Notice of Availability was published in the *Sun-Sentinel Newspaper* on January 10, 2021. A public comment period on the Proposed Plan was held from January 11, 2021, to February 19, 2021. The comment period ended on February 19, 2021. The EPA's responses to comments are included in Appendix A. Several questions were asked during the public meeting by the attendees after the presentation. The EPA's responses to these questions are documented in the meeting transcript, which is included in Appendix B.

TABLES

Table 1. Occurrence, Distribution and Selection of COCs in Surface Soil

Scenario Timeframe:	Future
Medium:	Surface Soil
Exposure Medium:	Surface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum Concentration	Maximum Concentration					
Surface Soil	Benz(a)anthracene	0.42 J	21.0	mg/kg	2/16	21.0	mg/kg	Maximum
	Benzo(a)pyrene	11	11.0	mg/kg	1/12	11.0	mg/kg	Maximum
	Benzo(b)fluoranthene	0.46 J	13.0	mg/kg	3/16	13.0	mg/kg	Maximum
	Dibenz(a,h)anthracene	5.0 J	5.0 J	mg/kg	1/16	5.0	mg/kg	Maximum
	Indeno(1,2,3-cd)pyrene	9.5	9.5	mg/kg	1/12	9.5	mg/kg	Maximum
	PCB (Arochlor 1016)	0.59 J	4.1	mg/kg	4/12	3.8	mg/kg	95% Student's-t UCL
	PCB (Arochlor 1248)	0.93 J	8.6	mg/kg	4/16	8.6	mg/kg	Maximum
	PCB (Arochlor 1260)	0.18	1.5	mg/kg	8/16	1.0	mg/kg	95% Student's-t UCL
	Dioxin TEQ	0.000054 J	0.00015 J	mg/kg	4/4	0.00015	mg/kg	Maximum
	Lead	94	34000	mg/kg	16/16	7621	mg/kg	Mean

Statistics: Maximum Detected Value (Maximum) or 95% UCL (ProUCL Version 5.0).

Source: Supplemental HHRA (USACE, 2016).

UCL = upper confidence limit

mg/kg = milligrams per kilogram

Table 2. Occurrence, Distribution and Selection of COCs in Subsurface Soil

Scenario Timeframe:	Future
Medium:	Subsurface Soil
Exposure Medium:	Subsurface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum Concentration	Maximum Concentration					
Subsurface Soil	1,2-Dibromoethane	0.75 J	19	mg/kg	2/6	19	mg/kg	Maximum
	Benz(a)anthracene	2.3 J	4.8 J	mg/kg	2/32	4.8	mg/kg	Maximum
	PCB (Aroclor 1016)	0.48 J	9.2	mg/kg	18/20	3.5	mg/kg	95% Adjusted Gamma UCL
	PCB (Aroclor 1248)	0.29 J	8.3 J	mg/kg	16/32	5.8	mg/kg	95% Adjusted Gamma UCL
	PCB (Aroclor 1254)	0.38 J	2.1	mg/kg	7/12	1.8	mg/kg	95% Student's-t UCL
	PCB (Aroclor 1260)	0.29 J	3.1	mg/kg	30/32	1.4	mg/kg	95% Student's-t UCL
	Dioxin TEQ	0.000084 J	0.000410 J	mg/kg	3/3	0.00041	mg/kg	Maximum
	Lead	33	17000	mg/kg	32/32	4366	mg/kg	Mean

Statistics: Maximum Detected Value (Maximum) or 95% UCL (ProUCL Version 5.0).

Source: Supplemental HHRA (USACE, 2016).

UCL = upper confidence limit

mg/kg = milligrams per kilogram

Table 3. Occurrence, Distribution and Selection of COCs in Groundwater

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater without sludge

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum Concentration (µg/L)	Maximum Concentration (µg/L)					
Groundwater Without Sludge	Benzene	0.14 J	34	µg/L	24/202	14.7	µg/L	95% Adjusted Gamma UCL
	cis-1,2-Dichloroethene	0.12 J	290	µg/L	41/225	47.5	µg/L	95% Chebyshev (Mean, Sd) UCL
	Trichloroethene (TCE)	0.21 J	200	µg/L	16/202	167.4	µg/L	99% Chebyshev (Mean, Sd) UCL
	Vinyl Chloride	0.17 J	140 J	µg/L	23/202	43.4	µg/L	95% Chebyshev (Mean, Sd) UCL
	Naphthalene	0.54 J	150 J	µg/L	19/179	116.4	µg/L	95% Chebyshev (Mean, Sd) UCL
	1,4-Dioxane	4.2 J	1200 J	µg/L	8/9	1200	µg/L	Maximum
	PCB (Aroclor 1242)	0.11 J	27 J	µg/L	23/191	7.7	µg/L	95% Adjusted Gamma UCL
	PCB (Aroclor 1260)	0.13 J	98 J	µg/L	23/214	30.7	µg/L	95% Chebyshev (Mean, Sd) UCL
	Dioxin TEQ	0.0000039 J	0.00014 J	µg/L	15/19	0.000082	µg/L	95% Adjusted Gamma UCL
	Antimony	0.17 J	150	µg/L	20/225	75.9	µg/L	95% Adjusted Gamma UCL
	Arsenic	0.2 J	110	µg/L	98/225	25.5	µg/L	95% Chebyshev (Mean, Sd) UCL
	Lead	0.12 J	4800	µg/L	121/225	653.1	µg/L	95% Chebyshev (Mean, Sd) UCL
	Vanadium	0.031 J	540	µg/L	74/225	80.5	µg/L	95% Chebyshev (Mean, Sd) UCL

Statistics: Maximum Detected Value (Maximum) or 95% UCL (ProUCL Version 5.0).

Source: Supplemental HHRA (USACE, 2016).

(1) Used data for on-site groundwater monitoring wells.

UCL = upper confidence limit

µg/L = micrograms per liter

Table 4. Risk Characterization Summary – Non-Carcinogens (Future Resident)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child (Age-adjusted)

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Noncarcinogenic Hazard			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	PCB - 1016	0.2	NE	0.08	0.3
			Dioxin TEQ	0.8	NE	0.07	0.9
						Surface Soil HI Total =	1
	Subsurface Soil	Subsurface Soil	PCB - 1016	0.2	NE	0.08	0.3
			PCB - 1254	0.3	NE	0.1	0.4
			Dioxin TEQ	2	NE	0.2	2.2
						Subsurface Soil HI Total =	3
Groundwater	Groundwater	Groundwater[1]	Bezene	0.1	NE	0.02	0.1
			cis-1,2-Dichlroethylene	0.8	NE	NE	0.8
			1,4-Dioxane	1	NE	0.005	1
			Trichloroethylene	12	NE	2	14
			Vinyl Chloride	0.5	NE	0.02	0.5
			Naphthalene	0.2	NE	0.1	0.3
			Dioxin TEQ	4	NE	NE	4
			Antimony	7	NE	0.2	7
			Arsenic	3	NE	0.01	3
			Vanadium	0.6	NE	0.1	0.7
						Groundwater HI Total =	32
						Total Receptor HI =	36
						Neurological HI =	0.9
						Immunological HI =	20
						Lymphoreticular HI =	7
						Developmental HI =	21
						Hematological HI =	2
						Ocular HI =	1
						Respiratory HI =	9
						Hepatic HI =	2
						Cardiovascular HI =	7
						Gastrointestinal HI =	3
						Dermal HI =	3

Notes:

[1] Groundwater not including sludge pits.

HI = hazard index

NE = not evaluated

Table 5. Risk Characterization Summary – Carcinogens (Future Resident)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child (Lifetime)

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risks			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	Benzo(a)anthracene	2E-05	NE	8E-06	3E-05
			Benzo(a)pyrene	1E-04	NE	4E-05	1E-04
			Benzo(b)fluoranthene	1E-05	NE	5E-06	2E-05
			Diben(a,h)anthracene	5E-05	NE	2E-05	7E-05
			Dioxin TEQ	3E-05	NE	2E-06	3E-05
			Indeno(1,2,3-cd)pyrene	1E-05	NE	4E-06	1E-05
			PCB – 1248	2E-05	NE	1E-05	3E-05
			PCB-1260	3E-06	NE	1E-06	4E-06
						Surface Soil Risk Total =	3E-04
	Subsurface Soil	Subsurface Soil	Benzo(a)anthracene	5E-06	NE	2E-06	7E-06
			1,2-Dibromoethane (EDB)	5E-05	NE	NE	5E-05
			Dioxin TEQ	8E-05	NE	6E-06	9E-05
			PCB – 1248	2E-05	NE	7E-06	3E-05
			PCB-1254	5E-06	NE	2E-06	7E-06
			PCB-1260	4E-06	NE	2E-06	6E-06
						Subsurface Soil Risk Total =	2E-04
Groundwater	Groundwater	Groundwater[1]	Benzene	1E-05	NE	1E-06	1E-05
			1,4-Dioxane	2E-03	NE	5E-06	2E-03
			Dioxin TEQ	1E-04	NE	NE	1E-04
			PCB – 1242	2E-04	NE	NE	2E-04
			PCB-1260	8E-04	NE	NE	8E-04
			Trichloroethylene	1E-04	NE	2E-05	1E-04
			Vinyl Chloride	4E-04	NE	2E-05	4E-04
			Arsenic	5E-04	NE	2E-06	5E-04
						Groundwater Risk Total =	4E-03
						Total Risk =	5E-03

Notes:

[1] Groundwater not including sludge pits.

NE – not evaluated

Table 6. Risk Characterization Summary – Non-Carcinogens (Future Outdoor Worker)

Scenario Timeframe: Future
Receptor Population: Outdoor Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Noncarcinogenic Hazard			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	None				
						Surface Soil HI Total =	
	Subsurface Soil	Subsurface Soil	None				
						Subsurface Soil HI Total =	
Groundwater	Groundwater	Groundwater[1]	cis-1,2-Dichlroethylene	0.2	NE	NE	0.2
			1,4-Dioxane	0.3	NE	0.0004	0.3
			Trichloroethylene	3	NE	0.2	3
			Vinyl Chloride	0.1	NE	0.002	0.1
			Dioxin TEQ	0.9	NE	NE	0.9
			Antimony	1	NE	0.02	1
			Arsenic	0.7	NE	0.002	1
			Vanadium	0.1	NE	0.01	0.1
						Groundwater HI Total =	7
						Total Receptor HI =	7
						Immunological HI =	4
						Lymphoreticular HI =	1
						Developmental HI =	4
						Hematological HI =	0.3
						Ocular HI =	0.3
						Respiratory HI =	1
						Hepatic HI =	0.4
						Cardiovascular HI =	1
						Gastrointestinal HI =	0.7
						Dermal HI =	0.7

Notes:

For the occupational receptor scenario, risk to the outdoor worker is presented, as the risk is comparable to the indoor worker scenario.

[1] Groundwater not including sludge pits.

HI = hazard index

NE = not evaluated

Table 7 (#10). Risk Characterization Summary – Carcinogens (Future Outdoor Worker)

Scenario Timeframe: Future
Receptor Population: Outdoor Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risks			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	None				
						Surface Soil Risk Total =	
	Subsurface Soil	Subsurface Soil	None				
						Subsurface Soil Risk Total =	
Groundwater	Groundwater	Groundwater[1]	Benzene	2E-06	NE	1E-07	2E-06
			1,4-Dioxane	3E-04	NE	4E-07	3E-04
			Dioxin TEQ	3E-05	NE	NE	3E-05
			PCB - 1242	4E-05	NE	NE	4E-05
			PCB-1260	2E-04	NE	NE	2E-04
			Trichloroethylene	2E-05	NE	1E-06	2E-05
			Vinyl Chloride	9E-05	NE	2E-06	9E-05
			Arsenic	1E-04	NE	3E-07	1E-04
						Groundwater Risk Total =	8E-04
						Total Risk =	8E-04

Notes:

For the occupational receptor scenario, risk to the outdoor worker is presented, as the risk is comparable to the indoor worker scenario.

[1] Groundwater not including sludge pits.

NE = not evaluated

Table 8 (#11). Risk Characterization Summary – Non-Carcinogens (Future Tenant, Young Child)

Scenario Timeframe: Future
Receptor Population: Tenant
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Noncarcinogenic Hazard			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	PCB - 1016	0.5	NE	0.2	0.7
			Dioxin TEQ	2	NE	0.1	2
						Surface Soil HI Total =	3
Groundwater	Groundwater	Groundwater[1]	Bezene	0.2	NE	0.007	0.2
			cis-1,2-Dichlroethylene	1	NE	NE	1
			1,4-Dioxane	2	NE	0.002	2
			Trichloroethylene	16	NE	0.7	17
			Vinyl Chloride	0.7	NE	0.009	0.7
			Naphthalene	0.3	NE	0.05	0.4
			Dioxin TEQ	6	NE	NE	6
			Antimony	9	NE	0.1	9
			Arsenic	4	NE	0.007	4
			Vanadium	0.8	NE	0.05	0.9
						Groundwater HI Total =	41
						Total Receptor HI =	44
						Neurological HI =	1
						Immunological HI =	26
						Lymphoreticular HI =	8
						Developmental HI =	26
						Hematological HI =	2
						Ocular HI =	2
						Respiratory HI =	12
						Hepatic HI =	3
						Cardiovascular HI =	9
						Gastrointestinal HI =	4
						Dermal HI =	4

Notes:

Risk to young child tenant presented, as the risk is higher than, and therefore protective of, the other tenant scenarios.

[1] Groundwater not including sludge pits.

HI = hazard index

NE = not evaluated

Table 9 (#12). Risk Characterization Summary – Carcinogens (Future Tenant, Young Child)

Scenario Timeframe: Future
Receptor Population: Tenant
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risks			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	Benzo(a)anthracene	1E-05	NE	4E-06	1E-05
			Benzo(a)pyrene	7E-05	NE	2E-05	9E-05
			Benzo(b)fluoranthene	8E-06	NE	2E-06	1E-05
			Diben(a,h)anthracene	3E-05	NE	9E-06	4E-05
			Dioxin TEQ	2E-05	NE	1E-06	2E-05
			Indeno(1,2,3-cd)pyrene	6E-06	NE	2E-06	8E-06
			PCB - 1248	1E-05	NE	5E-06	2E-05
			PCB-1260	2E-06	NE	5E-07	3E-06
						Surface Soil Risk Total =	2E-04
Groundwater	Groundwater	Groundwater[1]	Benzene	3E-06	NE	1E-07	3E-06
			1,4-Dioxane	5E-04	NE	4E-07	5E-04
			Dioxin TEQ	4E-05	NE	NE	4E-05
			PCB - 1242	6E-05	NE	NE	6E-05
			PCB-1260	3E-04	NE	NE	3E-04
			Trichloroethylene	3E-05	NE	1E-06	3E-05
			Vinyl Chloride	1E-04	NE	2E-06	1E-04
			Arsenic	2E-04	NE	3E-07	2E-04
						Groundwater Risk Total =	1E-03
						Total Risk =	1E-03

Notes:

Risk to young child tenant presented, as the risk is higher than, and therefore protective of, the other tenant scenarios.

[1] Groundwater not including sludge pits.

NE = not evaluated

Table 10 (#13). Risk Characterization Summary – Non-Carcinogens (Future Construction Worker)

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Noncarcinogenic Hazard			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	None				
						Surface Soil HI Total =	
	Subsurface Soil	Subsurface Soil	None				
						Subsurface Soil HI Total =	
Groundwater	Groundwater	Groundwater[1]	cis-1,2-Dichloroethylene	0.2	NE	NE	0.2
			1,4-Dioxane	0.3	NE	0.0004	0.3
			Trichloroethylene	2	NE	0.1	2
			Vinyl Chloride	0.1	NE	0.002	0.1
			Dioxin TEQ	0.8	NE	NE	1
			Antimony	1	NE	0.02	1
			Arsenic	0.6	NE	0.001	0.6
			Vanadium	0.1	NE	0.01	0.1
						Groundwater HI Total =	5
						Total Receptor HI =	5
						Immunological HI =	3
						Lymphoreticular HI =	0.8
						Developmental HI =	3
						Hematological HI =	0.3
						Ocular HI =	0.3
						Respiratory HI =	1
						Hepatic HI =	0.4
						Cardiovascular HI =	1
						Gastrointestinal HI =	0.6
						Dermal HI =	0.6

Notes:

[1] Groundwater not including sludge pits.

HI = hazard index

NE = not evaluated

Table 11 (#14). Risk Characterization Summary – Carcinogens (Future Construction Worker)

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risks			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil	None				
						Surface Soil HI Total =	
	Subsurface Soil	Subsurface Soil	None				
						Subsurface Soil HI Total =	
Groundwater	Groundwater	Groundwater[1]	1,4-Dioxane	1E-05	NE	2E-08	1E-05
			Dioxin TEQ	1E-06	NE	NE	1E-06
			PCB - 1242	2E-06	NE	NE	2E-06
			PCB-1260	6E-06	NE	NE	6E-06
			Vinyl Chloride	3E-06	NE	6E-08	3E-06
			Arsenic	4E-06	NE	9E-09	4E-06
						Groundwater Risk Total =	3E-05
						Total Risk =	3E-05

Notes:

NE = not evaluated

[1]Groundwater not including sludge pits.

Table 12. Cleanup Levels[1] for Groundwater

COCs	Units	Cleanup Level Concentrations	Basis
Benzene	µg/L	1	GCTL[2]
cis-1,2-Dichloroethene	µg/L	70	GCTL
1,4-Dioxane	µg/L	3	GCTL
Trichloroethene	µg/L	3	GCTL
Vinyl Chloride	µg/L	1	GCTL
Naphthalene	µg/L	14	GCTL
PCB-1242 (Aroclor 1242)	µg/L	0.5	GCTL
PCB-1260 (Aroclor 1260)	µg/L	0.5	GCTL
Dioxin TEQ	µg/L	3.00E-05	GCTL
Antimony	µg/L	6	GCTL
Arsenic	µg/L	10	GCTL
Lead	µg/L	15	MCL
Vanadium	µg/L	49	GCTL

Notes: mg/kg = milligrams per kilogram

[1]Cleanup levels for groundwater used only to measure performance of the interim remedy in preventing further migration of contaminated groundwater.

[2]Table I of FAC Chapter 62-777, Groundwater and Surface Water CTLs.

Table 13. Cleanup Levels for Surface Soil

COCs	Units	Cleanup Level (Facility Property)	Basis	Cleanup Level (Bamboo Mobile Home Park)	Basis
Benz(a)anthracene	mg/kg	7.0E+00	**SCTLs (Industrial)**	1.0E+00	**SCTL[1] (Residential)**
Benzo(a)pyrene	mg/kg	7.0E-01	**SCTLs (Industrial)**	1.0E-01	**SCTL (Residential)**
Benzo(b)fluoranthene	mg/kg	1.0E+00	**SCTLs (Industrial)**	1.0E+00	**SCTL (Residential)**
Dibenz(a,h)anthracene	mg/kg	7.0E-01	**SCTLs (Industrial)**	1.0E-01	**SCTL (Residential)**
Indeno(1,2,3-cd) pyrene	mg/kg	7.0E+00	**SCTL (Industrial)**	1.0E+00	**SCTL (Residential)**
PCB-1016	mg/kg	2.6E+00	**SCTL (Industrial)**	5.0E-01	**SCTL (Residential)**
PCB-1248	mg/kg	2.6E+00	**SCTL (Industrial)**	5.0E-01	**SCTL (Residential)**
PCB-1260	mg/kg	2.6E+00	**SCTL (Industrial)**	5.0E-01	**SCTL (Residential)**
Dioxin TEQ	mg/kg	3.0E-05	**SCTL (Industrial)**	7.40E-06	**Site Background Level**
Arsenic	mg/kg	1.2E+01	**SCTL (Industrial)**	2.1E+00	**SCTL (Residential)**
Lead[2]	mg/kg	1,400	**SCTL (Industrial)**	400	**SCTL (Residential)**

Notes: mg/kg = milligram per kilogram
[1]FAC Chapter 62-777, Table 2, Soil CTLs.

[2] EPA is currently evaluating its existing policy on human health risks from lead contamination in soil. Should the lead policy change, EPA will determine if changes to the cleanup levels for lead in soil are needed at this Site.

Table 14. Cleanup Levels for Subsurface Soil

COCs	Units	Cleanup Levels (Facility Property)	Basis	Cleanup Levels (Bamboo Mobile Home Park)	Basis
1,2-Dribromoethane	mg/kg	1.2E-01	**SCTLs[1] (Industrial)**	1.0E-01	**SCTLs (Residential)**
Benz(a)anthracene	mg/kg	7.00E+00	**SCTLs (Industrial)**	1.0E+00	**SCTLs (Residential)**
PCB-1016	mg/kg	2.6E+00	**SCTLs (Industrial)**	5.0E-01	**SCTLs (Residential)**
PCB-1248	mg/kg	2.6E+00	**SCTLs (Industrial)**	5.0E-01	**SCTLs (Residential)**
PCB-1254	mg/kg	2.6E+00	**SCTLs (Industrial)**	5.0E-01	**SCTLs (Residential)**
PCB-1260	mg/kg	2.6E+00	**SCTLs (Industrial)**	5.0E-01	**SCTLs (Residential)**
Dioxin TEQ	mg/kg	3.0E-05	**SCTLs (Industrial)**	7.40E-06	**Site Background Levels**
Lead[2]	mg/kg	1400	**SCTLs (Industrial)**	400	**SCTLs (Residential)**

Notes: mg/kg – milligrams per kilogram

[1]FAC Chapter Reference Table II of 62-777, Table 2, Soil CTLs

[2] EPA is currently evaluating its existing policy on human health risks from lead contamination in soil. Should the lead policy change, EPA will determine if changes to the cleanup levels for lead in soil are needed at this Site.

Table 15. Chemical-Specific ARARs

Action/Media	Requirement	Prerequisite	Citation
Classification of groundwater	All groundwater of the state is classified according to the designated uses and includes: Class G-I: potable water use, groundwater in single-source aquifers that has total dissolved solids content of less than 3,000 mg/L. Class G-II: potable water use, groundwater in single-source aquifers that has total dissolved solids content of less than 10,000 mg/L, unless otherwise classified by the Florida Environmental Regulation Commission.	Groundwater within the State of Florida – **Applicable**	FAC 62-520.410
Protection of groundwater as a potential drinking water source[1]	All groundwater (except for Class G-IV) shall meet the minimum criteria for groundwater specified in FAC 62-520.400(1)(a)-(f).	Groundwater within the State of Florida with designated beneficial use(s) of Class G-I or Class G-II – **Relevant and Appropriate**	FAC 62-520.400 Minimum Criteria for Groundwater
	Class I and Class II groundwater shall meet the primary drinking water standards listed in FAC 62-550.310 for public water systems, except as otherwise specified.		FAC 62-520.420(1) Standards for Class I and Class II Groundwater
	Shall not exceed the MCL listed in Table1 Inorganic Contaminants and Table 4 (Volatile Organic Contaminants). (These standards may also apply as groundwater quality standards as referenced in FAC Chapter 62-520).	Supply of water to public water system, as defined in FAC 62-550.200 (17) – **Relevant and Appropriate**	FAC 62-550.310 Primary Drinking Water Standards
Protection of groundwater as a potential drinking water source[1]	Specifies GCTLs for site rehabilitation. FAC 62-777.170, Table I lists the default groundwater criteria.	Rehabilitation (i.e., remediation) of contaminated site groundwater – **Relevant and Appropriate**	FAC 62-780.150(5) FAC 62-777.170(l)(a)
Protection of surface water from recharge of contaminated groundwater	All surface waters of the state shall at all places and at all times be free from: (a) Domestic, industrial, agricultural or other man-induced non-thermal components of discharges, which, alone or in combination with other substances or in combination with other components of discharges (whether thermal or non-thermal): 1. Settle to form putrescent deposits or otherwise create a	Presence of pollutant in Waters of the State of Florida as defined in F.S. Section 403.031(13) – **Relevant and Appropriate**	FAC 62-302.500(1)(a)1-6 Minimum Criteria for Surface Waters

[1] The scope of the interim action for groundwater does not include restoration to beneficial use as a drinking water resource. However, the groundwater recovery and treatment system shall attain MCLs or more stringent FDEP drinking water standards prior to re-injection of treated groundwater per the Underground Injection Control regulations identified below in Table 16 as Action-Specific ARARs.

Action/Media	Requirement	Prerequisite	Citation
	nuisance; or 2. Float as debris, scum, oil, or other matter in such amounts as to form nuisances; or 3. Produce color, odor, taste, turbidity, or other conditions in such a degree as to create a nuisance; or 4. Are acutely toxic; or 5. Are present in concentrations which are carcinogenic, mutagenic, or teratogenic to human beings or to significant, locally occurring, wildlife or aquatic species, unless specific standards are established for such components in subsection FAC 62-302.500(2) or Rule 62-302.530; or 6. Pose a serious danger to the public health, safety or welfare.		
	Shall not exceed the surface water quality criteria for the pollutants listed in Table entitled Surface Water Quality Standards.	Presence of pollutant in waters of the State of Florida as defined in F.S. Section 403.031(13) – **Relevant and Appropriate**	FAC 62-302.530 Surface Water Quality Criteria
Removal of contaminated surface soil for commercial/industrial use	Specifies default SCTLs for site rehabilitation. FAC 62-777, Table II lists the cleanup levels for commercial/industrial direct exposure.	Rehabilitation (i.e., remediation) of contaminated site soil and sediment – **Relevant and Appropriate**	FAC 62-777, Table II SCTLs
Removal of contaminated surface soil for residential use	Specifies SCTLs for site rehabilitation. FAC 62-777, Table II lists the cleanup levels for residential direct exposure.	Rehabilitation (i.e., remediation) of contaminated site soil and sediment – **Relevant and Appropriate**	FAC 62-777, Table II SCTLs
Protection of surface water from discharge of treated contaminated groundwater	Existing uses and the level of water quality necessary to protect the existing uses shall be fully maintained and protected.	Discharge of wastes into surface water designated Class III - Limited[2] – **Relevant and Appropriate**	FAC 62-302.300(14) Findings, Intent, and Antidegradation Policy for Surface Water Quality.

[2] Class III-Limited surface waters share the same water quality criteria as Class III except for any site specific alternative criteria that have been established for the waterbody under Rule 62-302.800, F.A.C. Class III-Limited waters are restricted to waters with human-induced physical or habitat conditions that prevent attainment of Class III uses and do not include waterbodies that were created for mitigation purposes. "Limited recreation" means opportunities for recreation in the water are reduced due to physical conditions. "Limited population of fish and wildlife" means the aquatic biological community does not fully resemble that of a natural system in the types, tolerance and diversity of species present.

Action/Media	Requirement	Prerequisite	Citation
	Pollution which causes or contributes to new violations of water quality standards or to continuation of existing violations is harmful to the waters of this State and shall not be allowed. Waters having water quality below the criteria established for them shall be protected and enhanced. However, the Department shall not strive to abate natural conditions.		FAC 62-302.300(15)
	If the Department finds that a new or existing discharge will reduce the quality of the receiving waters below the classification established for them or violate any Department rule or standard, it shall refuse to permit the discharge. *NOTE*: Per CERCLA § 121(e)(1), permits are not required for on-site response action; however, compliance with identified ARARs (including substantive requirements that otherwise would be included in a permit) is required.		FAC 62-302.300(16)
Protection of surface water from discharge of treated contaminated groundwater	All surface waters of the state shall at all places and at all times be free from: (b) Domestic, industrial, agricultural or other man-induced non-thermal components of discharges, which, alone or in combination with other substances or in combination with other components of discharges (whether thermal or non-thermal): 7. Settle to form putrescent deposits or otherwise create a nuisance; or 8. Float as debris, scum, oil, or other matter in such amounts as to form nuisances; or 9. Produce color, odor, taste, turbidity, or other conditions in such a degree as to create a nuisance; or 10. Are acutely toxic; or 11. Are present in concentrations which are carcinogenic, mutagenic, or teratogenic to human beings or to significant, locally occurring, wildlife or aquatic species, unless specific standards are established for such components in subsection FAC 62-302.500(2) or Rule 62-302.530; or 12. Pose a serious danger to the public health, safety or welfare.	Presence of pollutant in Waters of the State of Florida as defined in F.S. Section 403.031(13) – **Relevant and Appropriate**	FAC 62-302.500(1)(a)1-6 Minimum Criteria for Surface Waters
	Shall not exceed the surface water quality criteria for the pollutants listed in Table entitled Surface Water Quality Criteria for Class III-Limited.[2]	Presence of pollutant in waters of the State of Florida as defined in F.S. Section 403.031(13) – **Relevant and**	FAC 62-302.530 Surface Water Quality

Action/Media	Requirement	Prerequisite	Citation
		Appropriate	Criteria

Notes:

ARAR = applicable or relevant and appropriate requirement

CFR = Code of Federal Regulations

COC = chemical of concern

CTL = cleanup target level

FAC = Florida Administrative Code, chapters as specified

F.S. = Florida Statute

MCL = maximum contaminant level

ROD = Record of Decision

TBC = To Be Considered guidance

Table 16. Action-Specific ARARs and To Be Considered Guidance

Action	Requirement	Prerequisite	Citation
General Construction Standards — All Land-disturbing Activities (e.g., excavation, clearing, grading)			
Control of stormwater runoff from soil disturbing activities	Must comply with the substantive provisions in the "Generic Permit for Stormwater Discharge from Large and Small Construction Activities," document number 62-621.300(4)(a), issued by the FDEP and effective February 17, 2009. Requires development of a stormwater pollution prevention plan and implementation of best management practices and erosion and sedimentation controls for stormwater runoff to ensure protection of the surface waters of the state. NOTE: Plan would be part of CERCLA document such as Remedial Design or Remedial Action Work Plan.	Stormwater discharges from large and small construction activities to surface waters of the State as defined in F.S. Section 403.031 – **Applicable**	FAC 62-621.300(4)(a) Generic Permit for Stormwater Discharge from Large and Small Construction Activities
Control of stormwater runoff from soil disturbing activities	No discharge from a stormwater discharge facility shall cause or contribute to a violation of water quality standards in waters of the State.	Construction activity (e.g., alteration of land contours or land clearing) that results in creation of stormwater management system as defined in FAC 62-25.020(15) – **Applicable**	FAC 62-25.025 Regulation of Stormwater Discharge
	Erosion and sediment control best management practices shall be used as necessary during construction activity to retain sediment on site. These practices shall be designed by an engineer or other competent professional experienced in the fields of soil conservation or sediment control according to specific site conditions and shall be shown or noted on the plans of the stormwater management system. *Note:* Plan would be part of CERCLA document such as Remedial Design or Remedial Action Work Plan.		FAC 62-25.025 (7)
Control of Fugitive Dust	No person shall cause, let, permit, suffer or allow the emissions of unconfined particulate matter from any activity, including vehicular movement; transportation of materials; construction, alteration, demolition or wrecking; or industrially related activities such as loading, unloading, storing or handling; without taking reasonable precautions to prevent such emissions.	Land disturbing activity that has potential for unconfined emissions of particulate matter – **Applicable**	FAC 62-296.320(4)(c) General Pollutant Emission Limiting Standards

Action	Requirement	Prerequisite	Citation
Groundwater Monitoring and Extraction Wells – Installation, Operation and Abandonment			
Groundwater Monitoring Well Installation	Provides detailed guidance to assist in monitoring well design and material specifications for construction of groundwater monitoring well.	Installation of groundwater monitoring well to detect migration of contaminants – **To Be Considered**	FDEP, Monitoring Well Design and Construction Guidance Manual (2008)
Construction and repair of groundwater well	Construction of water well shall be in accordance with the substantive requirements specified in FAC 62-532.500(1)(a) through (i) as appropriate.	Installation of water well as defined in FAC 62-532.200 – **Relevant and Appropriate**	FAC 62-532.500(1) Well Casing, Liner Pipe, Coupling and Well Screen Requirements
	Wells shall be constructed to meet the following construction criteria specified in FAC 62-532.500(3)(a), (b), (e), (f), (g), (h) and (i) as appropriate.		FAC 62-532.500(3) Well Construction Criteria
Well Covers and Upper Terminus	Wells shall be covered with a tamper-resistant cover when there is an interruption in work and meet the criteria specified in FAC 62-532.500(4)(a) and (b) as appropriate.		FAC 62-532.500(4) Top of the Well
Plugging and abandonment of groundwater wells	All abandoned wells shall be plugged by filling them from bottom to top with neat cement grout or bentonite and capped with a minimum of one foot of neat cement grout. An alternate method providing equivalent protection shall be approved by the FDEP and the EPA.	Abandonment of water well as defined in FAC 62-532.200 – **Relevant and Appropriate**	FAC 62-532.500(5)
	In the abandonment of a water well, caution shall be taken to minimize the potential entrance of contaminants into the bore hole and groundwater resource.		FAC 62-532.500(3)(f)
	Only water from a potable water source shall be used in the abandonment of a water well.		FAC 62-532.500(3)(g)
Underground Injection Wells for Groundwater Treatment – Installation, Operation and Abandonment			
Reinjection of treated contaminated groundwater or treatment agent	No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health or persons.	Underground injection into an underground source of drinking water – **Relevant and Appropriate**	40 CFR 144.12(a)
Injection of treated groundwater into groundwater	An injection activity cannot allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of the primary	Class V wells [as defined in 40 CFR 144.6(e)] – **Relevant and Appropriate**	40 CFR 144.82(a)(1)

Action	Requirement	Prerequisite	Citation
	drinking water standards under 40 CFR part 141, other health based standards, or may otherwise adversely affect the health of persons. This prohibition applies to well construction, operation, maintenance, conversion, plugging, closure or any other injection activity.		
Abandonment for Class V wells	Wells must be closed in a manner that complies with the above prohibition of fluid movement. Also, any soil, gravel, sludge, liquids or other materials removed from or adjacent to the well must be disposed or otherwise managed in accordance with substantive applicable federal, state and local regulations and requirements.	Class V wells [as defined in 40 CFR § 144.6(e)] – **Relevant and Appropriate**	40 CFR 144.82(b)
General Criteria for Class V well used for underground injection (e.g., re-injection of treated groundwater)	A well shall be designed and constructed for its intended use, in accordance with good engineering practices.	Operation of Class V well Group 4 (wells associated with aquifer remediation projects) – **Relevant and Appropriate**	FAC 62-528.605(1)
	May not cause or allow fluids to migrate into underground source of drinking water which may cause a violation of a primary or secondary drinking water standard contained in FAC Chapter 62-550, or minimum criteria contained in FAC Rule 62-520.400, or may cause fluids of significantly differing water quality to migrate between underground sources of drinking water.		FAC 62-528.605(2)
Construction of Class V well used for underground injection (e.g., re-injection of treated groundwater)	Shall be constructed so that their intended use does not violate the water quality standards of FAC Chapter 62-520 at the point of discharge, except where specifically allowed in subsection 65-522.300(2), FAC	Operation of Class V well Group 4 (wells associated with aquifer remediation projects) – **Relevant and Appropriate**	FAC 62-528.605(3)
	All drilled wells shall, at a minimum, meet the casing and cementing requirements for water well construction set forth in Chapter 62-532, FAC		FAC 62-528.605(7)
Operation of Class V well used for underground injection (e.g., re-injection of treated groundwater)	Shall be used or operated in a manner that it does not present a hazard to an underground source of water.	Operation of Class V well Group 4 (wells associated with aquifer remediation projects) – **Relevant and Appropriate**	FAC 62-528.610(1)
	Pretreatment for fluids injected through existing wells shall be performed if necessary, to ensure the injected fluid does not violate applicable water quality standards in FAC Chapter 52-520.		FAC 62-528.610(3)

Action	Requirement	Prerequisite	Citation
Monitoring of Class V well used for underground injection	The need for monitoring shall be determined by the type of well, nature of injected fluid, and the water quality of the receiving and overlying aquifers. *NOTE:* The monitoring parameters and frequency will be specified in a CERCLA document such as a Remedial Work Plan or Removal Action Work Plan.	Operation of Class V well Group 4 (wells associated with aquifer remediation projects) – **Relevant and Appropriate**	FAC 62-528.615(1) and (2)
Plugging and abandonment of Class V well used for underground injection	Prior to abandoning Class V wells, the well shall be plugged with cement in a manner that will not allow movement of fluids between underground sources of water. Placement of the cement shall be accomplished by any recognized and approved method.	Operation of Class V well Group 4 (wells associated with aquifer remediation projects) – **Relevant and Appropriate.**	FAC 62-528.625(3)
Operation of Groundwater Extraction and Treatment Systems (e.g., Air Stripper and Activated Carbon Filtration)			
Operation and Monitoring of groundwater treatment system (e.g., pumping and treatment)	A separate air permit will not be required if the total air emissions from all on-site remediation equipment system(s) do not exceed 5.5 pounds per day for any single hazardous air pollutant (HAP) or 13.7 pounds per day for total HAPs. *NOTE:* Although permit not required under CERCLA 121(e)(1) for on-site response actions, the specified thresholds are relevant to application of other air emissions requirements.	Operation of an active remediation system that emits contaminants into the air – **Relevant and Appropriate**	FAC 62-780.700(3)(f)(3)
Operation and Monitoring of groundwater treatment system, including groundwater monitoring wells	Unless otherwise provided in CERCLA Remedial Work Plan/Removal Action Work Plan, the following shall be obtained or determined during the active remediation: • Water-level data collected from all designated wells, piezometers and staff gauge locations each time monitoring and recovery wells are sampled (water-level measurements shall be made within a 24-hour period). • Total volume of any free product recovered and the thickness and horizontal extent of free product. • Total volume of groundwater recovered from each recovery well. • Concentrations of applicable contaminants based on analyses performed on the effluent from the groundwater treatment system. • Concentrations of applicable contaminants based on analyses performed on the untreated groundwater from select recovery wells.	Operation of an active remediation system – **Relevant and Appropriate**	FAC 62-780.700(11)(a) through (e)
Operation and Monitoring of groundwater treatment system	Concentrations of recovered vapors from a vacuum extraction system and post-treatment air emissions if air emissions treatment is provided, must be conducted weekly for the first month, monthly for the next two months and quarterly thereafter.	Operation of an active remediation system utilizing activated carbon off-gas treatment – **Relevant and Appropriate**	FAC 62-780.700(11)(i)(1.)(2.) and (3)

Action	Requirement	Prerequisite	Citation
	Additional sampling may be performed based upon the estimated time of breakthrough, as follows: 1. Concentrations of recovered vapors from individual wells shall be determined using an organic vapor analyzer with a flame ionization detector, or other applicable field detection device to optimize airflow rate and contaminant recovery. 2. The influent and effluent samples shall be collected using appropriate air sampling protocols and shall be analyzed using an analytical method. 3. The samples shall be collected using appropriate air sampling protocols as specified in FAC 62-160. *NOTE:* Monitoring frequency, sampling and analysis methods will be specified in a CERCLA Remedial Action Work Plan.		
Corrective action for leaks during operation of groundwater treatment system (e.g., pumping and treatment)	If effluent concentrations or air concentrations exceed specified or prescribed levels or plume migration occurs during remediation system startup or during operation of the treatment systems, then corrective actions shall be taken.	Operation of an active remediation system – **Relevant and Appropriate**	FAC 62-780.700(13)
Post-active remediation monitoring for groundwater treatment system	Unless otherwise provided in a CERCLA Remedial Action Work Plan, the following shall be performed as follows: • A minimum of two monitoring wells is required, with at least one located at the downgradient edge of the plume; and at least one located in the areas of highest groundwater contamination or directly adjacent. • Designated monitoring wells shall be sampled quarterly for contaminants that were present. • Water-level measurements in all designated wells and piezometers shall be made within 24-hour of initiating each sampling event.	Operation of an active remediation system – **Relevant and Appropriate**	FAC 62-780.750(4)(a) through (c)
General standards for process vents used in treatment of VOC-contaminated groundwater	Select and meet the requirements under one of the options specified below: • Control HAP emissions from the affected process vents according to the applicable standards specified in §§ 63.7890 through 63.7893. • Determine for the remediation material treated or managed by the process vented through the affected process vents that the average total volatile organic hazardous air pollutant (VOHAP) concentration, as defined in § 63.7957, of this material is less than 10 parts per million by volume. Determination of VOHAP	Process vents as defined in 40 CFR 63.7957 used in site remediation of media (e.g., soil and groundwater) that could emit HAPs listed in Table 1 of Subpart GGGGG of Part 63 and vent stream flow exceeds the rate in 40 CFR 63.7885(c)(1) – **Relevant and Appropriate**	40 CFR 63.7885(b) FAC 62-204.800(11)(b)(59)

Action	Requirement	Prerequisite	Citation
	concentration will be made using procedures specified in § 63.7943. • Control HAP emissions from affected process vents subject to another subpart under 40 CFR part 61 or 40 CFR part 63 in compliance with the standards specified in the applicable subpart.		
Emission limitations for process vents used in treatment of VOC-contaminated groundwater	Meet the requirements under one of the options specified below: • Reduce from all affected process vents the total emissions of the HAP to a level less than 1.4 kilograms per hour and 2.8 mg/year (3.0 pounds per hour and 3.1 tons per year). • Reduce from all affected process vents the emissions of total organic compounds (TOCs) (minus methane and ethane) to a level below 1.4 kilograms per hour and 2.8 mg/year (3.0 pounds per hour and 3.1 tons per year). • Reduce from all affected process vents the total emissions of the HAP by 95% by weight or more; or • Reduce from all affected process vents the TOC emissions (minus methane and ethane) by 95% by weight or more.	Process vents as defined in 40 CFR 63.7957 used in site remediation of media (e.g., soil and groundwater) that could emit HAPs listed in Table 1 of Subpart GGGGG of Part 63 and vent stream flow exceeds the rate in 40 CFR § 63.7885(c)(1) – **Relevant and Appropriate**	40 CFR 63.7890(b)(1)-(4) FAC 62-204.800(11)(b)(59)
Standards for closed vent systems and control devices used in treatment of VOC-contaminated groundwater	For each closed vent system and control device you use to comply with the requirements above, you must meet the operating limit requirements and work practice standards in Sec. 63.7925(d) through (j) that apply to the closed vent system and control device. *NOTE:* EPA approval to use alternate work practices under paragraph (j) in 40 CFR § 63.7925 will be obtained in a CERCLA document.	Closed vent system and control devices as defined in 40 CFR 63.7957 that are used to comply with § 63.7890(b) – **Relevant and Appropriate**	40 CFR 63.7890(c) FAC 62-204.800(11)(b)(59)
Monitoring of closed vent systems and control devices used in treatment of VOC-contaminated groundwater	Must monitor and inspect the closed vent system and control device according to the requirements in 40 CFR § 63.7927 that apply to the affected source. *NOTE:* Monitoring program will be developed as part of the CERCLA process and included in an appropriate CERCLA document.	Closed vent system and control devices as defined in 40 CFR 63.7957 that are used to comply with § 63.7890(b) – **Relevant and Appropriate**	40 CFR 63.7892 FAC 62-204.800(11)(b)(59)
Treatment in miscellaneous treatment units (with air emissions)	Unit must be located, designed, constructed, operated and maintained, and closed in a manner that will ensure protection of human health and the environment.	Treatment of RCRA hazardous waste in miscellaneous units, except as provided in 40 CFR 264.1 – **Relevant and Appropriate**	40 CFR 264.601

Action	Requirement	Prerequisite	Citation
	Protection of human health and the environment includes, but is not limited to, prevention of any release that may have adverse effects due to migration of waste constituents in the air considering the factors listed in 40 CFR 264.601(C)(1)-(7).		40 CFR 264.601(c)
	The requirements of RCRA Subpart A, Air Emission Standards for Process Vents do not apply to process vents that would otherwise be subject to this subpart when equipped with emission controls and operated in accordance with an applicable Clean Air Act regulation codified under 40 CFR Part 60, Part 61 or Part 63.	Process vents associated with the air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10 parts per million – **Relevant and Appropriate**	40 CFR 264.1030(e)
	The requirements of RCRA Subpart CC, Air Emission Standards for Tanks, Surface Impoundments and Containers do not apply to a waste management unit that is solely used for on-site treatment or storage of hazardous waste that is placed in the unit as a result of implementing remedial activities required under RCRA 3004(u) and (v) or 3008(h), or CERCLA authorities.	Air pollutant emissions with volatile organics from a hazardous waste tank, surface impoundment or container – **Relevant and Appropriate**	40 CFR 264.1080(a)(5)
Wastewater Treatment and Discharge — Contaminated Groundwater			
Discharge of treated groundwater to a Wastewater Facility	An industrial user shall not introduce into a wastewater facility (WWF) any pollutant which causes pass through or interference.	Discharge pollutants into a "Wastewater Facility" as defined in FAC 62-625.200(29) by an industrial user (i.e., source of discharge) – **Applicable**	FAC 62-625.400(1)(a) General Prohibitions
Discharge of treated groundwater to a WWF	The following pollutants shall not be introduced into a WWF: • Pollutants which create a fire or explosion hazard in the WWF. • Pollutants which will cause corrosive structural damage to the WWF, but in no case discharges with pH lower than 5.0, unless the WWF is specifically designed to accommodate such discharges. • Solid or viscous pollutants in amounts which will cause obstruction to the flow in the WWF resulting in interference. • Any pollutant, including oxygen demanding pollutants, released in a discharge at a flow rate or pollutant concentration which will cause interference with the WWF. • Heat in amounts which will inhibit biological activity in the WWF resulting in interference, but in no case heat in such quantities that result in the discharge from the treatment plant having a temperature that exceeds 40° C (104° F) unless the FDEP, upon	Discharge pollutants into a "Wastewater Facility" as defined in FAC 62-625.200(29) by an industrial user (i.e., source of discharge) – **Applicable**	FAC 62-625.400(2)(a)-(h) Specific Prohibitions

Action	Requirement	Prerequisite	Citation
	request of the control authority, approves alternate temperature limits in accordance with FAC Rule 62-302.520. • Petroleum oil, nonbiodegradable cutting oil or products of mineral oil origin in amounts that will cause interference or pass through. • Pollutants which result in the presence of toxic gases, vapors, or fumes within the WWF in a quantity that will cause acute worker health and safety problems. • Any trucked or hauled pollutants, except at discharge points designated by the control authority.		
	Local limits: Where specific prohibitions or limits on pollutants or pollutant parameters are developed by a public utility in accordance with FAC 62-625.400(3), such limits shall be deemed to be pre-treatment standards.	Discharge pollutants into a "Wastewater Facility" as defined in FAC 62-625.200(29) by an industrial user (i.e., source of discharge) – **Applicable**	FAC 62-625.400(4)
General duty to mitigate for discharge	Take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of effluent standards which has a reasonable likelihood of adversely affecting human health or the environment.	Discharge of pollutants to surface waters of the State – **Applicable**	40 CFR.122.41(d)
	No wastewater facility or activity which discharges wastes into waters or which will reasonably be expected to be a source of water pollution shall be operated, constructed, or modified without an appropriate and valid permit issued by the Department, unless exempted by Department rule. *NOTE*: Per CERCLA § 121(e)(1), permits are not required for on-site response action; however, compliance with identified ARARs (including substantive requirements that otherwise would be included in a permit) is required.		FAC 62-620.300(2) General Prohibitions
	No person shall discharge into waters any waste which, by itself or in combination with the wastes of other sources, reduces the quality of the receiving waters below the classification established for them.		FAC 62-620.300(4)
Operation and maintenance of treatment system	Properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used to achieve compliance with the effluent standards. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.	Discharge of pollutants to surface waters of the State – **Applicable**	40 CFR 122.41(e)

Action	Requirement	Prerequisite	Citation
	A permitted wastewater facility or activity shall not be operated, maintained, constructed, expanded, or modified in a manner that is inconsistent with the terms of the permit. *NOTE*: Per CERCLA § 121(e)(1), permits are not required for on-site response action; however, compliance with identified ARARs (including substantive requirements that otherwise would be included in a permit) is required.		FAC 62-620.300(5)
	The permittee shall at all times properly operate and maintain the facility and systems of treatment and control, and related appurtenances, that are installed and used by the permittee to achieve compliance with the conditions of this permit. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to maintain or achieve compliance with the conditions of the permit.		FAC 62-620.610(7) General Conditions for All Permits
Technology-based treatment requirements for wastewater discharge	To the extent that EPA promulgated effluent limitations are inapplicable, develop on a case-by-case Best Professional Judgment (BPJ) basis under Section 402(a)(1)(B) of the CWA, technology based effluent limitations by applying the factors listed in section 125.3(d) and shall consider: • The appropriate technology for this category or class of point sources, based upon all available information; and • Any unique factors relating to the discharger.	Discharge of pollutants to surface waters from other than a POTW – **Applicable**	40 CFR 125.3(c)(2) *Effluent Limitations*
	Except for collection system permits under Chapter 62-604, F.A.C., each permit shall contain the following permit conditions as applicable: (a) Technology-based effluent limitations and standards set forth in Chapters 62-600, 62-610, 62-611, 62-660, 62-670, or 62-671, F.A.C., or developed under 40 CFR Part 125, subpart A; (h) Technology-based controls for toxic pollutants which are or may be discharged at a level greater than the level which can be achieved by technology-based treatment requirements appropriate to the permittee or, in the alternative, limitations to control those or other pollutants that will provide treatment of the toxic pollutants to the required levels for discharge; *NOTE*: Per CERCLA § 121(e)(1), permits are not required for on-site response action; however, compliance with identified ARARs (including substantive requirements that otherwise would be included in a permit) is required.		FAC 62-620.620(1)(a) and (h) Guidelines for Establishing Specific Permit Conditions

Action	Requirement	Prerequisite	Citation
Water quality-based effluent limits for wastewater discharge	Must develop water quality based effluent limits that ensure that: • The level of water quality to be achieved by limits on point source(s) established under 40 CFR. 122.44(d)(1)(vii) is derived from, and complies with all applicable water quality standards; and • Effluent limits developed to protect narrative or numeric water quality criteria are consistent with the assumptions and any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR 130.7.	Discharge of pollutants to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criteria within a State water quality standard – **Applicable**	40 CFR 122.44(d)(1)(vii)
	Except for collection system permits under Chapter 62-604, F.A.C., each permit shall contain the following permit conditions as applicable: (g) Any requirements in addition to or more stringent than applicable promulgated effluent limitations necessary to provide reasonable assurance that a discharge will not cause or contribute to violations of water quality standards set forth in Chapter 62-302, F.A.C., including chemical-specific limits and whole effluent toxicity limits, as applicable; *NOTE*: Per CERCLA § 121(e)(1), permits are not required for on-site response action; however, compliance with identified ARARs (including substantive requirements that otherwise would be included in a permit) is required.		FAC 62-620.620(1)(g) Guidelines for Establishing Specific Permit Conditions
	Must attain or maintain a specified water quality through water quality related effluent limits established under § 302 of the CWA.	Discharge of pollutants to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criterion within a State water quality standard – **Applicable**	40 CFR 122.44(d)(2)
	If a discharge causes, has the reasonable potential to cause, or contribute to an in-stream excursion above the numeric criterion for whole effluent toxicity using the procedures in paragraph (d)(1)(ii), must develop effluent limits for whole effluent toxicity.	Discharge of wastewater that causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity – **Applicable**	40 CFR. 122.44(d)(1)(iv)

Action	Requirement	Prerequisite	Citation
Monitoring requirements for discharges	In addition to 40 CFR 122.48 (a) and (b) and to assure compliance with effluent limitations requirements to monitor, one must monitor, as appropriate, according to the substantive requirements provided in 40 CFR 122.44(i)(1)(i) through (iv). *NOTE:* Monitoring location and frequency will be conducted in accordance with CERCLA Remedial Action Work Plan.	Discharge of pollutants to surface waters – **Applicable**	40 CFR 122.44(i)(1) *Monitoring Requirements* 40 CFR 122.44(i)(2)
	Sampling and monitoring data shall be collected and analyzed in accordance with Rule 62-4.246, Chapters 62-160 and 62-601, F.A.C., and 40 CFR 136, as appropriate.		FAC 62-620.610(18) General Conditions for All Permits
Outfalls and discharge points	All effluent limitations, standards and prohibitions shall be established for each outfall or discharge point, except as provided under 40 CFR 122.44(k).		40 CFR 122.45(a)
	All permit effluent limitations, standards and prohibitions shall be established for each outfall or discharge point of the permitted facility or activity, except as otherwise provided under paragraphs (1)(m), (1)(p) and (2)(i) of this section and activities permitted under Chapter 62-624, F.A.C.		FAC 62-620.620(2)(a) Guidelines for Establishing Specific Permit Conditions
Continuous discharges	Unless impracticable or not applicable under Department rules, all permit effluent limitations, standards, and prohibitions, other than permitted capacity, pH, and fecal coliform, shall be stated as: 1. Maximum daily and average monthly discharge limitations for all industrial wastewater treatment facilities;	Continuous discharge of pollutants to surface waters – **Applicable**	FAC 62-620.620(2)(d)(1)
Waste Characterization – Primary Waste (e.g., excavated waste and contaminated soil, purged groundwater) and Secondary Wastes (e.g., contaminated equipment or treatment residuals)			
Characterization of solid waste (all primary and secondary wastes)	Must determine if solid waste is a hazardous waste using the following method: • Should first determine if waste is excluded from regulation under 40 CFR 261.4. • Must then determine if waste is listed as a hazardous waste under subpart D 40 CFR Part 261.	Generation of solid waste as defined in 40 CFR 261.2 – **Applicable**	40 CFR 262.11(a) and (b) FAC 62-730.160
	Must determine whether the waste is (characteristic waste) identified in subpart C of 40 CFR part 261by either:	Generation of solid waste which is not excluded under 40 CFR 261.4(a) – **Applicable**	40 CFR 262.11(c) FAC 62-730.160

Action	Requirement	Prerequisite	Citation
	(1) Testing the waste according to the methods set forth in subpart C of 40 CFR part 261, or according to an equivalent method approved by the Administrator under 40 CFR 260.21; or (2) Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.		
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous waste – **Applicable**	40 CFR 262.11(d) FAC 62-730.160
Characterization of hazardous waste (all primary and secondary wastes)	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store or dispose of the waste in accordance with pertinent sections of 40 CFR 264 and 268.	Generation of RCRA hazardous waste for storage, treatment or disposal – **Applicable**	40 CFR 264.13(a)(1) FAC 62-730.180(1)
Determinations for management of hazardous waste	Must determine each EPA Hazardous Waste Number (waste code) applicable to the waste in order to determine the applicable treatment standards under 40 CFR 268 et seq. *NOTE:* This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11 of this chapter.	Generation of hazardous waste for storage, treatment or disposal – **Applicable**	40 CFR 268.9(a) FAC 62-730.183
	Must determine the underlying hazardous constituents [as defined in 40 CFR 268.2(i)] in the characteristic waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non –wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment or disposal – **Applicable**	40 CFR 268.9(a) FAC 62-730.183
Determinations for management of hazardous waste	Must determine if the hazardous waste meets the treatment standards in 40 CFR 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste. *Note:* This determination can be made concurrently with the hazardous waste determination required in 40 CFR 262.11.	Generation of hazardous waste for storage, treatment or disposal – **Applicable**	40 CFR 268.7(a) FAC 62-730.183
	Must comply with the special requirements of 40 CFR 268.9 in addition to any applicable requirements in CFR 268.7.	Generation of waste or soil that displays a hazardous characteristic of ignitability, corrosivity, reactivity, or toxicity for storage, treatment or disposal – **Applicable**	40 CFR 268.7(a) FAC 62-730.183

Action	Requirement	Prerequisite	Citation
Characterization of remediation wastes	Obtain a detailed chemical and physical analysis of a representative sample of the hazardous remediation wastes to be managed at the site. At a minimum, the analysis must contain all of the information which must be known to treat, store or dispose of the waste according to this part and part 268 of this chapter and must be kept up to date.	Management of remediation wastes at facility that does not have a RCRA permit - **Applicable**	40 CFR § 264.1(j)(2)
Waste Storage – Primary Waste (e.g., excavated waste and contaminated soil) and Secondary Wastes (e.g., contaminated equipment or treatment residuals)			
Temporary on–site storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility provided that: • Waste is placed in containers that comply with 40 CFR 265.171 – 173. • The date upon which accumulation begins is clearly marked and visible for inspection on each container. • The container is marked with the words "hazardous waste".	Accumulation of RCRA hazardous waste on site as defined in 40 CFR 260.10 – Applicable	40 CFR 262.34(a); 40 CFR 262.34(a)(1)(i); 40 CFR 262.34(a)(2) and (3) FAC 62-730.160
	• The container may be marked with other words that identify the contents.	Accumulation of 55 gallons or less of RCRA hazardous waste or one quart of acutely hazardous waste listed in 261.33(e) at or near any point of generation – **Applicable**	40 CFR 262.34(c)(1) FAC 62-730.160
Use and management of hazardous waste in containers	If container is not in good condition (e.g. severe rusting, structural defects) or if it begins to leak, must transfer waste from this container to a container that is in good condition.	Storage of RCRA hazardous waste in containers – **Applicable**	40 CFR 265.171 FAC 62-730.180(2)
	Must use container made or lined with materials compatible with waste to be stored so that the ability of the container to contain is not impaired.		40 CFR 265.172 FAC 62-730.180(2)
	Containers must be closed during storage, except when necessary to add/remove waste. Container must not be opened, handled and stored in a manner that may rupture the container or cause it to leak.		40 CFR 265.173(a) and (b) FAC 62-730.180(2)
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 CFR 264.175(b)	Storage of RCRA hazardous waste in containers with free liquids – **Applicable**	40 CFR 264.175(a) FAC 62-730.180(1)

Action	Requirement	Prerequisite	Citation
	Area must be sloped or otherwise designed and operated to drain liquid resulting from precipitation; or Containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage of RCRA–hazardous waste in containers that do not contain free liquids (other than F020, F021, F022, F023, F026 and F027) – **Applicable**	40 CFR 264.175(c)(1) and (2) FAC 62-730.180(1)
Closure of RCRA container storage unit	At closure, all hazardous waste and hazardous waste residues must be removed from the containment system. Remaining containers, liners, bases, and soils containing or contaminated with hazardous waste and hazardous waste residues must be decontaminated or removed. [*Comment:* At closure, as throughout the operating period, unless the owner or operator can demonstrate in accordance with 40 CFR 261.3(d) of this chapter that the solid waste removed from the containment system is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of parts 262 through 266 of this chapter].	Storage of RCRA hazardous waste in containers in a unit with a containment system – **Applicable**	40 CFR 264.178 FAC 62-730.180(1)
Storage and processing of non-hazardous waste	No person shall store, process or dispose of solid waste except as authorized at a permitted solid waste management facility or a facility exempt from permitting under this chapter. No person shall store, process or dispose of solid waste in a manner or location that causes air quality standards to be violated or water quality standards or criteria of receiving waters to be violated.	Management and storage of solid waste – **Applicable**	FAC 62 701.300(1)(a) and (b)
Temporary on-site storage of remediation waste in staging pile (e.g., excavated soils)	Must be located within the contiguous property under the control of the owner/operator where the wastes are to be managed in the staging pile originated. For purposes of this section, storage includes mixing, sizing, blending or other similar physical operations so long as intended to prepare the wastes for subsequent management or treatment.	Accumulation of solid non–flowing hazardous remediation waste (or remediation waste otherwise subject to LDRs) as defined in 40 CFR 260.10 – **Applicable**	40 CFR 264.554(a)(1) FAC 62- 730.180(1)
Performance criteria for staging pile	Staging pile must: • Facilitate a reliable, effective and protective remedy. • Be designed to prevent or minimize releases of hazardous wastes and constituents into the environment. • Minimize or adequately control cross–media transfer as necessary to protect human health and the environment (e.g., use of liners, covers, runoff/run-on controls).	Storage of remediation waste in a staging pile – **Applicable**	40 CFR 264.554(d)(1)(i) and (ii) FAC 62- 730.180(1)

Action	Requirement	Prerequisite	Citation
Operation of a staging pile	Must not operate for more than two years, except when an operating term extension under 40 CFR 264.554(i) is granted. *Note:* Must measure the two-year limit (or other operating term specified) from first time remediation waste placed in staging pile	Storage of remediation waste in a staging pile – **Applicable**	40 CFR 264.554(d)(1)(iii) FAC 62-730.180(1)
	Must not use staging pile longer than the length of time designated by the EPA in the appropriate decision document.		40 CFR 264.554(h) FAC 62- 730.180(1)
	Extension of up to an additional 180 days beyond the operating- term limit may be granted provided the continued operation of the staging pile will not pose a threat to human health and the environment; and is necessary to ensure timely and efficient implementation of remedial actions at the facility.		40 CFR 264.554(i)(1)(i) and (ii) FAC 62- 730.180(1)
Management of staging pile	Must not place ignitable or reactive remediation waste in a staging pile unless the remediation waste has been treated, rendered, or mixed before placed in the staging pile so that: • The remediation waste no longer meets the definition of ignitable or reactive under 40 CFR 261.21 or 40 CFR 261.23; and • You have complied with 40 CFR §264.17(b); or • Must manage the remediation waste to protect it from exposure to any material or condition that may cause it to ignite or react.	Storage of ignitable or reactive remediation waste in staging pile – **Applicable**	40 CFR 264.554(e) FAC 62- 730.180(1) 40 CFR 264.554(e)(1)(i) and (ii) 40 CFR 264.554(e)(2)
	Must not place in the same staging pile unless you have complied with 40 CFR § 264.17(b).	Storage of "incompatible" remediation waste (as defined in 40 CFR § 260.10) in staging pile – **Applicable**	40 CFR 264.554(f)(1)
	Must separate the incompatible waste or materials or protect them from one another by using a dike, berm, wall or other device.	Staging pile of remediation waste stored nearby to incompatible wastes or materials in containers, other piles, open tanks or land disposal units – **Applicable**	40 CFR 264.554(f)(2)
	Must not pile remediation waste on same base where incompatible wastes or materials were previously piled unless you have sufficiently decontaminated the base to comply with 40 CFR § 264.17(b).		40 CFR 264.554(f)(3)
Design criteria for staging pile	In setting standards and design criteria, must consider the following factors: • Length of time pile will be in operation.	Storage of remediation waste in a staging pile – **Applicable**	40 CFR § 264.554(d)(2)(i) – (vi)

Action	Requirement	Prerequisite	Citation
	• Volumes of waste you intend to store in the pile. • Physical and chemical characteristics of the wastes to be stored in the unit. • Potential for releases from the unit. • Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases. • Potential for human and environmental exposure to potential releases from the unit.		FAC 62- 730.180(1)
Closure of staging pile of remediation waste	Must be closed within 180 days after the operating term by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate. Must decontaminate contaminated sub-soils in a manner that the EPA determines will protect human and the environment.	Storage of remediation waste in staging pile in previously contaminated area – **Applicable**	40 CFR § 264.554(j)(1) and (2) FAC 62- 730.180(1)
	Must be closed within 180 days after the operating term, according to 40 CFR 264.258(a) and 264.111 or 265.258(a) and 265.111.	Storage of remediation waste in staging pile in uncontaminated area – **Applicable**	40 CFR § 264.554(k) FAC 62- 730.180(1)
Waste Treatment and Disposal – Primary Wastes (e.g., excavated sludge, NAPL, contaminated soil) and Secondary Wastes (e.g., contaminated equipment or treatment residuals)			
Disposal of RCRA hazardous waste in a land-based unit (e.g., sludge and NAPL)	May be land disposed if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 CFR 268.40 before land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted RCRA waste – **Applicable**	40 CFR 268.40(a) FAC 62-730.183
	All underlying hazardous constituents [as defined in 40 CFR 268.2(i)] must meet the UTS, found in 40 CFR 268.48 Table UTS prior to land disposal.	Land disposal of restricted RCRA characteristic wastes (D001 – D043) that are not managed in a wastewater treatment system that is regulated under the Clean Water Act, that is Clean Water Act equivalent or that is injected into a Class I nonhazardous injection well – **Applicable**	40 CFR 268.40(e) FAC 62-730.183
Disposal of RCRA hazardous waste in a land-based unit	To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards of 40 CFR 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as	Land disposal of RCRA toxicity characteristic wastes (D004 – D011) that are newly identified (i.e., wastes, soil or debris	40 CFR 268.34(f) FAC 62-730.183

Action	Requirement	Prerequisite	Citation
	concentration in the waste extract or waste, or the generator may use knowledge of the waste. If the waste contains constituents (including underlying hazardous constituents [UHCs] in the characteristic wastes) in excess of the applicable UTS levels in 40 CFR 268.48, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.	identified by the TCLP but not the extraction procedure) – **Applicable**	
Disposal of RCRA hazardous waste soil in a land-based unit	Must be treated according to the alternative treatment standards of 40 CFR 268.49(c) or according to the UTSs specified in 40 CFR 268.48 applicable to the listed and/or characteristic waste contaminating the soil prior to land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted hazardous soils – **Applicable**	40 CFR § 268.49(b) FAC 62-730.183
Disposal of RCRA hazardous waste debris in a land–based unit (i.e., landfill)	Must be treated prior to land disposal as provided in 40 CFR 268.45(a)(1)–(5) unless the EPA determines under 40 CFR 261.3(f)(2) that the debris no longer contaminated with hazardous waste or the debris is treated to the waste-specific treatment standard provided in 40 CFR 268.40 for the waste contaminating the debris.	Land disposal, as defined in 40 CFR 268.2, of restricted RCRA hazardous debris – **Applicable**	40 CFR § 268.45(a) FAC 62-730.183
Disposal of treated hazardous debris	Debris treated by one of the specified extraction or destruction technologies on Table 1 of 40 CFR 268.45 and which no longer exhibits a characteristic is not a hazardous waste and need not be managed in RCRA Subtitle C facility. Hazardous debris contaminated with listed waste that is treated by immobilization technology must be managed in a RCRA Subtitle C facility.	Treated debris contaminated with RCRA listed or characteristic waste – **Applicable**	40 CFR § 268.45(c) FAC 62-730.183
Disposal of hazardous debris treatment residues	Except as provided in 268.45(d)(2) and (d)(4), must be separated from debris by simple physical or mechanical means, and such residues are subject to the waste–specific treatment standards for the waste contaminating the debris.	Residue from treatment of hazardous debris – **Applicable**	40 CFR § 268.45(d)(1) FAC 62-730.183
Disposal of RCRA characteristic wastewaters in a publicly owned treatment works	Are not prohibited, if wastes are treated for purposes of the pretreatment requirements of Section 307 of the Clean Water Act, unless the wastes are subject to a specified method of treatment other than DEACT in 40 CFR 268.40, or are D003 reactive cyanide.	Land disposal of hazardous wastewaters that are hazardous only because they exhibit a characteristic and are not otherwise prohibited under 40 CFR 268 – **Applicable**	40 CFR 268.49(b) FAC 62-730.183

Action	Requirement	Prerequisite	Citation
Treated Waste in Place – Cover and Post-Closure Care			
Florida solid waste landfill cover design and construction	For unlined Class I landfills (i.e., unlined landfills containing "Class I waste"), the barrier layer shall have a permeability of 1×10^{-7} centimeters per second or less. "Class I waste" means solid waste that is not hazardous waste, and that is not prohibited from disposal in a lined landfill under FAC Rule 62-701.300. See FAC 62-701.200(13).	Closure of a Class I solid waste landfill as defined in F.A.C 62-701.340(2)(a) – **Relevant and Appropriate**	FAC 62-701.600(3)(g)(1)
Florida solid waste landfill deed notice for areas with in-situ stabilization	Once closure construction has been completed, the landfill owner or operator shall file a declaration to the public in the deed records in the office of the county clerk of the county in which the landfill is located. The declaration shall include a legal description of the property on which the landfill is located and a site plan specifying the area actually filled with solid waste. The declaration shall also include a notice that any future owner or user of the site should consult with the FDEP prior to planning or initiating any activity involving the disturbance of the landfill cover, monitoring system or other control structures. A certified copy of the declaration shall be filed with the FDEP.	Closure of a Class I solid waste landfill as defined in FAC 62-701.340(2)(a) – **Relevant and Appropriate**	FAC 62-701.600(7)
Florida solid waste landfill (Vegetation and Grading) for areas with in-situ stabilization	The final cover shall be vegetated to control erosion and provide a moisture infiltration seal, with species that are drought resistant and have roots that will not penetrate the final cover.	Closure of a Class I solid waste landfill as defined in FAC 62-701.340(2)(a) – **Relevant and Appropriate**	FAC 62-701.600(3)(f)(2)
	Top gradients of final cover on landfill areas shall be graded to maximize runoff and minimize erosion, considering total fill height and expected subsidence caused by decomposing waste, and shall be designed to prevent ponding or low spots.		FAC 62-701.600(3)(f)(3)
Warning signs at hazardous waste sites	Shall place warning signs pursuant to FAC Chapter 62-730.	Site located in Florida where risk of exposure to the public exists due to contaminated soil and sediment – **Relevant and Appropriate**	FAC 62-780.220(5)
Waste Transportation – Primary and Secondary Wastes			
Transportation of hazardous waste on site	The generator manifesting requirements of 40 CFR 262.20–262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 CFR 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way – **Applicable**	40 CFR 262.20(f) FAC 62-730.160

Action	Requirement	Prerequisite	Citation
Transportation of hazardous waste off site	Must comply with the generator standards of Part 262, including 40 CFR 262.20–23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect. 262.32 for marking and Sect. 262.33 for placarding.	Preparation and initiation of shipment of hazardous waste off site – **Applicable**	40 CFR 262.10(h); FAC 62-730.160
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the Hazardous Materials Transportation Act and Hazardous Materials Regulations at 49 CFR 171–180 related to marking, labeling, placarding, packaging and emergency response.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material – **Applicable**	49 CFR 171.1(c)
Transportation of samples (i.e., contaminated soils, sludge and wastewaters)	Are not subject to any requirements of 40 CFR Parts 261 through 268 or 270 when: • The sample is being transported to a laboratory for the purpose of testing. • The sample is being transported back to the sample collector after testing. • The sample is being stored by sample collector before transport to a lab for testing.	Samples of solid waste or a sample of water, soil for purpose of conducting testing to determine its characteristics or composition – **Applicable**	40 CFR 261.4(d)(1)(i)–(iii) FAC 62-730.030
	In order to qualify for the exemption in 40 CFR 261.4 (d)(1)(i) and (ii), a sample collector shipping samples to a laboratory must: • Comply with U.S. Department of Transportation, U.S. Postal Service or any other applicable shipping requirements. • Assure that the information provided in (1) thru (5) of this section accompanies the sample. • Package the sample so that it does not leak, spill or vaporize from its packaging.		40 CFR § 261.4(d)(2) 40 CFR § 261.4(d)(2) (ii)(A) and (B) FAC 62-730.030

Notes:

ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
FAC = Florida Administrative Code, chapters as specified
FDEP = Florida Department of Environmental Protection
F.S. = Florida statute
HAP = hazardous air pollutant
RCRA = Resource Conservation and Recovery Act
TCLP = toxicity characteristic leaching procedure
UHC = underlying hazardous constituent
UTS = universal treatment standard
VOC = volatile organic compound

Table 17. Selected Remedy Cost Estimate Summary

Zone	Alternative #	Alternative Name	Cost
Common	COM #1	Bamboo Mobile Home Park Excavation and Relocation	$141K
	COM #2	MSA Building Demolition and Relocation of Businesses, Tenants and Residents	$1.69M
	COM #3A	Shallow Soil Excavation Under Buildings	$4.57M
UZ	UZ #4	In-Situ Stabilization/Solidification with Limited Soil Excavation, and Off-Facility Disposal	$12.3M
MSA	MSA #3	In-Situ Stabilization/Solidification with LDAs	$11.6M
EP	EP #2	GR&T	$4.1M
Sitewide Costs		(e.g., five-year sampling and reviews, ICs)	$102K
Potential Ancillary Costs			
Fair Market Appraisal of Buildings Proposed for Demolition (preliminary estimate)			$9.5M
Tenant Relocation Costs (To be submitted under separate cover)			$13.1M
Estimated Total			**$57.1M**

FIGURES

Figure 1. Site Location Map

Figure 2. Site Layout

Figure 3. Historical Site Layout – November 1969

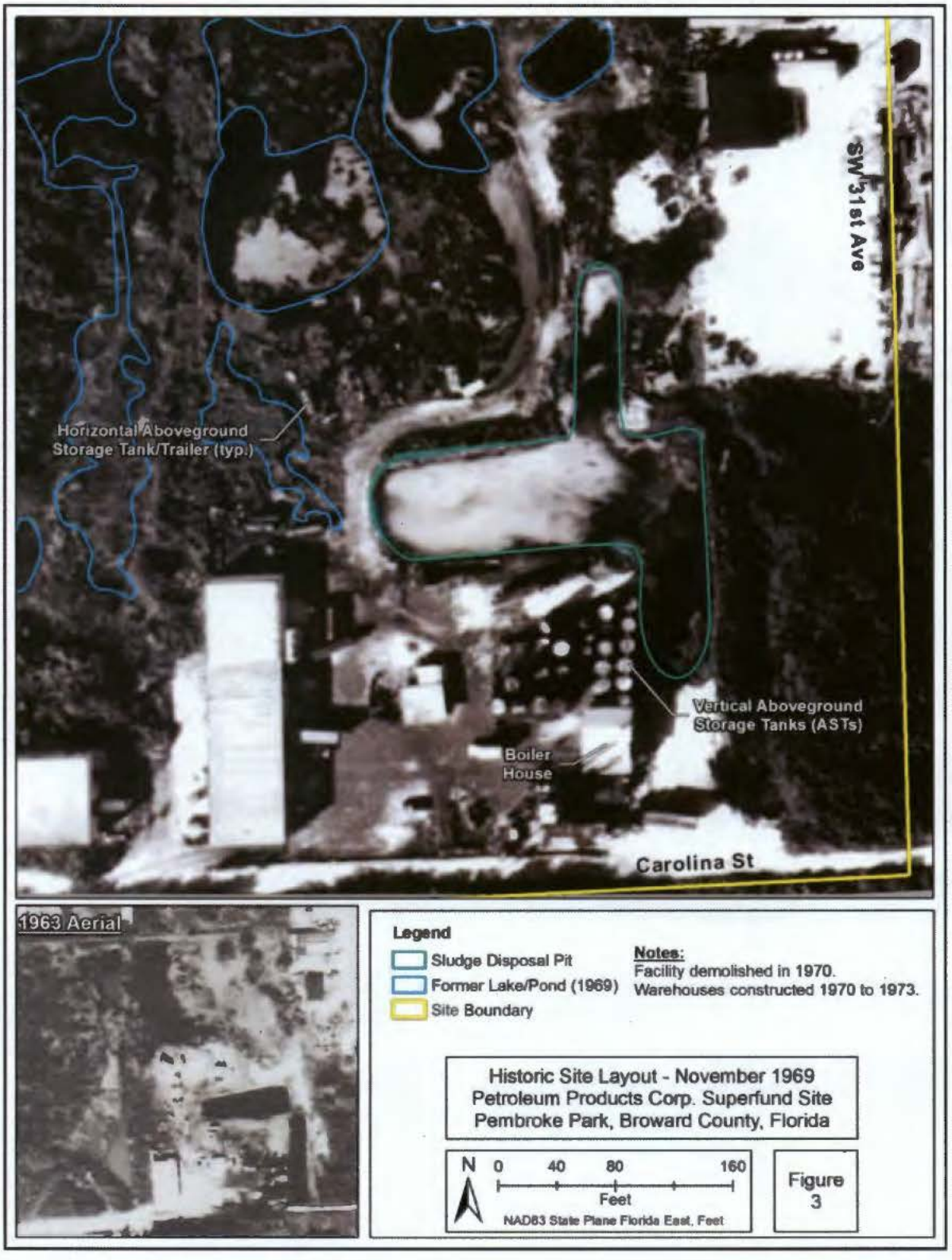
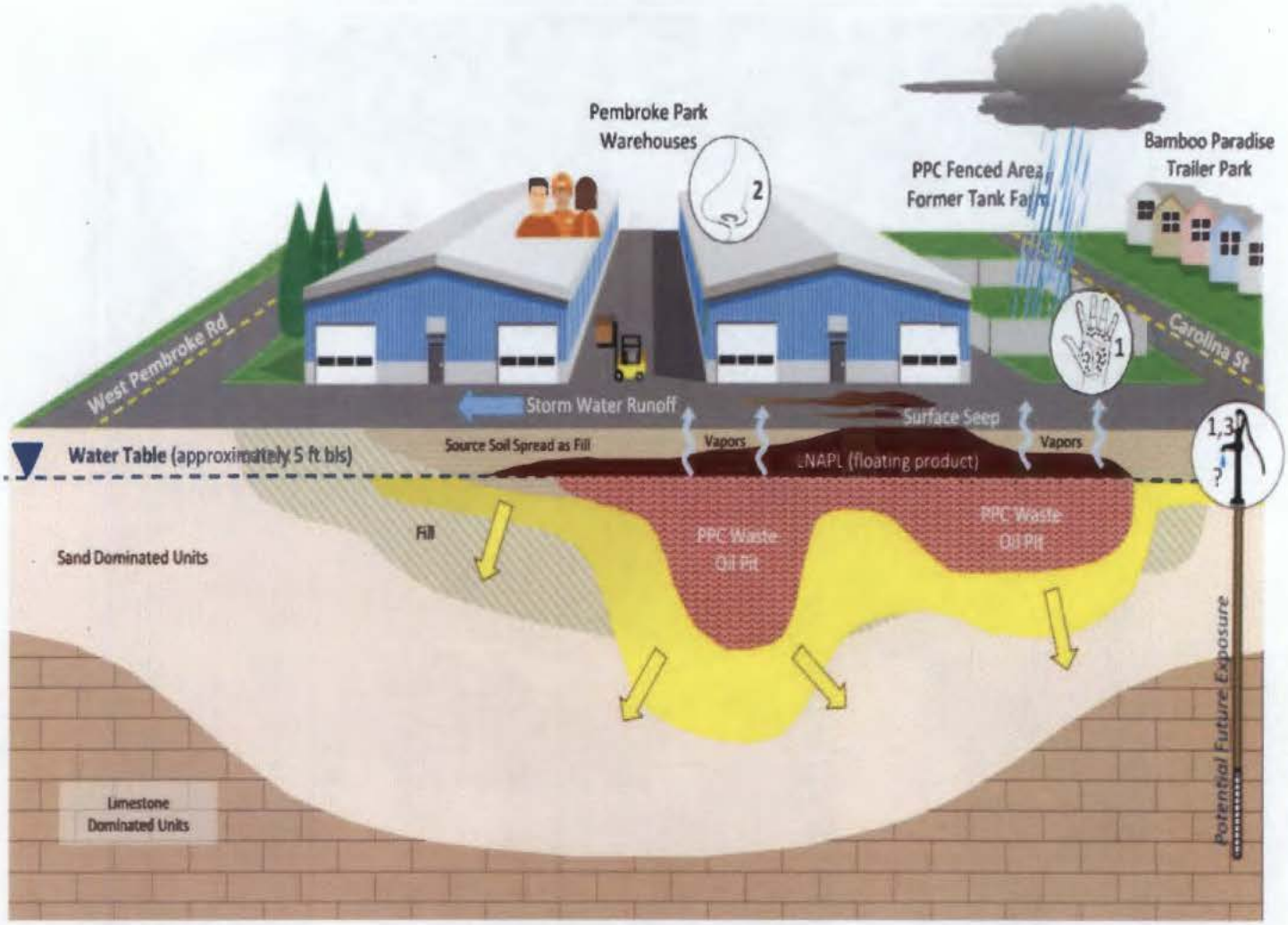


Figure 4. General Conceptual Site Model



Main Potential Exposure Routes

① Dermal contact – soils, future groundwater (?)

② Inhalation

③ Ingestion – soils, product, future groundwater (?)

Diffused/Dispersed Contamination in Groundwater

Cracks in foundation allow vapors to enter building

Figure 5. Hallandale, Florida Wellfield, 270-Day Travel

LEGEND
270 Day Travel Time
2-foot drawdown contour
Approx. Scale 1" =1,500'

Hallandale, FL Wellfield, 270 Day Travel
Petroleum Products Corp. Superfund Site
Pembroke Park, Broward County, Florida

Figure 5

Figure 6. Conceptual Site Model

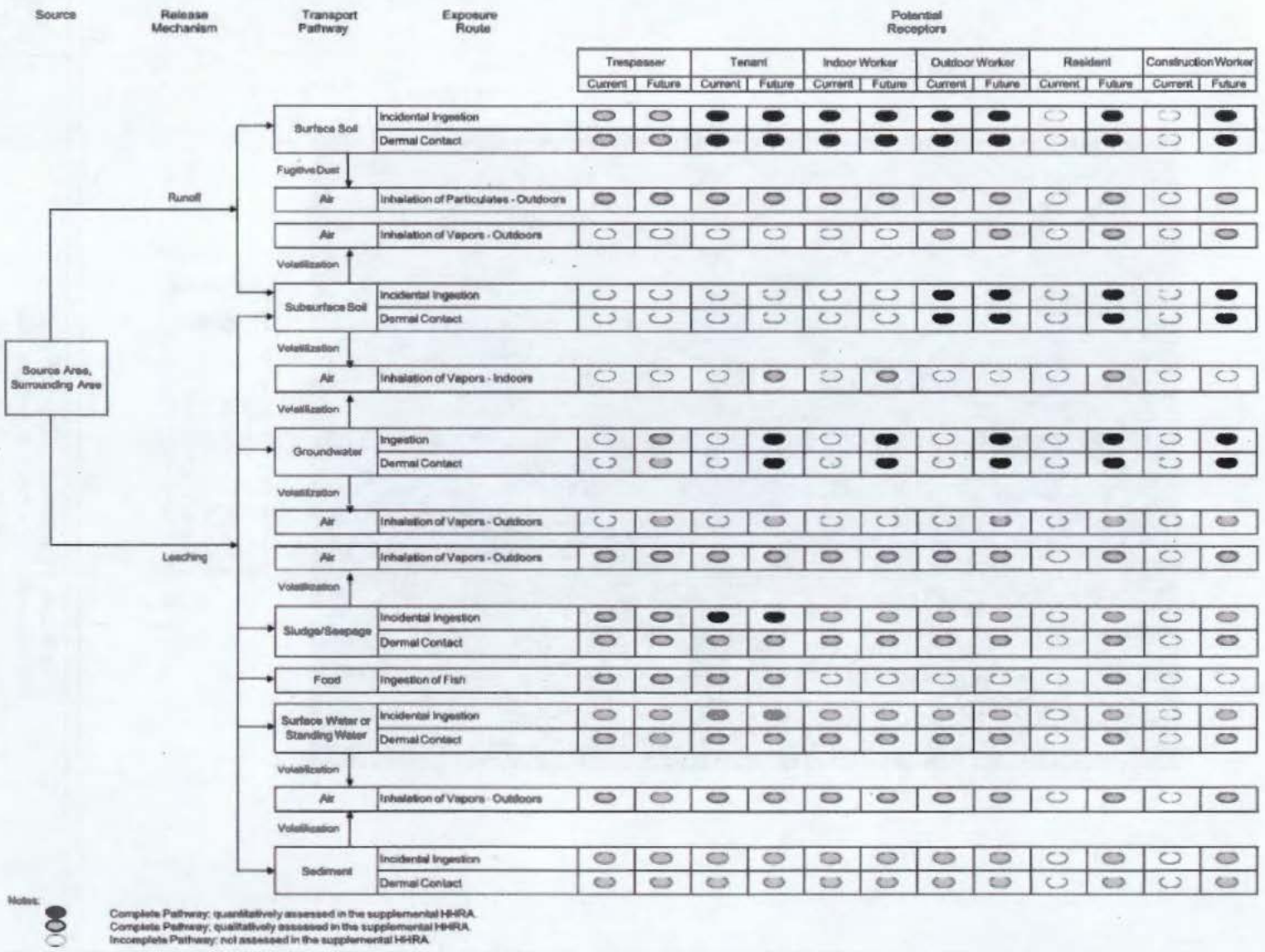


Figure 7. Building Demolition for Common Elements

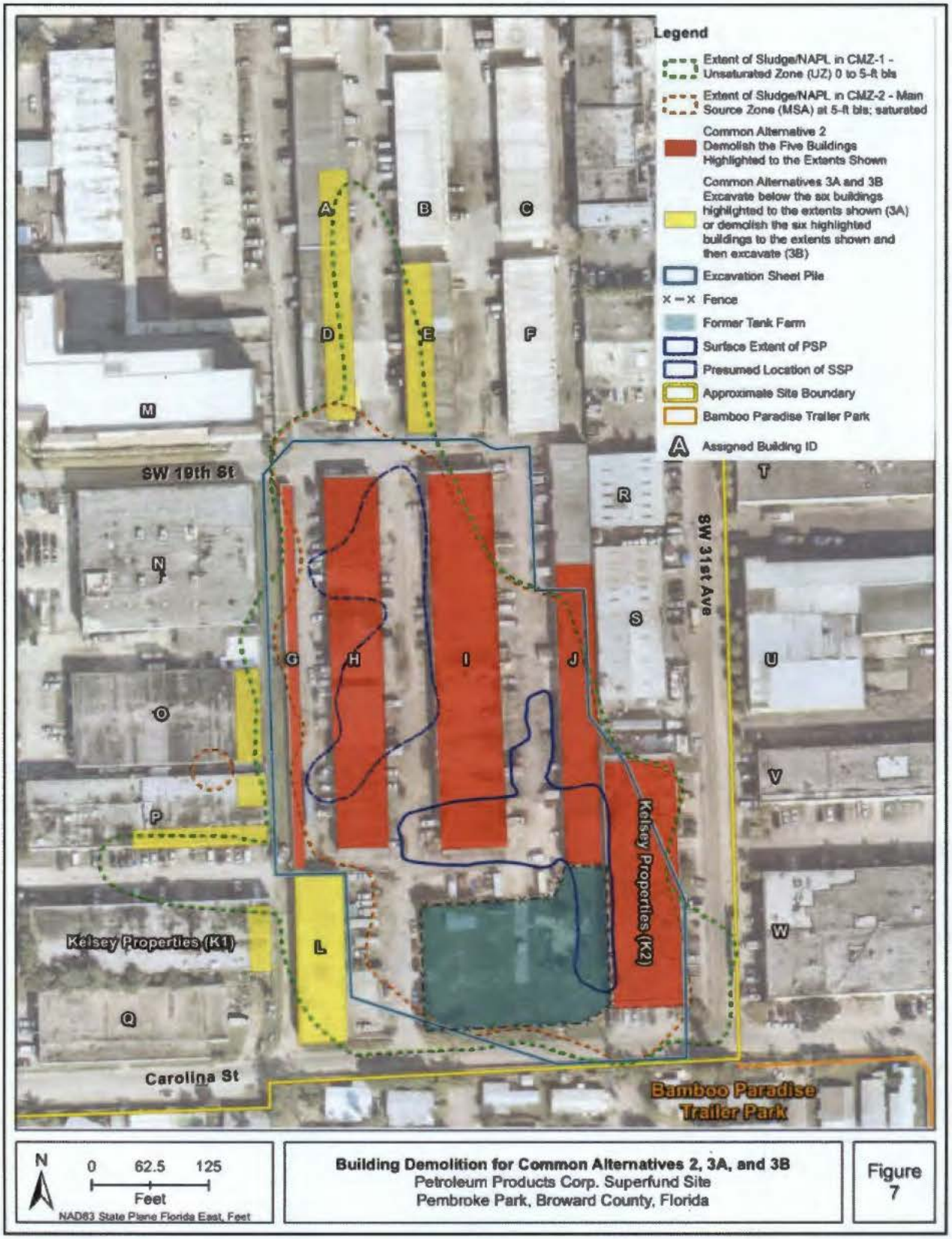
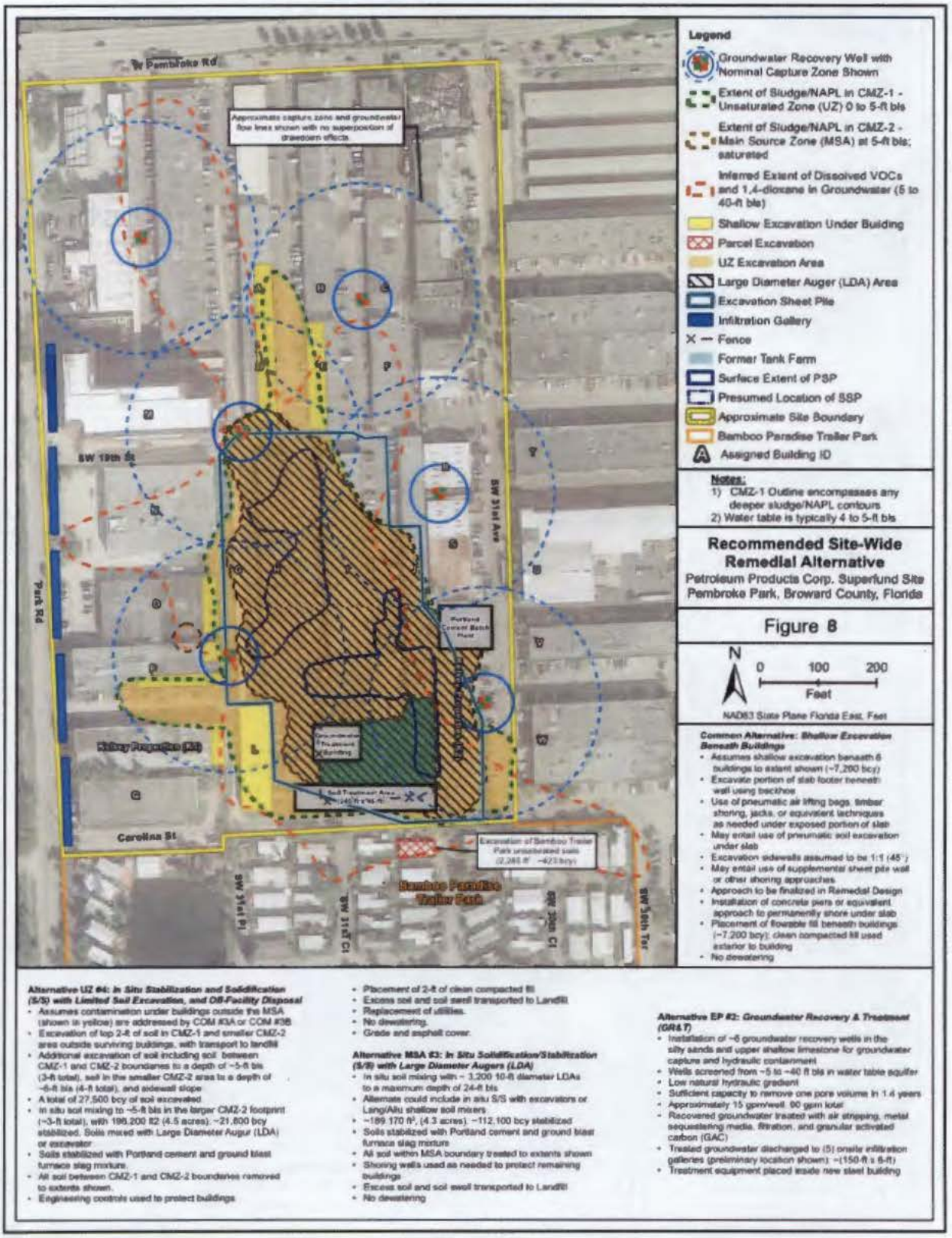


Figure 8. Recommended Sitewide Remedial Alternative



APPENDIX A
RESPONSE TO COMMENTS

PETROLEUM PRODUCTS CORP. SUPERFUND SITE
RESPONSIVENESS SUMMARY

PREFACE

This Responsiveness Summary addresses comments and questions related to the Proposed Plan for the Petroleum Products Corp. Superfund site received by EPA during the public comment period from January 11 to February 19, 2021. EPA received comments and questions on the Proposed Plan via email and letter and during the January 19, 2021 Zoom public meeting. This document summarizes these questions and comments as well as EPA's responses.

A chronological list of additional EPA interactions with stakeholders regarding the Proposed Plan follows the comments/questions and EPA responses below. Attachment A provides extended comments submitted by the OU1 Cooperating Parties Group. Attachment B is a copy of the transcript from the January 2021 Zoom public meeting. The transcript includes all of the comments and questions submitted during the meeting.

SUMMARY OF EMAIL, LETTER AND PUBLIC MEETING COMMENTS MADE ON THE PROPOSED PLAN FOR THE PETROLEUM PRODUCTS CORP. SITE3

1. **Question**: *When will you know which buildings will be demolished and which cleanup plan will be used?*

   EPA Response: Once we receive all of the comments on the Proposed Plan, we will compile them and include them in the Record of Decision, which is the final decision document. At that point, it will be decided whether the Proposed Plan should be modified based on the comments that we receive from the public and the state of Florida. The Record of Decision will show the structures that will ultimately be demolished. All of the evaluation of technologies and treatments includes the five buildings that we identified. Our approach was to minimize the number of buildings that will be affected, and this plan includes the minimal number of buildings affected to accomplish the goals for the site.

2. **Question:** ***How will the gun range in the building affect the project?***

   EPA Response: The gun range building is the center of the site, on top of the primary pit and portions of the secondary sludge pit. It is the most centrally located building and has to

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3 When known, the names of the people and organizations providing comments/asking questions are included in the document. Questions asked via the chat function during the January 2021 Zoom public meeting are not attributed to a person or affiliation. EPA held the public meeting virtually using Zoom due to COVID-19 concerns.

be removed to access the soil and the sludge pits, which includes the majority of the depth of soil down to 24 feet underneath the gun range building.

3. **Question:** ***Are only buildings south of 19th Street presumed to be removed, and nothing north of 19th Street?***

EPA Response: All of the buildings that we are looking at for proposed demolition are south of 19th Street. There are four buildings on the Pembroke Park warehouse property and one building on the Kelsey property at 31st Avenue and Carolina Street, on the far-right corner. These five buildings are the ones that fall into the demolition category. We are proposing that the yellow buildings (referring to a slide from the video presentation, shown to the right) remain and that we excavate underneath them, since there is much-shallower contamination there. If it is found later, even during the design phase, that there's more extensive or deeper contamination than what we are aware of, there will be an evaluation to determine whether to demolish one of those buildings or to try and save it. We do not want to demolish any buildings unnecessarily. Based on where contamination is located and the depth of the contamination, these five buildings have to be removed to reach the contaminated soil and accomplish all of the goals for this site.

4. **Question:** ***Will the presence of PCBs exclude a Class D landfill as a disposal option?***

EPA Response: PCBs are present and are at very low levels. Once the soil is excavated, a sample analysis will be performed on the batch soil. Then it will be determined whether the disposal method will be off site at a Subtitle C or Subtitle D landfill.

5. **Question:** ***Do the groundwater impacts extend to the Florida Department of Transportation (FDOT) right of way on Pembroke Road?***

EPA Response: It extends to Pembroke Road, as we have identified to the north. The red dashed line (referring to a slide from the video presentation, shown to the right) is CMZ 3, which is the groundwater. This red dashed line shows what we have identified through our investigation of groundwater contamination and the dissolved phase to a depth of 40 feet below surface. This is located within the yellow boundary and Pembroke Road is to the north of the yellow line. After soil treatment and sludge treatment, there will be more groundwater investigations or sampling necessary to monitor if any contaminants migrate at all. Once the soil and the sludges are disturbed, there may be a release of contaminants and the groundwater could carry that contamination toward the well fields to the east and to the north.

Soil/Groundwater from 5 to 40-ft bls

6. **Question from Maria Salgado, FDOT:** ***We have projects working along DOT right of way. As per guidelines from the Florida Department of Environmental Protection (DEP), we are supposed to look for any Superfund or other contaminated sites that show up on our GIS layers with a potential impact on our projects within 500 feet if it is a contaminated site or 1,000 feet if it is a Superfund site, and so on. How soon is this activity going to take place so we can keep it on our radar for our surrounding projects?***

   EPA Response: The schedule for this project will be updated at the end of the comment period in February 2021. We will compile all the information from the comments we receive and prepare a Record of Decision around June or July of this year. After the Record of Decision is completed, we will conduct negotiations with responsible parties and prepare a Consent Decree. The design will start after the Consent Decree is lodged. A typical design will take about 18 months. We estimate that it will take two years from the time the Record of Decision is signed to starting physical activity. The summer of 2023 is an approximate date for on-site activities to begin.

7. **Question from Evan Goldenberg, White & Case, on behalf of The Kelsey Group:** ***My client, The Kelsey Group and its affiliates, requests an in-person meeting (or a virtual one if necessary) to discuss issues unique or specific to it, including traffic, access and ingress/egress issues. We believe an in-person meeting would be best so the participants can walk the area in order to best understand the traffic and access concerns. We would like to have the meeting sufficiently in advance of the February 12, 2021 public comment deadline so that what we learn from the meeting can inform our comments. Please let us know if and when the relevant EPA personnel are available for such a meeting.***

EPA Response: The details for all remedial actions will be included in the upcoming remedial design once a decision document is approved. The traffic details will depend on the approved contractor and how they propose addressing site objectives. The remedial design will lay out the order of progression for site plans and schedule of events that will be followed for the selected contractor. All planned actions will allow adequate time for surrounding businesses, local officials, and residents to be familiar with the scheduled events. Typically, all efforts to prevent road closures or cause inaccessible roadways are a top priority for any site remediated. There may be intermittent periods of the operation that affect traffic during movement of dump trucks or heavy equipment onto the site. This may slow traffic or temporarily stop the flow until the equipment is off the road. At this time, I do not envision road closures for three of the surrounding roads, Pembroke Road, Park Road and 31st Avenue. Carolina Street may experience the most disruption over the course of the remediation, but I do not anticipate a complete closure. If there is a need for this action, it will be for a relatively short duration. There can be provisions for one lane closure at a time that still allows traffic to flow through the area.

The initial remedial action that involves the removal of buildings through demolition will experience the most active road traffic. The majority of the soil/sludge activity will be conducted on the property and not affect the surrounding roadways, with the exception of delivering the stabilizing agent to be added to the soil. This material is delivered via tractor mobile home and offloaded into containers as needed. I would anticipate that personnel will be directing traffic on occasion, strictly for safety concerns and this will allow traffic flow to continue along with the remediation of the site.

As a final note, I expect that there will be a website, phone number or location provided for locals to check on site progress and upcoming events in order to keep the public informed. There will always be a point of contact available to address public concerns and provide site updates.

8. **Comments from Evan Goldenberg, White & Case, on behalf of The Kelsey Group:** *As you know, this firm represents The Kelsey Group and its affiliated companies, including Aon 31st LLC ("Aon") and Park 31st Corp. ("Park 31"), with respect to environmental issues associated with the Petroleum Products Corporation Superfund Site ("PPC Site"). The Kelsey Group, Aon and Park 31 hereby submit these comments to the Superfund Program Proposed Plan for the PPC Site, dated January 2021 (the "Proposed Plan"). Aon is the owner of the property located at 2000-2050 S.W. 31st Avenue, Pembroke Park, Florida, which is identified as "Kelsey Properties (K2)" on Figure 6 of the Proposed Plan ("K2"). Park 31 is the owner of the property located at 1975-1985 S. Park Road, Pembroke Park, Florida, which is identified as "Kelsey Properties (K1)" on Figure 6 of the Proposed Plan ("K1"). Kelsey Group affiliates also own other properties in the immediate vicinity, including property on the east side of 31st Avenue, which are referred to herein as the "Other Kelsey Properties."*

These comments to the Proposed Plan focus on two issues: (1) compensation for the taking of Aon and Park 31 property under the Fifth Amendment of the United States Constitution

and/or Article X, Section 6(a) of the Florida Constitution; and (2) traffic and access issues associated with the remedial activities discussed in the Proposed Plan.

Takings Under the United States and Florida Constitutions

The Fifth Amendment of the United States Constitution requires just compensation whenever the federal government takes private property for public use. Article X, Section 6(a) similarly requires just compensation whenever the State of Florida takes private property for public use. There is no exception for response activities under Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") and nothing in CERCLA itself purports to limit the government's takings liability (nor could it).

While Kelsey Group and EPA representatives have discussed CERCLA liability associated with anticipated response actions at the PPC Site for many years, the Proposed Plan is largely silent on the issue. The Proposed Plan proposes to demolish structures on the K2 property, which clearly constitutes a physical taking for which compensation is required. The Proposed Plan also proposes soil removal beneath the K1 property that will eliminate any economically viable use of that property for an extended period of time, which also constitutes a compensable temporary taking. The extensive remediation activities proposed for the K2 property will also constitute an extended physical invasion of the K2 property that will also deprive Aon of any economically viable use of its property for a significant period of time.

In the discussion of Common Alternative #2 on page 24, the Proposed Plan notes that "[a] Fair Market Value (FMV) appraisal of the five buildings was completed in mid-2019 and determined the value of the buildings to be estimated at $9.5M," but this $9.5 million figure is not included in the "Estimated Costs for Common Alternatives" on page 25, which has a "Net Present Value" for Alternative #2 of just $1,690,900.00. The $9.5 million figure for "Fair Market Appraisal of buildings proposed for demolition ("Preliminary Estimate") is included in the estimated costs of Recommended Alternatives on page 37 of the Proposed Plan, which is an appropriate acknowledgment of the need to provide just compensation to Aon for the taking of the buildings themselves.

While we are pleased to see recognition of the need to provide compensation for the physical destruction of the buildings, the estimated costs for Common Alternative #2 also appear to ignore the government's obligation to provide compensation, in addition to the costs of the buildings themselves, for the physical occupation of the K2 property for what will clearly be an extended period of time. A physical taking does not require a showing that it deprives the owner of all, or substantially all, economically viable use of the property during the temporary taking, but it is clear that the proposed site activities on the K2 property will leave Aon with no economically viable use of the property while site activities are ongoing. The costs associated with compensation for such temporary taking should have been included in the Proposed Plan and must be included in the ROD. This is also true of Common Alternatives #3A, which will not only cause a physical invasion of the K1 property, but also seems likely to eliminate any economically viable use of the property for an extended period

of time. Relocation of tenants under the Uniform Relocation Act, 42 U.S.C. §§4601 et seq., may not be sufficient.

Traffic and Access

The Proposed Plan does not meaningfully address potential access and traffic issues. It seems highly likely that the proposed remedial activities will affect ingress and egress in and around the PPC Site. Access restrictions associated with activities in the Main Source Area ("MSA") may affect access by The Kelsey Group, its tenants and their clients/customers at the K1 property, and vice-versa. In addition, all activities may affect access and traffic with respect to the Other Kelsey Properties, which include the properties located at 1798-2101 S.W. 31st Avenue, Pembroke Park, Florida, on the east side of 31st Avenue. Approximately 58 tenants run their businesses in approximately 275,000 square feet of warehouses. Their ingress and egress are from SW 31st Avenue and Carolina Street. Any activity that diminishes access to those roads will disrupt and negatively impact these businesses, which bear no blame for the contamination at the PPC Site. Closure and demolition of all or most of Carolina Street would similarly create transportation problems, as well as potential noise and air quality impacts that could make the neighboring residential community uninhabitable. Traffic and transportation impacts on Pembroke Road, South Park Road and Hallandale Beach Boulevard and could create hazards at railroad crossings and with respect to first responders' ability to respond to emergencies in the area. There is a risk that site activities could constructively shut down businesses that are outside the site boundaries due to inability to receive materials, ship/deliver products or get customers in and out of the area safely.

While the Proposed Plan does not address these issues, you responded to our inquiry on these issues in the email from you dated February 2, 2021, which is attached hereto as Exhibit A and which should be included in the Administrative Record. We reiterate our request for an in-person meeting in the vicinity of the PPC Site to discuss these issues to ensure that they are properly accounted for and addressed in the remedial design.

EPA Response: EPA is aware that the preferred remedial alternative for the Kelsey southeast property, K2, involves demolition of the warehouse structure and that an appraisal which attempts to address the fair market value (FMV) of that structure, which includes its revenue generating capacity, has been developed. CERCLA remedial response (i.e., cleanup) work is also needed on the Kelsey southwest property, K1, due to both historical PPC Site activities and business activities conducted by Kelsey or its tenants during Kelsey's ownership. However, business interruptions for cleanup work on property owned by a CERCLA PRP absent a defense to liability typically do not involve compensation from EPA.

During remedial design and settlement discussions with the other Site PRPs, the FMV of the K2 property will be discussed further. Updating the 2019 appraisal or conducting a new appraisal for the K2 property with input from EPA, FDEP and the other PRPs is likely. Further discussions on damages, costs or other financial impacts to the Kelsey properties and tenants will also need to occur. Some of those issues are directly addressed by EPA's CERCLA authorities, while others are potentially the responsibility of the Kelsey entities and the other businesses as site PRPs for both the K1 and K2 properties.

9. **Comments from Franklin Zemel, Saul Ewing Arnstein & Lehr LLP on behalf of Pembroke Park Warehouses:** *The Trustees/Owners of Pembroke Park Warehouses strongly support the remedy described by Mr. Michael Taylor of US EPA in his public comments on January 19, 2021 and urge US EPA to implement the remedy as quickly as possible subject to finalizing an agreement with Pembroke Park Warehouses on economic losses and other financial impacts, including remedial design impacts. This agreement should compensate Pembroke Park Warehouses for the loss of productive use of its warehouse parcels, including all costs and losses associated with the demolition/taking of certain of the warehouses as well as the requirement that certain warehouses may, or will be, required to be vacated or not used during the remediation including costs and/or losses related to possible limitations on the future use of the warehouses due to institutional controls and restrictions.*

While Pembroke Park Warehouses did not cause, create, allow or embellish the contamination at what is now described as the Petroleum Products Superfund Site, for the past 30 years the Trustees/Owner has consistently cooperated with, and supported, federal and state efforts designed to address the contamination at that portion of the Superfund Site on the warehouse property. We encourage the Agency to recognize the significant contributions (and sacrifices) made by Pembroke Park Warehouses when allocating funds to compensate the owners of property contaminated by the activities of Petroleum Products Corporation and by those who arranged for the disposal of used oil at the PPC Superfund Site. To be clear, Pembroke Park Warehouses had no connection whatsoever to Petroleum Products Corporation or its activities.

Finally, Pembroke Park Warehouses recognizes that the design of the remedy has not yet been completed by the Agency – and that the specific design details related to access, occupation, possession and adverse impacts to portions of the warehouse parcel located north and south of 19th Street are not yet determined. Pembroke Park Warehouses further recognizes that it is not possible to quantify those concerns or needs at this time. Nonetheless, the Trustees/Owners look forward to the implementation of the remedy and addressing those needs and concerns with the Agency during both the Consent Decree and design phases consistent with the rights of the Trustees/Owners.

The Trustees/Owners and the Agency have enjoyed a cooperative relationship, and the Trustees/Owners look forward to additional, fruitful and respectful negotiations with the Agency on the expected concerns and needs in the future.

EPA Response: EPA appreciates the support and cooperation from the Trustees/Owners historically in terms of providing site access and over the past few years in the effort to develop a remedy for the PPC Site. EPA is aware of several potential impacts to the Trustees/Owners property located both north or and south of 19th Street. Impacts will be direct and indirect to property and warehouses owned by the Trustees/Owners which EPA will work to manage and minimize those impacts during the remedial design process. As has

been discussed, some of the expected financial impacts from the upcoming site work, such as demolition, relocation and the fair market value of the warehouses, can be addressed by CERCLA legal authorities. Other economic losses cannot but would be the collective responsibility of the site PRPs to compensate the Trustees/Owners where appropriate and legally required based on individual PRP-allocated shares.

10. **Question:** ***What was the outcome of the air sparging system that was on site and is now demolished?***

    EPA Response: That system was in operation from the early-to-mid 1990s. This system was later replaced by the bioslurping system in the late 1990s. The initial system collected about 3,000 gallons of oil. It was replaced with a more efficient system, the bioslurper system that was put into use after 1997. The bioslurping system collected about 40,000 gallons of oil by late 2012. The State of Florida removed the bioslurper system in 2019, and it is no longer on the property. All of the old equipment has been removed.

11. **Question from Josh Buchheit, Envirocon:** ***What type of water system, or what do you think the water treatment would be for the discharge criteria and overall treatment of it?***

    EPA Response: The groundwater treatment is an interim action that we are proposing. Once the soil and sludge work are complete there will be about 18 months before the interim groundwater action will begin. The groundwater treatment will involve a multi-treatment system. Since we have different types of contaminants of concern with metals, chlorinated compounds and PCBs, one single treatment type will not address all of these contaminants. The interim action is proposing approximately six wells across the property. It will include an oil/water separator, a filtration system, a pH adjustment and an infiltration gallery. Once we treat the groundwater, the plan will be to reinject it on the west side of the property, which is the preferred method. If we are not able to install an infiltration system, then the alternative will be to consider the local publicly owned treatment works or the nearby surface water retention area to the west.

    Question: *Is the red-lined area* (referring to a slide from the video presentation that is included below) *just being monitored after the excavation? My building is in the top left of that area.*

EPA Response: Once the soil and sludge are addressed, several monitoring wells that we currently have in position will be removed or destroyed, because of the soil remediation and the depth that we must reach in some areas. New wells will be installed in affected areas. We will be monitoring the existing wells in addition to installing new wells to get a baseline on conditions after the treatment of the soil and sludge. Everyone in the vicinity of the site receives groundwater through city sources or county water, and EPA is not aware of wells that are pumping groundwater currently. We have conducted well surveys in the area, and no one is pumping groundwater for any potable source. This site has been designated as a delineated area, so it requires permits from the State to install any type of wells.

Soil/Groundwater from 5 to 40-ft bls

12. **Comment from Genifer Tarkowski, U.S. Department of the Navy:** *The plan to stabilize soils in-situ is a good solution to achieving RAOs. One concern is related to stabilized soil that is in contact with groundwater that contains chemicals that could act as a solvent for contaminants in the stabilized material. Nonpolar compounds could mobilize dioxins and other COCs after long-term contact. Recommend running TCLP analysis on in-situ stabilized material using a modified procedure that more closely approximates groundwater conditions to evaluate that potential before moving to full scale treatment.*

EPA Response: Page 4-13 of the Feasibility Study Revision 3 includes the following language: "At this time, based on the preliminary results of the treatability study, and following confirmation from SPLP testing, Black and Veatch recommends mixtures 12 and 13 for use in the CMZ-2 zones." The CMZ-2 zones are the sludge pit materials and associated soil below the water table that would be left in place as solidified/stabilized material. The various SPLP mixtures evaluated in treatability testing for compressive strength and hydraulic conductivity will be tested for SPLP during the remedial design and remedial action to make a final mix selection for application to CMZ-2 soils and sludges.

13. **Question:** ***Will the schedule be coming out through this PowerPoint*** **(referring to the video presentation)*? Will it have the schedule you are talking about so that we can download it and keep it in our files for later?***

EPA Response: The best way to keep up with site information is through our site web page. You can also contact remedial project manager (RPM) Marcia Nale for site scheduling. Information will be posted with periodic updates on our web page. We also post the

initiation of site activities in the local newspapers and through the mail list we have on file. The site presentation is available on YouTube.

14. **Question from Robert Stover, Action Environmental:** ***Thank you for all of your work on this site. Has the EPA selected an engineer/designer for this site?***

    EPA Response: The contractor for the remedial design and remedial action will be selected later in the Superfund process. EPA is currently in the comment period for the Proposed Plan. The next phase of the process will be for a final decision document, which is the Record of Decision. Once a Record of Decision is signed, EPA will negotiate a Consent Decree with the responsible parties at the site. After the Consent Decree is finalized, the contractor for the remedial design will be selected. I anticipate this will occur in late 2021. Feel free to check with EPA's Petroleum Products Corp. web page or RPM Marcia Nale on future developments.

15. **Question from Scheril Murray Powell, Doumar, Allsworth, Laystrom, Voigt, Wachs, Adair & Dishowitz, LLC/Green Sustainable Strong, LLC:** ***Thank you so much for the presentation earlier today. I appreciate your team taking the time to review the plan. I was hoping that I could speak with you about potentially planting hemp on the site post-excavation so that we can use the hemp to remediate the soil. Hemp was used after Chernobyl in the Soviet Union to remediate the soil. I am an Agricultural Attorney, but I am also a Florida-licensed hemp farmer doing research cultivation with the University of Florida. I would love to have a discussion about using hemp for soil remediation as a final phase of the cleanup project. If you are open to this possibility, I will engage the University team of researchers to assist with the planning. I am attaching my bio for your review. I am a Broward County resident and I am a close drive to the restoration site. I am copying my business partner William Rennalls on this email, he is a soil and water management expert.***

    EPA Response: Thank you for your response in reference to the Proposed Plan for the Petroleum Products Corporation site. EPA has evaluated numerous treatment technologies during the remedial investigation and feasibility study. Multiple factors are considered in narrowing the proposed treatment options.

    Primary and supplemental remedial treatment technologies were eliminated if they did not satisfy the RAOs for the evaluated media, were inappropriate for the site-specific contaminants of concern, were untenable for the given lithology, presented an unacceptable impact on the community or were cost prohibitive.

    In-situ bioremediation can be effective for treating many of the petroleum contaminants in the dissolved phase, but would not be effective for specific VOCs, some SVOCs, some metals and many other COCs, such as PCBs and 1,4 dioxane.

    The process you are referring to is phytoremediation. Phytoremediation is a bioremediation process that employs a variety of plants to eliminate, extract or degrade contaminants in the soil and groundwater. Bioremediation was considered and eliminated during the screening

process. This approach may address some of the contaminants identified from low level concentrations for some metals but may not be effective for all contaminants.

In addition, there are several factors that has rendered this type of treatment unacceptable. The depths of contamination extend into the aquifer to depths of 24 feet below surface. The root system for hemp typically extends to 1.5 to 3 feet deep. Even if effective, most of the contaminated media would not be addressed. In addition, there are some areas of soil contamination that may be considered a RCRA characteristic hazardous waste due to toxicity. If there is a RCRA waste, this material will require off-site disposal at a Subtitle C landfill. Also, there are soil and sludge pockets of low pH levels that may greatly hamper any biotreatment remediation.

The RAOs are to reduce and prevent exposures to soil and groundwater contamination. A biotreatment remedy would not accomplish the RAOs identified for this site. Further migration of contaminants would continue to migrate into the Biscayne Aquifer and further degrade a federally designated drinking water source.

The timeframe to conduct a biotreatment action is another consideration that does not meet the site objectives. A biotreatment process would typically take a much longer period to remediate the site than better alternatives. This Superfund site is zoned as a commercial/industrial area by the Town of Pembroke Park and Broward County. The current property owners have expressed a desire to quickly redevelop their property upon completion of any final remediation. An extended biotreatment process would delay the property owners using their property for their livelihoods.

16. Comments from Cheryl N. Adams, Resident:

Petroleum Products Corporation Superfund Site
PUBLIC COMMENT SHEET

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for the Petroleum Products Corporation Superfund Site is important in helping EPA select a remedy for the Site. You may use the space below to write your comments, then fold and mail. A response to your comment will be included in the Responsiveness Summary.

[illegible]

My concern is if you give us amount of dollars for our homes, what if we Can NOT find homes for that amount?? I love the area, I want to stay in the area, for me personally I borrowed the money to move here. I put a lot of time + money in the property. I fixed the wiring + plumbing Water heater [illegible] I don't want to move!!! Are you planning sending someone out to talk to us person to person?? Everyone has different needs + Circumstances. I can't afford a lot of Land Rent here [illegible] afford. Do you find us a location??? I am [illegible] years old [illegible] myself! I have arthritis very bad [illegible] makes it Hard to walk Etc?? Who HELP?? [illegible] Moves in Boxes, Our Electric, cable, [illegible]?? These are financial Concerns for me! This will be a Hardship for a lot of us!!!

I Love my House. I do not want to leave!

Please HELP US!

Thank you Cheryl Adams

EPA Response: Thank you for reaching out to us about your concerns about relocation related to the Petroleum Products Corporation Superfund site in Hallandale, Florida. This letter is written in response to let you know that relocation will not be necessary for you.

The Frequently Asked Question Fact Sheet and Proposed Plan Fact Sheet provided an outreach opportunity to inform the surrounding community about the activities that will be taking place at the site. Residents in the community who will be affected by relocation have

already been informed and are aware that these activities will not take place for 18 months or more.

We apologize for the miscommunication of information provided and assure you that we only wanted to inform you of activities at the Site near your home. More information will be provided in the future. If you have any questions or concerns, please call RPM Marcia Nale at 404-562-8442 or public affairs specialist L'Tonya Spencer-Harvey at 404-562-8463.

17. Comments from the OU1 Cooperating Parties Group (included as Attachment A)

EPA Response: For Comment 1 from Attachment A.

During EPA's development of the PPC Proposed Plan, EPA has had discussions with FDEP about its past and future financial obligations to pay for the cleanup of releases from petroleum storage systems that are covered by the terms of the FDEP Early Detection Initiative (EDI) and Inland Protection Trust Fund program. The PPC Site applied to and was accepted into this state petroleum cleanup program back in the late 1980s. For planning purposes, FDEP's ongoing funding responsibilities and how it plans to identify and select environmental remediation contractors for the PPC remedy, along with EPA oversight, have been discussed on several occasions in the past two years. EPA understands that state law governs the administration of the EDI program and its source of funding. Further, FDEP acknowledges the importance of its funding to the negotiations of a settlement for the implementation of the PPC Site remedial design and remedial action response activities. EPA believes that FDEP will use its flexibility and discretion to accommodate EPA's basic CERCLA requirements for the selection and approval of contractors and the effective oversight of the implementation of the required Site response work.

EPA Response: For Comment 2 from Attachment A.

In order to effectively evaluate the proposed remedial alternatives, the CERCLA response activities and their associated response costs must be identified and quantified to determine the total estimated cost of each remedy option. CERCLA response costs can be incurred by both EPA and the site PRPs. EPA believes that the cost components outlined in the Proposed Plan for all the remedial alternatives under consideration identify and quantify the main CERCLA response costs for each remedy proposal. EPA understands that the characterization and appraisal of the FMV of the warehouses proposed to be demolished is an issue that is significant to the Site PRPs and EPA will work with the parties during settlement discussion to resolve any outstanding concerns on this topic.

EPA Response: For Comment 3 from Attachment A.

The comment specifically points to the assessment of chromium and of acetone in the 2016 Human Health Risk Assessment (HHRA). This 2016 HHRA was actually written as a Supplement to the 1992 site-specific Baseline Risk Assessment. The HHRA Supplement used all data available at the time and closely followed relevant EPA guidance and policy for site HHRAs (EPA 1990, 2010). As stated in the comment, "Hexavalent chromium was never analyzed in connection with the HHRA." When data are available only for total chromium,

EPA region 4 policy has long been to assume that all of the detected chromium is in the hexavalent (more toxic) form. The intent is not to make any final remedial decisions based on unacceptable health risks estimated from this approach, but rather to follow up the HHRA with chromium speciation analysis. Following the 2016 HHRA, chromium speciation analysis was indeed performed, and based on the reported hexavalent chromium concentrations, the risks were re-calculated. Based on the re-calculated risks, chromium was determined to no longer be a COC in soil based on direct human contact. Chromium is still a COC in groundwater as the health-based drinking water MCL (100 µg/L) is for total chromium; the site groundwater concentrations of total chromium, as of 2016, ranged from 0.17 to 110,000 µg/L, and the exposure point concentration (EPC) derived for site groundwater was 7,524 µg/L (calculated statistical Upper Confidence Limit on the mean [UCL]).

Regarding acetone in groundwater, EPA used the data available at the time of the 2016 HHRA. The maximum acetone detection of 17,000,000 µg/L was determined to be a valid concentration based on validated laboratory data. Based on the entire dataset for acetone in groundwater, an EPC (UCL) of 8,427,127 µg/L was calculated for estimating risks in the HHRA. This EPC resulted in high hazard quotient (HQ) values for all relevant receptors. Following the 2016 HHRA, however, EPA gathered additional groundwater data and determined that the extremely high acetone level was not seen prior to or since the July 2011 sample result. Therefore, EPA has tentatively removed acetone as a COC in groundwater.

Even after the HHRA risk characterization is revised regarding acetone and chromium, there are other COCs that pose unacceptable risks (carcinogenic and noncarcinogenic). When chromium is removed from the risk characterization table, the carcinogenic risk to a future resident assumed to be drinking the groundwater is 4×10^{-3}, exceeding the EPA target risk range of 10^{-6} to 10^{-4}. The COCs contributing significantly to this carcinogenic risk include trichloroethylene, dioxin, arsenic, benzene, 1,4-dioxane, vinyl chloride and PCBs. Likewise, even without chromium or acetone, the noncarcinogenic hazard index (HI) for this receptor is above 1, even when appropriately segregated by target organ. The COCs contributing significantly to the noncarcinogenic HI include trichloroethylene, dioxin, arsenic, antimony. The groundwater levels of lead are also significant relative to health risks. The maximum level of 4,800 µg/L and the average concentration of 270 µg/L are well above the drinking water action level of 15 µg/L (EPA 2018).

EPA recognizes that the site-specific health risks from direct contact with soil are lower than the risks from assumed use of the groundwater as a drinking water source. Once unacceptable risks are determined for a given receptor, however, EPA policy is to include as COCs all contaminants (in all exposure media) that contribute a carcinogenic risk of at least 10^{-6}, or a HQ of at least 0.1. The COCs can be further refined (as discussed in the site's Proposed Plan) based on factors such as the frequency of detections exceeding selected risk-based levels or exceedances of ARARs (e.g., Florida CTLs).

The comment also states that "…institutional controls, an asphalt parking lot, and the current zoning regulations are more than sufficient to prevent the hypothetical tenant-young child

from exposure to any Chemical of Concern at the site in the future." EPA is strictly forbidden by the NCP (Superfund regulations) to assume in a baseline risk assessment that any institutional controls, including current zoning regulations, will be in place in the future (EPA-FR 1990). As discussed above, the largest contributions to health risks under all future exposure scenarios are from assumed future use of the site groundwater as a drinking water source. This was determined by EPA to be a reasonably assumed future use scenario as nearby groundwater is currently used for a drinking water source for area residents.

EPA Response: For Comment 4 from Attachment A.

This response addresses the timeframe for initiating the interim action for groundwater. It is anticipated that a duration of 18 months, from the completion of the soil and sludge remediation, will occur before the interim groundwater treatment will begin.

EPA Response: For Comment 5 from Attachment A.

The comment addresses the request to include a letter dated September 26, 2016. The letter will be part of the site record.

EPA Response: For Comment 6 from Attachment A.

This response is for the reference to the "Kelsey East" building. The Proposed Plan includes a proposal to remove the "Kelsey East" or Kelsey Southeast building. The remedial investigation found substantial contamination below the building foundation to depths that require building removal to fully remediate the area.

The Kelsey Southwest buildings reveal more shallow soil contamination and is currently deemed to remain in place with excavation from underneath portions of the foundation. Additional investigations for the Southwest buildings will be conducted during the remedial design and remedial action.

EPA Response: For Comment 7 from Attachment A.

The letters from John Barkett and de maximis, inc. will be included in the site's Administrative Record.

LIST OF ADDITIONAL EPA INTERACTIONS WITH STAKEHOLDERS REGARDING THE PETROLEUM PRODUCTS CORP. PROPOSED PLAN

On January 13, 2021, EPA received an email from Mike Bender of Environmental Assessment and Consulting-EAC inquiring about when the work would begin and if a contractor had been selected.

On January 19, 2021, EPA RPM Michael Taylor contacted Mr. Veliz, the owner of the mobile home in Bamboo Mobile Home Park. Via an EPA translator, RPM Taylor explained

the Proposed Plan to Mr. Veliz and answered any concerns. EPA provided the public Zoom meeting invite to Mr. Veliz.
On January 19, 2021, EPA received an email from Scheril Murray Powell inquiring about a potential remediation approach for hemp plants, a bioremediation treatment. RPM Taylor prepared a response.

On January 20, 2021, Mike Miller of de maximis, inc. requested that the public meeting presentation be sent to him.

On January 20, 2021, Robert Stover submitted an email inquiry soliciting business for Action Environmental of Tampa, Florida. The inquiry was regarding the selection of a contractor for the site remediation.

On February 2, 2021, EPA RPM Taylor responded to Kelsey Group representative Evan Goldenberg regarding the concern for road closures and traffic issues that might impede surrounding businesses during a remedial action. RPM Taylor responded via an email.

On February 2, 2021, EPA and FDEP held a conference call with de maximis, inc. to discuss technical issues regarding the site remediation.

On February 2, 2021, EPA and the Pembroke Park Warehouse owner's representative, Franklin Zemel et. al. held a conference call to provide a site status and next steps discussion for the site.

On February 3, 2021, EPA and de maximis, inc. held a second call that included an EPA hydrogeologist to discuss the proposed groundwater interim action.

On February 10, 2021, U.S. Department of Justice attorney Debra Carfora, who represents the U.S. Department of Defense, provided an email to EPA Attorney Rudy Tanasijevich stating that the U.S. Navy will submit comments on the Proposed Plan before the closing date.

On February 11, 2021, EPA RPM Taylor received an email from Cooperating Party Group representative John Barkett, who is representing a group of OU1 settling PRPs with comments/questions on the Proposed Plan. A follow-up email from John Barkett requested a "recall" of the email and requested the deletion of the email. A revised set of comments will be provided on February 12, 2021, per Mr. Barkett.

ATTACHMENT A: COMMENTS SUBMITTED BY THE OU1 COOPERATING PARTIES GROUP

BARNES & THORNBURG LLP

[redacted]

www.btlaw.com

Bruce White
Partner
[redacted]

February 11, 2021

Via E Mail
Michael Taylor/Marcia Nale
U.S. EPA
Superfund & Emergency Management Division
61 Forsyth Street, SW
11th Floor
Atlanta, GA 30303

Re: Petroleum Products Corporation Superfund Site/Comments on Proposed Plan

Dear Mr. Taylor and Ms. Nale:

On behalf of a group of potentially responsible generators who sold used oil to the Petroleum Products Corporation when it was operating, I have these comments on the Proposed Plan. These comments are made to protect these parties' interests in the event that EPA's negotiations with the largest generator potentially responsible party, the United States (the Navy, Air Force, Coast Guard, and Defense Reutilization & Marketing Service, representing 63.78% of the generator share), fails to produce a Consent Decree to which these parties can join.

Comment No. 1

We applaud the Florida Department of Environmental Protection's (FDEP) continuing involvement and efforts to execute its obligations under State law to clean-up the Site. The petroleum-impacted soils and peats in the subsurface at the Site, resulting from releases from petroleum storage systems, have held the State's attention for many years. The State's implementation of the bio-slurper remedy that was part of Operable Unit No. 1 at the Site achieved a substantial reduction in any free oils remaining in the subsurface. The State has shown great determination in its desire to finish the job.

That said there remains the need to integrate the State's administrative process and retention of a qualified environmental remediation firm with the requirements of the National Contingency Plan. EPA made appropriate reference in the Proposed Plan to funding from the State of Florida but did not articulate how it planned to coordinate with the State. We are confident that coordination can be accomplished successfully but not without careful planning. While we know this topic has been discussed by EPA and FDEP and are optimistic that integration of the two processes will be successful, please provide information or assurances that EPA will be coordinating remedial design and remedial action with the FDEP to ensure that the FDEP will be able: (1) to identify a

contractor to perform the remedial portions of the Proposed Plan (as opposed to the relocation portion or addressing economic losses) and (2) to fully implement remedial design and remedial action.

Comment No. 2

The Proposed Plan refers to a "Fair Market Value (FMV) appraisal of the five buildings" planned for demolition under the Proposed Plan. According to the Proposed Plan, the "value of the buildings" was "estimated at $9.5 million."

There are two types of concerns here, one factual and several are legal in nature.

As to the factual concern, the Proposed Plan does not explain how the FMV was derived. Was it based on actual rental income? If so, please provide the basis for the FMV calculation. If it was not based on actual rental income, on what was it based? If it was not based on actual rental income and actual lease terms, how has EPA verified that the assumptions that were used match up to actual lease terms and actual rental income?

There are several legal problems surrounding the FMV portion of the Proposed Plan. These issues, explained below, are that (1) CERCLA Section 104(j) cannot apply to the circumstances at the Site; (2) FMV losses are not CERCLA "removal" or "remedial" action costs; and (3) over three decades of case law precedent confirm that FMV economic losses are not recoverable under CERCLA. Whether "FMV" was based on lost rental income or any other metric, these are not compensable "response costs" under CERCLA.

(1) CERCLA 104(j) cannot apply to the Site

CERCLA permits EPA to acquire an interest in real property if EPA needs the property to conduct a remedial action. 42 U. S. C. §9604(j)(1). But EPA cannot rely on this provision to justify the inclusion of "FMV" in the Proposed Plan for two reasons. First, under Section 9604(j)(2), EPA cannot use its acquisition authority unless the State of Florida "through a contract or cooperative agreement or otherwise," agrees to accept transfer of the interest in real property following completion of the remedial action. Here, EPA is not acquiring "an interest in real property" that it could transfer. It is proposing to demolish buildings. Once demolished, there is nothing tangible to transfer and thus nothing for the State to accept. *A fortiori*, the State has not entered into a contract or cooperative agreement, as required by CERCLA and there is no reference to any such document in the Proposed Plan.

Second, a building does not represent an interest in real property under Florida law. *Stiles v. Gordon*, 44 So. 2d 417 (Fla. 1950). *Stiles* holds that a building that is sold separately from the land to which it is affixed becomes personal property upon completion of the sale, and cannot constitute an interest in real property where the intention of the sale is that the building is to be removed from the realty by the buyer. In *Stiles*, the plaintiff-buyer contracted with the defendant-seller to purchase and remove a surplus government building that was affixed to the defendant's realty. Regarding the nature of the agreement, the Supreme Court of Florida explained that "it was contemplated by the contracting parties that upon the closing of any deal the buildings would be removed from the premises and that the sale should not include any interest in the realty." *Id.* at

421. The Florida Supreme Court held that "[w]hen the plaintiff in good faith paid the price asked for the building and Gordon Land Company gave its invoice and credited the amount of the proceeds to its account, the building became severed from the realty, as a matter of law, and thereafter, as between the parties, became subject to the rules applicable to personal property." *Id.* at 422-23. The Supreme Court reasoned that "whereas the parties have expressed the intention by their contract to buy and sell a building separate from the realty and moved from its foundations, not an intention to buy and sell the building coupled with the real property interest, the courts will give effect to that intention." *Id.* at 420. As a result of the sale, "the plaintiff ha[d] a complete property interest in the building, coupled with the right to remove it from the premises . . . ." *Id.* at 423. Therefore, where parties contract for the sale of a building with the intention that it be removed from the realty to which it is affixed, a property interest in the building cannot constitute an interest in real property because the completion of the sale operates to sever the building from the realty, as a matter of law. Demolishing a building is an even easier case than that presented in *Stiles*. Demolishing a building does not leave EPA with an interest in real or personal property.

In addition, if lost rental income or personal property loss was covered by CERCLA, Section 104(j) would have been the place for Congress to say that. Yet Congress did not do so. There is no statutory authority for compensating an owner for lost rental income or any other economic loss where EPA has determined that demolition of a building is necessary.

(2) FMV is not a CERCLA Cost of Removal or Remedial Action

CERCLA Section 107(a)(4)(B) only permits EPA to recover for all "costs of removal or remedial action." Lost rental income is not a "cost." It is an economic loss.

It is also not a cost of a "removal" or a "remedial" action. Both "removal" and "remedial" are defined terms in CERCLA. 42 U. S. C. §9601(24) and (25). They do not include lost rental income or "fair market value. A "removal action" means:

> [T]he cleanup or removal of released hazardous substances from the environment, such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under section 9604(b) of this title, and any emergency assistance which may be provided under the Disaster Relief and Emergency Assistance Act.

This definition speaks to actions taken ("cleanup," "removal" "such actions"). "Fair market value" is not a cleanup, a removal, or an action.

Similarly, "fair market value" is not a remedial action. Here is the definition of "remedial action":

> The terms "remedy" or "remedial action" means those actions consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection using dikes, trenches, or ditches, clay cover, neutralization, cleanup of released hazardous substances and associated contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging or excavations, repair or replacement of leaking containers, collection of leachate and runoff, onsite treatment or incineration, provision of alternative water supplies, and any monitoring reasonably required to assure that such actions protect the public health and welfare and the environment. The term includes the costs of permanent relocation of residents and businesses and community facilities where the President determines that, alone or in combination with other measures, such relocation is more cost-effective than and environmentally preferable to the transportation, storage, treatment, destruction, or secure disposition offsite of hazardous substances, or may otherwise be necessary to protect the public health or welfare; the term includes offsite transport and offsite storage, treatment, destruction, or secure disposition of hazardous substances and associated contaminated materials.

Again, this definition makes reference to "actions" taken. Notably, relocation is covered by the definition but there is no reference to lost rental income of any person.

It is also not apparent how EPA plans to enforce this "FMV" figure. Is it planning to be an intermediary for the transfer of money from some potentially responsible parties (PRPs) to other PRPs? Direct some PRPs to pay other PRPs? We know of no statutory or other authority allowing EPA to play such a role.

(3) Case law confirms FMV economic losses are not recoverable under CERCLA

Finally, the law is crystal clear that a PRP cannot recover economic losses under CERCLA. EPA cannot achieve for a PRP what the PRP could not achieve for itself under CERCLA.

The Court in *Daigle v. Shell Oil*, 872 F.2d 1527 (10th Cir. 1992), discusses CERCLA's legislative history and explained that Congress specifically rejected the recovery of "private damages" – economic losses being among them – under CERCLA:

> [T]he history of the enactment of CERCLA reveals that both houses of Congress considered and rejected any provision for recovery of private damages unrelated to the cleanup effort, including medical expenses. Each chamber of Congress considered Bills which contained provisions for causes of action for certain economic damages and for personal injury. For example, the original House Bill contained a provision for private recovery of "all damages for personal injury, injury to real or personal property, and **economic loss**, resulting from such release or threatened release." H.R. 7020, 96th Cong., 2d Sess., as submitted by Representative Florio on April 1, 1980, *reprinted in Superfund: A Legislative History,* Environmental Law Institute (1982), Vol. III, 183. This provision did not make it out of committee, and the final Bill as enacted by the House included no provision for medical expense recovery. H.R. 7020, 96th Cong., 2d Sess., as enacted Sep. 30, 1980, *reprinted in Superfund: A Legislative History,* Vol. III, 89. The Senate Bill also contained a provision for private recovery of "all out-of-pocket medical expenses, including rehabilitation costs or burial expenses, due to personal injury." S. 1480, 96th Cong., 2d Sess. (1980), *reprinted in Superfund: A Legislative History,* Vol. I, 289. But this provision was later deleted by amendment, and H.R. 7020 was ultimately substituted as a compromise bill, amended, enacted by both chambers and signed into law without any reference to medical expenses.

Id. at 1536-37 (emphasis added and footnote omitted). And CERCLA has been amended several times since 1980 and the Congress has not seen fit to add economic losses to Section 107.

In *Exxon v. Hunt*, 475 U.S. 355, 378 (1986), the United States Supreme Court recognized that economic harms are not compensable under CERCLA in deciding that the New Jersey Spill Act, which does permit recovery for economic losses, was pre-empted only in part by CERCLA:

> Unlike the Spill Act, CERCLA does not include oil spills within its definition of hazardous substance releases, **nor is Superfund money available to compensate private parties for economic harms that result from discharges of hazardous substances.** Rather, it seeks to facilitate government cleanup of hazardous waste discharges and prevention of future releases.

Id. at 359-60 (emphasis added).

CERCLA is a cost-reimbursement statute, not a tort statute. Thus, PRPs who have tried to recover economic losses have consistently lost their lawsuits for over three decades. These cases are illustrative:

- *Artesian Water Co. v. Government of New Castle County*, 659 F. Supp. 1269, 1287 (D. Del. 1987) (claim for $600,000 in losses resulting from the idling of property and equipment because of pumping restrictions was rejected: "Because CERCLA provides no private cause of action for economic losses, this claim is beyond the scope of the statute");
- *Piccolini v. Simon's Wrecking*, 686 F. Supp. 1063 (M.D. Pa. 1988) (granting motion to dismiss claims seeking monetary damages as compensation for the alleged loss of value of land: "Plaintiffs' request for damages which can be construed as seeking damages for diminution in property value and lost income are not recoverable under CERCLA");
- *Thompson v. Andersen Window Corp.*, Civil No. 4-88-229, 1989 U. S. Dist. LEXIS 871, *13-15 (D. Minn. Jan. 17, 1989) (inability to fulfill long-term contracts for waste disposal and diminished property value rejected as the basis for a claim: "It is clear that lost income is not a loss incurred in response to hazardous waste cleanup." "[E]conomic losses may not be recovered." "This result is consistent with CERCLA's primary purpose: to provide reimbursement to those forced to incur the costs necessary to remedy hazardous waste dangers");
- *Ambrogi v. Gould, Inc.*, 750 F.Supp. 1233, 1248 (M.D. Pa. 1990) (medical costs not recoverable under CERCLA: "[T]he courts have consistently held that Congress did not intend CERCLA to be utilized as a means to recover 'economic loss' for civil damages that a private party may seek as part of a toxic tort action");
- *Braswell Shipyards, Inc. v. Beazer East, Inc.*, 2 F.3d 1331, 1337 (4th Cir. 1993) ("Damages for diminution property value and lost income are not recoverable under CERCLA");
- *Rolan v. Atlantic Richfield Co.*, 427 F. Supp. 3d 1013 (N.D. Ind. 2019) ("The Court finds that, as a matter of law, Plaintiffs' expenses for temporary housing and related expenses, incurred because they decided to limit their time at the West Calumet Housing Complex, is an economic loss for which CERCLA was not intended to provide a remedy").

EPA must reject this part of the Proposed Plan in the Record of Decision or it will be in violation of CERCLA, Supreme Court precedent, and over thirty years of case law that has rejected the recovery of economic loss claims under CERCLA.[1]

Comment No. 3

The Proposed Plan relies on a flawed Human Health Risk Assessment (HHRA). EPA previously received a letter from John M. Barkett, dated December 27, 2016, explaining this fact with the assistance of Christopher M. Teaf, Ph.D., President and Director of Toxicology at Hazardous Substance & Waste Management Research, Inc. Rather than repeat all of the contents of that letter, it is included as Attachment 1. I incorporate its contents by reference.

But certain points bear repeating. Virtually all of the risks calculated in the HHRA are derived from hypothetical exposure to acetone or hexavalent chromium.

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1 As part of a negotiation process, PRPs can agree among themselves how to exchange consideration in support of a settlement. EPA can be facilitative in many respects as part of such a process. But EPA cannot impose an obligation on some PRPs to pay economic losses to other PRPs. It has no statutory authority to do so and, as explained in the text, a PRP claiming an economic loss does not have a claim under CERCLA.

Hexavalent chromium was never analyzed in connection with the HHRA. Hexavalent chromium values in the HHRA were assumed to represent 100% of the detected chromium. That would be exceedingly rare under any circumstances. This species of chromium is typically found near chrome plating operations or metal processing facilities, not in the Biscayne Aquifer. With no analytical verification, the assumption that 100% of the chromium detected was hexavalent chromium was not only arbitrary, it was wrong. Hexavalent chromium is not present at the Site as EPA has confirmed in subsequent testing by Black & Veatch conducted after Mr. Barkett's letter.

And the acetone sample result that the HHRA was premised upon should have never been considered. The result came from one sample from Monitoring Well COEMW-7. The result bore no relationship to results from that same well before and after the anomalous result was reported. Here are the data from COEMW-7, which is controlling the risk at the Site:

COEMW-7

Sample Date	*7/13/2010*	*2/1/2011*	*7/8/2011*	*8/2/2012*	*7/15/2013*
Analyte	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
Acetone	210	68	17,000,000	83	180
Chromium	3000	4600	110,000	4900	5400

Neutral observers would look at the table and think that something is unusual about the groundwater sample on July 8, 2011. The July 8, 2011 result had to be related to sampling error, a laboratory analytical artifact, or a "groundwater sample" that in fact also contained free product, oil, or oil sediment in the sample. The anomalous result should have been eliminated, and certainly should not have been used as the basis for a completely dominant influence on the risks calculated for the Site as a whole.

While the HHRA was in large part premised on these two anomalous constituents, EPA itself has now recognized that neither acetone nor hexavalent chromium represent "Chemicals of Concern" at the Site. On page 21 of the Proposed Plan, EPA lists the "Preliminary Remediation Goals" for "Chemicals of Concern" in surficial and subsurface soils. On page 22 of the Proposed Plan, EPA lists the PRGs for "Chemical of Concern" in groundwater. Acetone and hexavalent chromium do not appear on either of the lists. Yet EPA inexplicably still relies on both chemicals to justify the HHRA. That is both arbitrary and capricious under CERCLA and totally undermines the remedy proposed in the Proposed Plan.

As explained in the attached December 27, 2016, letter, once acetone and hexavalent chromium are removed from the risk calculations for non-carcinogens, the Hazard Quotient drops significantly: to 0.5 - 2 except for the "tenant – young child" and hypothetical future resident where the HQ is 10 or 9.

But even these reduced HQs are dominated by dioxin and to a lesser extent by antimony. Antimony is not even listed by EPA as a Chemical of Concern in soils. Proposed Plan, p. 21. And the dioxin risk is based on four estimated ("J") values from soil samples, with the maximum detected value occurring within the fenced area at the Site. Those soils could easily be removed to eliminate any hypothetical risk to a future tenant from dioxin. That brings the HQ nearly down to 1.

For the hypothetical future resident, the HQ is 2, a value that is contributed by copper, cobalt, and iron. Yet none of these constituents is even identified as a Chemical of Concern in the Proposed Plan. Proposed Plan, p. 21, 22. The remaining non-carcinogenic risk with a HQ >1 exists only for a hypothetical future tenant – young child and is also based in large part on exposure to copper, cobalt, and iron, none of which is a Chemical of Concern in the Proposed Plan. Proposed Plan, p. 21, 22. A discussion of actual Site attributes in the HHRA would have highlighted the unrealistic exposure assumptions upon which even this risk was calculated. In any event, institutional controls, an asphalt parking lot, and the current zoning regulations are more than sufficient to prevent the hypothetical tenant - young child from exposure to any Chemical of Concern at the Site in the future. If the risks had been properly calculated, they would show that the Proposed Plan is not supported by known conditions at the Site; i.e., that it is arbitrary and capricious.

For carcinogenic risk, exposure to acetone and hexavalent chromium in groundwater represent 100% of the groundwater contribution to risk for the tenant – young child, tenant – older child, and indoor worker, and 80-90% of the groundwater contribution to risk for the outdoor worker, tenant – adult, and outdoor worker. However, acetone is not a carcinogen and chromium and, as discussed above, hexavalent chromium is not present at the Site. Once these are removed, the risk range is 1E-04 to 1E-06.

With respect to the soil exposure contribution to risk, PAHs, dioxin, PCBs, arsenic, and ethylene dibromide (EDB) are the primary contributors to risk. EDB is not even a Chemical of Concern at the Site. Proposed Plan, p. 21, 22. The PAH risk is based on low frequency detection. For example benzo(a)pyrene was detected in one out of 12 samples. PCB detections were reported in four out of 16 samples, with the maximum within the fenced area at the Site. As noted already the dioxin sample results were estimated, with the maximum value within the fenced area. All of these constituents and corresponding risk are easily addressed with a shallow, focused excavation. Removing them places the carcinogenic risk in the range of 1E-05, easily addressable with a surface cap, like an asphalt parking lot, or by institutional controls.

In sum, relying on the HHRA to justify the proposed remedy is not technically supportable, arbitrary and capricious, and not consistent with the National Contingency Plan.

Comment No. 4

The Proposed Plan and the Public Meeting were unclear on the interim groundwater remedy. In a subsequent conference call between de maximis and EPA, it was clarified that the interim groundwater remedy, if required, would result after the soils remedy and the 18 months of additional groundwater sampling period were complete. At that point, the need for the interim remedy would be evaluated. Please confirm this understanding.

Comment No. 5

I am attaching, as Attachment 2, a separate letter dated September 26, 2016 to Rudolph C. Tanasijevich and Michael Taylor from John M. Barkett regarding the HHRA and the Remedial Investigation. That letter also contains comments from Dr. Teaf and Mike Miller, some similar to the ones set forth above. There was a request in that letter that it be made part of the administrative record. It was not. Please make it a part of the administrative record. I incorporate its contents herein rather than repeat them.

Comment No. 6

There may be technical or other reasons that are determined during Remedial Design that would eliminate the need to demolish what is referred to as the "Kelsey East" building. This kind of flexible decision-making by EPA and FDEP is normal during Remedial Design, but, for thoroughness, we want to record the comment.

Comment No. 7

There have been a number of comments submitted to EPA regarding the RI/FS, HHRA, and the Proposed Plan since 2009 from John Barkett or de maximis. In particular, these comments criticized the work of the Army Corps of Engineers in attempting to complete the RI/FS, which they failed to do despite taking more than seven years and spending large sums of money. These comments are reflected in letters from John M. Barkett in EPA's files. Please acknowledge that these comments are part of the Administrative Record.

Yours truly,

Bruce White

Attachments

ATTACHMENT 1

Shook, Hardy & Bacon L.L.P.
www.shb.com

BY EMAIL AND U.S. MAIL

September 26, 2016

[redacted]

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Email: tanasijevich.rudy@epa.gov, taylor.michael@epa.gov

RE: Petroleum Products Corporation Superfund Site
Pembroke Park, Broward County, Florida
Final Human Health Risk Assessment

Dear Rudy and Michael:

In the transition from Camila Tobon and then to Tim Moore and then Tim's departure to join an in-house law department, I have realized that comments that we received from de maximis and Dr. Christopher M. Teaf on the Remedial Investigation Report and Human Health Risk Assessment (HHRA), were not sent to you to be included in the administrative record. By this letter I am remedying that realization.

As you know, Dr. Christopher M. Teaf is board-certified by the Academy of Toxicological Sciences and is Director of Toxicology and President for HSWMR. Dr. Teaf previously submitted comments on the Risk Assessment for the PPC Site prepared in 1992 by Clement International Corporation for Bechtel Corporation on behalf of EPA. Based on his experience with the PPC Site and his toxicological expertise, Dr. Teaf provides, among others, the following comments:

- The HHRA contains scenarios that are unreasonable and not consistent with what is known. Assumptions about current tenant exposures to surface or subsurface soils and assumptions about future residential occupancy are unrealistic and do not comport with the "known and most likely anticipated future land use scenarios" set forth in the Uncertainties section of the HHRA.[1]

[1] We note, as we have in the past (see our July 16, 2013 letter), that all but a small parcel of the site is paved and covered by warehouses. The small, unpaved

- Acetone and chromium continue to represent over 90% of the calculated noncancer hazard index in groundwater, with exposure to acetone making up over 70% of the hazard index. Chromium is also the overwhelming driver for the calculated cancer risk in groundwater. These risk calculations are driven by a single sample result that is anomalous in relation to all other data collected at the Site.[2]
- The assumption that chromium is 100% hexavalent chromium is continued in the final HHRA. As Dr. Teaf notes, it is "highly uncertain to assume 1) the highly elevated exposure point concentration, 2) all chromium is hexavalent chromium, and 3) hexavalent chromium is carcinogenic via the oral route."[3]
- As we have been stating since 2013, there remains double counting in the soil ingestion calculations for the current and future outdoor worker, future resident, and future construction worker because the HHRA assigns soil ingestion rates both surface and subsurface soil. A daily ingestion rate assumption should be exceeded, regardless of the source of the ingestion; "if you assume a total of 100 mg/day for a worker, you cannot assume 100 mg/day for surface soil and 100 mg/day for subsurface soil," as Dr. Teaf explains. Yet that was done in the HHRA thereby doubling noncancer hazards and cancer risks.

de maximis and Mike Miller, in particular, have been involved with the Site for about 25 years and are familiar with past and current site conditions as well as cleanup

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parcel is fenced-in and locked. For a future exposure-to-soil scenario, all existing fencing, all existing pavement, and all existing buildings in the areas of soil impacts would need to be removed. Furthermore, for a future residential exposure scenario, current zoning and land use designations dictating industrial use only would have to be changed at both the City and County level. For a future groundwater exposure scenario, where no groundwater is currently used for potable water, a groundwater withdrawal and delivery system would need to be installed. Given the nature of site conditions and the historic uses of the property, these theoretical scenarios are not likely to ever occur.

[2] The groundwater data used is from COEMW-7. We have criticized the use of this data before, but it is still being used in risk calculations. COEMW-7 had a high value of acetone (17,000,000 ug/L) and chromium (110,000 ug/L). COEMW-7 is screened in the shallow area of sludge as noted in the well logs, Appendix B. This well was also used for collecting waste oil samples and is in the primary pit sludge area according to figures and historical aerial photographs in the RI. It is inappropriate to be using this data to evaluate risk.

[3] The HHRA contains a section describing how protective its assumptions were, but that is another way of saying EPA cannot rely on the chromium-based risks for any remedy determination. In other circumstances, Region 4 has acknowledged that 16% hexavalent Cr is a reasonable default assumption, if no data are available.

work, sampling, and analysis efforts. In brief, *de maximis's* comments address, among others, the following issues:

- There remain questions about the accuracy of the Site history.
- There remain questions about data collected from wells with oil in them.
- The use made of acetone and chromium data collected from COEMW-7 is improper.
- Three different risk assessments have been generated using a different analysis each time.

We want to repeat again what we have pointed out for many years with respect to a residential scenario:

1. The properties that make-up the PPC Site are zoned industrial by the City of Pembroke Park and designated for industrial land use by Broward County. Our July 16, 2013 letter contains images from the Broward County Property Appraiser's website showing the zoning and land use overlays from the Site. And printed copies of the zoning and land use designations for the parcels that together make up the Site.
2. Broward County owns the portion of the PPC Site that is fenced in and where the treatment system is currently located.
3. A property owner wanting to build residences on the property would have to convince the current private landowners who lease warehousing space, as well as Broward County, to sell their land.
4. Assuming those hurdles can be overcome, the hypothetical owner would have to convince Broward County to change the land use designation for the property.
5. The hypothetical owner would then have to convince the City of Pembroke Park to change the zoning.
6. The theoretical owner would then have to persuade someone to build on the property and install drinking water wells after receiving permits from government agencies that would have to decide to allow drinking water wells irrespective of the Site's Superfund status.
7. And the theoretical owner would then have to convince buyers or tenants to buy or lease a residence and drink water from groundwater.

It does a disservice to calculate a risk using the highest concentration of any contaminant present, irrespective the anomalous nature of the data and quality assurance concerns and then fail to properly explain how implausible the scenario is. Academic exercises are for classroom toxicology courses.

The ACOE has taken seven years to generate an RI and HHRA and now a draft Feasibility Study that will be the subject of future discussion because it, too, is not an

NCP-consistent document. EPA is a fiduciary with respect to the funds in the Special Account. *We would like to know how much money has been paid to the ACOE from the Special Account, and thus would appreciate you sending us an accounting of all such payments from 2009 to the present.*

Please confirm that these comments are in the administrative record for the Site.

Sincerely,

John M. Barkett

John M. Barkett

Enclosures

cc: Michael Miller
Christopher Teaf, Ph.D
PPC Cooperating Parties Group

ATTACHMENT 2

de maximis, inc.

[redacted]

Via email

February 24, 2016

[redacted]

Reference: Comments on EPA's RI and HHRA dated January 2016
Petroleum Products Corporation NPL Site

Dear Mr. Moore,

We have reviewed the revised RI and HHRA submitted by EPA on January 26, 2016.

Our comments address whether EPA considered de maximis' previous comments from the Group's July 16, 2014 letter to the EPA. The previous comments were about four broad subjects listed below.

Then we have some new comments about the revised RI and HHRA.

Site history

The EPA report description of site history was not revised despite our previous comments, and our comments were not addressed in subsequent meetings. This section of the RI, thus, continues to have question marks associated with it.

Groundwater sampling in wells containing oil
Groundwater sampling techniques
Groundwater evaluation / interpretation

After submitting our comments and subsequent conference calls and a meeting, EPA agreed to analyze the groundwater data and calculate risks for two groundwater exposure scenarios. The two exposure paths would include data sets for:

- groundwater "including sludge pit data"
- groundwater "not including sludge pit data"

The final RI text on page 55 stated " *In accordance with this memorandum, the groundwater data was separated into two different data sets; one including the sludge pits and one not including the sludge pits.* "

The revised HHRA does present groundwater risks for these two exposure paths.

EPA hydrogeologist, Bill O'Steen, also reviewed which wells might be suitable or not suitable for groundwater sampling.

This review was included in Appendix K and a few key paragraphs follow:

- Page 1 – Appendix K: *"For this analysis only, and as an exercise to demonstrate that a significant Site risk exists based largely on the Group's theory of what groundwater data can be included in the RI and the HHRA, this memorandum will evaluate the use of data acquired from wells located outside of the boundaries of the two identified sludge disposal pits. The Site-specific condition and the location of such wells are illustrated by Figure 4-10 from the RI Report. Figure 4-10 shows an area identifying the location of the two former sludge pits (red encircling line) with two larger areas identified as the "overflow sludge extent" and the "oil extent." Similarly, Figure 4-21 of the RI Report also depicts the area of sludge extent and the area of oil extent."*

- Page 6 – Appendix K: *"Whereas a well completed through several feet of sludge or similarly described material is probably within a waste disposal area. In the latter case, the well would likely be in a location that is part of a waste in place remedial scenario and thus should not be used in the HHRA. "*

However, the groundwater data for "not including sludge pits" still includes data from wells in the sludge pit area.

- Wells in the area of the sludge pits were included in the groundwater data for risk analysis for groundwater "not including sludge pits". This included COEMW-7, COEMW-8, COEMW-5A, COEMW-14A, etc.
- Groundwater data from COEMW-7 was still used in risk calculations. COEMW-7 had the high values of acetone (17,000,000 ug/L) and chromium (110,000 ug/L)
- COEMW-7 is screened in the shallow area of sludge as noted in the well logs, Appendix B. This well was also used for collecting waste oil samples and is in the primary pit sludge area according to COE figures and historical aerial photographs.

Appendix K avoided the evaluation of wells inside the oil and sludge areas.

- COEMW-7, and other wells like COEMW-14A in the sludge pit areas, were not evaluated in Appendix K.

Appendix K also stated that the risk assessor should decide which well data is used:

- *"Note that for data from wells that can be used in the HHRA, this memorandum does not specify which wells should be included in the risk evaluation. Instead, OSWER Directive 9283-1.42 (Determining Groundwater Exposure Point Concentrations, EPA, 2014) should be used along with consulting the EPA Region 4, Technical Services Section human health risk assessor to decide which well data should be included in the HHRA."*
- *"Although analytical results from a sample containing oil is not expected to be representative of the purely dissolved-phase groundwater quality, if oil could be pulled into a hypothetical well and persons could be exposed to that contamination, there is clearly a potential risk from exposure to the oil as well as the water. Omission from the HHRA of any wells yielding groundwater with the potential presence of oil would likely underestimate the potential risk from exposure to contaminated groundwater."*

In response to these observations, there is no question that oil had to be removed from wells used for sampling groundwater. In other words, the well was not fouled and oil was not "pulled in." There was probably a foot or more of oil already in COEMW-7 or COEMW-14A. These data should not be used as groundwater data for purposes of a HHRA.

EPA submitted field records for groundwater sampling and COEMW-7 had oil in the water column. The well construction log also indicates sludge. These wells are known to frequently have oil in the water column.

We also have the following general comments about the revised RI and HHRA that discuss the related issues with groundwater.

Groundwater evaluation / interpretation

- Generally risks went up for groundwater risks, across all groundwater exposure tables for HQ (non-cancer) and ILCRs (cancer) risk calculations.

  Risks are much higher because they used another calculation for the Exposure Point Concentration (EPC or Cw in the Tables).

  Much of the groundwater risks are still driven by acetone and chromium. The exposure concentration for acetone went from 1,380,196 to 8,427,127 ug/L.

- The revised HHRA represents the third calculation of risks using new methods of calculating the exposure concentration.

  The EPA used the absolute highest value for all analytes in their first risk calculations. Their second risk calculation used the "mean." This is acceptable when the data is more normally distributed but often not when the data is highly skewed, as it is at PPC. The output from their second calculations used the free software program, Pro UCL, which does not recommend using the mean.

Their third risk calculations used 95%/97.5% Chebyshev mean. It is troubling that the risk assessor has done two revisions in calculating the exposure concentration and calculating risks.

- It is difficult to evaluate the exposure concentration when there are such extremely skewed values in a data set, like for acetone and chromium in groundwater. See table below. It is also difficult to evaluate the exposure concentration when there are such extremely skewed values even at the same well.

  It is not clear why such a small data set was used for acetone calculations, 15 detections, when most of the groundwater samples (237 of 252) had no acetone detected at low detection levels (2 to 10 ug/L for most samples).

The table below demonstrates the concern over data usage here. The sample collected on July 8, 2011 is anomalous. A reasonable person who saw this data and reviewed the field logs would conclude that free product, oil, or oil sediment was included in the groundwater sample collected on July 8.

COEMW-7

Sample Date	7/13/2010	2/1/2011	7/8/2011	8/2/2012	7/15/2013
Analyte	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	210	68	17,000,000	83	180
Chromium	3000	4600	110,000	4900	5400

At a site with free product DNAPL or LNAPL, we would avoid groundwater sampling from a well with standing free product just as FDEP has done at the PPC site since we have been involved. The data is not representative of groundwater quality.

If you have any questions concerning this matter, please contact me at (865) 691-5052.

Best regards,
de maximis, inc.

John Stiles
Alternate Project Coordinator

MAM:JPS:akw

cc: John M. Barkett, Esq. Shook, Hardy & Bacon
Michael Miller, Project Coordinator, *de maximis*
Chris Teaf, Ph.D, HSWMR

APPENDIX B
TRANSCRIPT OF JANUARY 2021 PUBLIC MEETING

TRANSCRIPT OF

US EPA PETROLEUM PRODUCTS CORPORATION SITE

PROPOSED PLAN PUBLIC MEETING

VIA ZOOM WEB CONFERENCE

January 19, 2021

5:00 p.m. - 5:51 p.m. EST

Stenographically reported remotely by

Kelly G. Broomfield, FPR
Stenographic Reporter
Huseby Global Litigation
1-800-333-2082

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- - -

(The presentation commenced at 5:02 p.m. EST via Zoom Web conference.)

MS. SPENCER: My name is LaTonya Spencer. I'm the Community Involvement Coordinator for the Environmental Protection Agency for the Petroleum Products Corporation Site, and we would like to welcome you to our Proposed Plan Meeting on this evening.

As Josie just announced, please note that by participating in this recording you are consenting to be recorded. We will use this recording for future reference. Please note that this meeting is also being transcribed, so we do have a transcriptionist present.

On this evening our agenda will consist of introductions. We will also have the video, the virtual presentation will run, then we will also have a question and answer session. The question and answer session will first answer questions that are put in the chat room. If you have questions during the video presentation, please type it into the chat room, and also, if there's a particular slide that needs to be addressed, please put the slide number in your question so that we'll know to

go back to that particular slide. Josie will read the questions and have us to go back to the slide that's needed to be summarized or explained.

Also, at this point in time, if there's anyone that needs Spanish translation, please type your name and your need for Spanish in the chat room so that we can address you and so that you will have an opportunity to have the Spanish translation.

After we finish with the questions and answer that have been put into the chat, we will open up the lines for additional questions. If everyone would please ensure that your phones are on mute so that we can cut down on background noise. And, again, we will open up the lines when we go into question and answer after we answer the questions in the chat. Also, if you have a VPN, it would help if you turn it off so that you won't have any interruptions.

So as I mentioned, I'm L'Tonya Spencer, I'm your Community Involvement Coordinator with EPA. Also for this call we have Remedial Project Manager Michael Taylor. We also have Remedial Project Manager Marcia Nale. Also from EPA we have. Kevin Koporek and Bill O'Steen, as well as our EPA attorney, Rudy Tanasijevich. From the Florida

Department of Environmental Protection we have Killian Talley. From the Army Corp of Engineers we have Michael Grove.

And also, now that I've done those introductions, if we end up having anyone from media, if you would please let us know in the chat that you are part of the media. If you have any additional questions that we can address, we will. Also if we have any Congressionals or Congressional Aides, if you will put your information in this chat as well so that we can acknowledge you and address any questions you may have.

At this time we are going to run the virtual presentation. And, again, after the virtual presentation is completed, we will answer the questions in the chat, and then open it up for additional questions.

(Video presentation starts.)

MR. TAYLOR: Welcome everyone, my name is Michael Taylor, I am a Remedial Project Manager for the Environmental Protection Agency in Region 4. I'm here today to provide details on the EPA's proposed cleanup for the Petroleum Products Corporation Superfund Site, which I will refer to as the PPC site.

The PPC site is in Pembroke Park, Broward County, Florida. I'll explain the history of the site, the Superfund process, and how you can comment on our proposed cleanup for this site. Here you will find the contact names and numbers for EPA and the Florida Department of Environmental Protection that are associated with the site. If you need further information after this presentation, we can be reached at the email and phone number provided.

As I mention, the PPC site is located in Pembroke Park between Fort Lauderdale and Miami. The former facility is located a quarter of a mile west of I-95 off Pembroke Road. The yellow line in this figure indicates the approximate boundary and the area impacted for this Superfund site. It is, approximately, seven acres in size, there are multiple warehouses and storage units currently on this property. Two former waste oil sludge pits that have been filled in exist underneath some of these structures. The contaminated oil and sludge has impacted the Biscayne aquifer which is a federally designated Sole Source Aquifer.

You have heard me mention the term Superfund. What is Superfund? This is a common name used in EPA for the Comprehensive Environmental Response

Compensation and Liability Act or CERCLA. This is a law that mandates cleanup of hazardous waste sites. EPA Superfund program oversees carrying out this responsibility. Superfund includes both removal and remedial actions. The PPC is under a Remedial Action.

This slideshow is the Superfund process. Once a site is discovered, the site is evaluated, which consists of a preliminary assessment and site investigation. The site is then scored for listing on the National Priority List. The PPC site was listed on the NPL in 1987. The next step is to conduct a Remedial Investigation. We have concluded the Remedial Feasibility Study for the site. Currently, we are at the Proposed Plan stage. At the conclusion of the Proposed Plan and comment period, we will make a remedy selection which will be documented in a Record of Decision. A design will follow the Record of Decision, and then we begin implementation of the Remedial Action, which is the physical site activities of treating the soil and groundwater. Once the site actions are completed, the site will move into the maintenance phase. After all site remedial actions and goals are achieved, the site will be deleted from the NPL.

Past operations at the facility utilized an acid clay refining process to treat million of gallons of waste oil received from hundreds of locations. Two waste oil and sludge pits, which include the primary and secondary sludge pit, were used to dispose of spent waste material after treatments. The free product recovery refers to the free-floating waste oil on top of the groundwater. Site documents and testimony show that more than 18 million gallons of waste oil was processed at the PPC facility during its operation.

Here are two aerial photos of the site that show what the area looked like in 1963 and 1969. The 1963 aerial shows the primary sludge pit location as outlined by the green box. Also pictured is one warehouse building and several above-ground storage tanks. The blue outlined area indicates a water body such as a sinkhole or wetland. There were very few structures or businesses around the area in 1963, as you can see.

The 1969, aerial also shows an expanded primary sludge pit outlined in the green. The secondary sludge pit is located to the north of the primary pit. On this slide, the blue lined areas are former sinkholes, wetlands, and ponds. Investigations

indicate that all these areas were eventually filled in and graded to allow for construction of storage warehouses that were built in the 1970s and 1980s.

Multiple oil spills contributed to oily contaminants negatively impacting the soil and Biscayne aquifer. These photos show some of the above-ground storage tanks that were on the property during the facility operation and the conditions that existed. There are obvious spills and releases that occurred as shown by these photographs.

These are photos of Bay 261 at the Pembroke Park warehouse. Inside this bay the floor is purposely cut away in order to collect oil and sludge. Bay 261 is cleaned periodically from the lateral and vertical movement of oil. The viscosity of the material ranges from a light machine oil to a heavy crude, often a solid mass that is not readily pumpable. The oil and sludge pits are located underneath some of the warehouses that are located primarily on the south end of the warehouse property. These sludge pits extend to, approximately, 20 to 24 feet below land surface. This is well into the groundwater and Biscayne aquifer, which begins at, approximately, 5 feet below surface. There is periodic day-lighting of

oil which is above ground. The seepage of oil and sludge that seep through the cracks and around foundations of concrete and asphalt. The structures are more than 40 years old with notable settling and uneven foundations. The buildings are comprised of concrete foundations and block walls.

The initial remedial site investigation began in 1989. In 1990, an Interim Action ROD for Operable Unit 1, which is product recovery, was signed. An oil collection system was established in the early 1990s, that was later followed by the installation of a bioslurper unit in late 1990s. A bioslurper unit is a vacuum-enhanced oil collection system that collected light, non-aqueous phase liquids. The biosluper unit operated until late 2012. During this period, approximately, 43,000 gallons of waste oil was collected. Currently, product recovery continues with oil collected manually from existing wells and disposed off-site. It has been estimated that 50,000 to 150,000 gallons of spent material may be impacting the groundwater.

The site is located in the cone of influence, for example, groundwater drawdown footprint for the nearby Hallandale well field. The well field is, approximately, half a mile east of the site and

supplies water to Broward County residents. The oil and sludge has not impacted the well fields that supply the local drinking water. The buried sludge volume in this area is estimated to be around 50,000 cubic yards.

The primary contaminants of concern identified on site are listed here on this slide. Additional constituents are present at lower concentrations that did not add to site risk. For example, we have polycyclic aromatic hydrocarbons, or PAHs, heavy metals, PCBs, dioxins, and chlorinated compounds in the waste, oil, sludges, and soil. The groundwater contains, for example, Benzene, multiple chlorinated compounds, PCBs, 1-4 Dioxane, and multiple heavy metals, such as lead and arsenic.

This photo shows some examples of day-lighting I mentioned. This is oil around the warehouse structures and roadways. There's occasional oil seepage at the parking lot and building foundations, as well as around one of our monitoring wells. As you can see tire tracks where vehicles have driven through a seepage area and tracked it along the roadway. We have been addressing these seepages as they occur. These seeps are intermittent and do not daylight at the same location every time.

Here's an example of this oil and sludge from two sample cores onsite. The left photo shows subsurface conditions at different depths. The sample indicates very oily material from ground surface to 5 feet and it continue from 5 feet to 10 feet and starts to get lighter at 10 to 15 feet where it indicates a more native type of soil.

The photo on the right is from another location that is heavily saturated with oil and sludge, but also contains very low pH levels from the sulfuric acid. Sulfuric acid was used in this re-refining process. Our investigation show that sludge deposits reached depths of 24 feet below ground surface in some areas. This photos shows how the sludge is bound to the sand and silt below surface. The material will continually leach from the groundwater of the Biscayne aquifer. Because contaminants are present beneath the site in the Biscayne aquifer, there is a potential risk if contamination migrates through groundwater into nearby well fields. The contaminants pose a potential risk to local municipal well fields which draw water from the Biscayne aquifer and service well over 50,000 residents.

This photo shows the PPC site in relation to

the nearby Hallandale wellfield, which is, approximately, half a mile east and along I-95. The site is within the cone of influence and the two-foot drawdown of this well field system. There's another wellfield located directly north of the site, which is the Hollywood wellfield. The Hollywood wellfield is, approximately, two miles north. A third wellfield, Miramar, is more than two miles away and is located southwest of the site near the Broward and Miami-Dade County line.

This slide will give you a conceptual site model of what exists at the site. As you can see, there are two distinct sludge pits which have been filled in and graded over with the construction of warehouses on top of the waste material. The contaminated soil and sludge continually impact their surroundings and the groundwater for migration of this waste. The PPC site is underlaying by a series of carbonate and clastic sedimentary unit typical of marine deposits. The depth to the limestone varies across the site. Groundwater is often perched on the sludge. The surrounding area is highly developed with commercial and light industrial operations. There is also a significant residential area located to the south and west of

this facility.

Our Remedial Action objectives for this site are identified in this slide. Our objective is to minimize the migration of contaminants to protect the Biscayne aquifer and the drinking water. We want to prevent leaching of contaminants from the subsurface soil and sludge pits to the groundwater. Our objective is to prevent any human exposure to contaminants in the groundwater. These objectives also include the prevention for migration of contaminants in the aquifer. In addition, our objectives include preventing human exposure to contaminants in the surface and subsurface soil on the former facility and the subsurface soil in the Bamboo Mobile Home Park.

The Basis For Action to protect the groundwater comes from CERCLA and the Code of Federal Regulations. There are documented exceedances of the maximum contaminant level, or MCLs, in the groundwater for contaminants such as lead, PCBs, volatile, semi-volatile compounds, and PAHs, as I mentioned earlier. The site is within the cone of influence for the nearby Hallandale wellfield. The Biscayne aquifer begins at around 5 feet below surface and is, approximately, 200 feet deep. Soil

contamination in the former sludge pits are impacting this Biscayne aquifer.

EPA conducts baseline risk assessments as part of the remedial process. A Superfund human health risk assessment estimates the baseline risk. This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at the site. To estimate the baseline risk at a Superfund site, EPA undertakes a four-step process. Step one is analyze contamination. Step two is estimate exposure. Step three is assess potential health dangers. And step four characterize site risk.

To address the different Contaminated Media, EPA broke out the various media into Contaminated Media Zones, or CMZs. CMZ 1 is for the Unsaturated Zone, which is the more widespread shallow soil from surface to 5 feet below ground surface. This area includes, approximately, 110,000 cubic yards of soil.

CMZ 2 is comprised of the Main Source Area, which is, essentially, the two buried covered sludge pits which extend from 5 to 24 feet below ground surface. The volume of material in the CMZ 2 is, approximately, 50,000 cubic yards. CMZ 1 is outlined with a white dashed line on the slide,

while CMZ 2, the Main Source Area, sludge pits, is shown with the red dashed line.

This slide shows the third Contaminated Media Zone, which is the Extended Plume for groundwater contamination. The groundwater has detections for contaminants of concern to a depth of 40 feet below surface. After identifying the areas and media contaminated from the site investigation, EPA will select a treatment remedy for the contaminants. EPA evaluates the different treatment technologies based upon nine criteria. This includes a Threshold Criteria to determine if the remedy is protective of the public health and environment, as well as making sure it is compliant with Applicable Or Relevant and Appropriate Requirements, or ARARs. A Balancing Criteria follows with how effective is the remedy long-term and short-term. How would the remedy be implemented? What is the cost of the remedy? The last two criteria, or the Modifying Criteria, which is there state acceptance for the remedy and is there community acceptance? This 30-day comment period will help provide the community an opportunity for evaluating the proposed remedy.

The cleanup alternatives were considered for several areas on site. The Bamboo Mobile Home Park

is an area south of the former process area that includes a small area of subsurface soil under one mobile home. The area that is impacted is from 2 to 5 feet below surface. The contamination is a result of the oily material migrating from the former process area. Cleanup alternatives considered for the Contaminated Media Zone, CMZ 1, Unsaturated Zone, which is the shallow soil, are shown in this slide. A no action to excavation, stabilization/solidification, and thermal treatments were considered. This alternative addresses the soil down to, approximately, 5 feet below land surface.

Cleanup alternatives considered for the CMZ 2, which is the Main Source Area, are shown in this slide. A no action to excavation, stabilization/solidification, and thermal treatments were also considered. The Main Source Area is predominantly the buried sludge pits that extend, approximately, 20 to 24 feet below surface. The cleanup alternatives considered for CMZ 3, the Extended Plume and the Groundwater, are shown here. A no-action, a recovery and treatment system, a carbon injection with permeable barriers to monitor natural attenuation alternatives were considered.

Since there are multiple contaminants on this site, no one treatment technology will address all the site contaminants, that is why we must evaluate so many technologies that address all contaminants.

For all the remedial alternatives considered, there were some common alternatives and areas that remained the same, such as for the one mobile home in the Bamboo Mobile Home Park. This action will involve a very short duration to remediate, since there is minimal amount of soil to remove and backfill. It will involve temporary relocation of the occupants in order to move the trailer and access the soil underneath. The excavated soil will be shipped off-site to a landfill. The soil will be replaced and the property restored.

The second common alternative involves the demolition of five warehouse structures that are on top of the buried sludge pits. These buildings are shown in orange and located along Carolina Street and 31st Avenue. Prior to demolition and off-site disposal of the structure, the building occupants and contents in the rental storage buildings and small business areas will need to be moved and relocated. The needs and requirement for the renters and leasing companies in these warehouses

will be addressed between EPA, the property owners, and the renters on an individual basis. Keep in mind that no onsite activity will take place until after the design is completed, which is about two years from the Record of Decision approval. The third common alternative involves a shallow soil excavation from underneath six buildings. These are highlighted in yellow and the plan is for these structures to remain in place.

This slide summarizes the preferred alternatives. One mobile home in the Bamboo Mobile Home park is proposed to be moved and the soil underneath will be excavated down to 5 feet. Backfill and grading will occur afterwards. The remaining work will be on property that is zoned commercial/industrial. The remedy will include a permanent move or relocation for the impacted tenants in the five warehouses identified for demolition, which are pictured in orange. Demolition of the five structures is required since waste cannot be addressed or treated with the buildings in place. The top two feet of soil, which is pictured in the tan color, will be excavated followed by stabilization and solidification of the remaining subsurface soils.

Under the buildings, which are pictured in yellow, 5 feet of soil will be excavated for off-site disposal and backfilled with a flowable cement-based material. The six yellow highlighted buildings will remain in place and not be demolished.

The final action will include an interim short-term multi-treatment groundwater system to prevent further degradation of the Biscayne aquifer from the oily soil and sludge contaminants. This interim step will help determine if the remedy has a positive impact on groundwater contamination.

Here is a summary of the costs for the alternatives evaluated and recommended. This table includes the common elements, estimated building value, and estimated relocation cost. The projected total cost for the Proposed Plan is $57.1 million. Now that the Proposed Plan has been made available there is a 30-day comment period. After the comment period, EPA will prepare a summary of responses to comments received from the public and place them in the Record of Decision. A Record of Decision explains the cleanup, and it also targeted to be completed in mid-2021, and will be available online and at the Broward County Public Library.

Afterwards, a remedial design will be prepared, which is typically completed in 18 to 24 months. Then the remedial action will begin. EPA will let the public know once the Record of Decision is signed and before the cleanup begins.

MARCIA NALE: Community participation is an important part of the Superfund process. It allows the public and EPA to communicate concerns and issues, as well as provide a process to facilitate the proposed plans and decisions that are made for the site that impacts the community. If you would like to submit a comment on the Proposed Plan you can mail, send an email, or call us. Our contact information is on the next slide. This PPC Proposed Plan is published and you can send comments to us until February 12th. As part of the process in providing the public an opportunity to review documents and information, the Administrative Record, AR, has been established. The AR can be viewed at the Broward County Public Library and on EPA's website. There is also a significant amount of information on the EPA website for PPC.

The admin record in the regional office of EPA in Atlanta is currently unavailable for the public to visit due to the COVID pandemic.

MR. TAYLOR: I want to thank you for your time in allowing me to present the proposed plan to you.

(Video presentation concluded.)

MS. SPENCER: So at this time we are going to open it up for questions. Josie, did we get any questions in the chat?

MS. TORRES: Hi Tonya, there was one question in the chat. It was a two-part question, it was:

When will you know which buildings are going and when will we find out for sure which plan you are going to use?

MS. SPENCER: I think that's for you, Michael.

MR. TAYLOR: Yes, I'll answer that. Once we receive all the comments from the proposed plan we'll compile those and include those in the Record of Decision, and the Record of Decision will be a final decision document. At that point, it will be decided if this proposed plan, as you've just heard the presentation, or if it's been modified based upon the comments that we receive from the public or state of Florida and it may be modified. So a Record of Decision will be the final decision document, shows what structures will ultimately be demolished, but just keep in mind, all of the evaluation of technology, the treatments, do include

the five buildings that we identified. And our approach was to minimize the number of buildings that will be affected, and these are the end results, these are the minimal amount of buildings that would affected to accomplish the goals that we have for this site.

MS. TORRES: Thanks, Michael. We actually have another question that's been submitted. The question is:

Will the presence of PCBs exclude a Class D landfill for disposal? Also, how will the gun range in the building affect the project?

MR. TAYLOR: On the PCB question. PCBS are present, they are very low levels. What we'll do is once soil is excavated, sample analysis will be performed on the batch soil, and it will be determined what disposal method will be; off-site disposal at a Subtitle C landfill or a Subtitle D landfill. And as far as the second part, could you repeat the part about the gun range?

MS. TORRES: Sure. It said:

Also, how will the gun range in the building affect the project?

MR. TAYLOR: Well, the gun range building is, if you see on the presentation, is actually the

center of the site. It's on top of the primary and portions of the secondary sludge pit. So of all the buildings, that one is the most center located and it would have to be removed to get access to the soil and the sludge pits, which the majority of the depth of soil down to 24 feet is underneath the gun range building.

MR. TORRES: All right. Great, Michael.

MR. TAYLOR: There are two aerial photos of the site that show what the area looked like in 1963 and 1960 --

MS. TORRES: Great. Thank you for that response. I do have another question here. It says:

Do the groundwater impacts extend to the right-of-way?

MR. TAYLOR: I'm not sure the groundwater impact extends to the right-of-way. Could you explain what's your question?

MS. TORRES: So let me see if the participant has more to add to that.

So the Department of Transportation right-of-way on Pembroke Road --

MR. TAYLOR: It extends to Pembroke Road, as we have identified to the north. If you recall the

yellow outline of the property, and there's a red line that shows on one of the slides the identified groundwater contamination --

MR. TORRES: Mike, if you will give me a moment I will pull that slide up. Just give me a moment.

MR. TAYLOR: Okay. I don't recall what slide number it is, but it's near the end.

MS. TORRES: Just one moment folks, just bear with me. All right. I think this could be it. Trying to get the most complete picture here. All right. Michael, can you see my screen now, is this the map you were thinking of?

MR. TAYLOR: No, it's one with the investigation, it shows a heavy red line. It may be before this one.

MS. TORRES: One moment. I apologize folks, trying to navigate to the slide. Thank you for your patience.

MR. TAYLOR: The one you just were showing, with CMZ 1 and 2, I believe it's the next one below that, the next one. That's it. The red dashed line, this is the CMZ 3, which is the groundwater. And this red dashed line shows what we have identified through our investigation of groundwater contamination and dissolve phase as deep as 40 feet

below surface.

And it is within the yellow boundary and the Pembroke Park Road is to the north of the yellow line. Now, keep in mind, after soil treatment and sludge treatment, there will be additional groundwater investigations or sampling necessary in the event there's some migration of contaminants, because once you start stirring up the soil and the sludges there may be release of contaminants and the groundwater could carry that. The reason for having an interim action groundwater component to minimize further spread of contamination expected to the well fields to the east and to the north. So at this time it extends almost to Pembroke Road, as we identified it, but additional investigation will be needed after the soil work.

MS. TORRES: All right. Great. Thank you, Michael. I don't think we have any additional questions, unless that participant who just submitted a follow-up comment would like me to read it out loud to everyone? I think, yes, we are good to go then. If anyone has any other questions they would like me to read out loud, please submit them into the chat. Otherwise, Tanya, let me know if you would like me to allow folks to unmute themselves?

MS. SPENCER: Yes, please go ahead and unmute the lines, if anybody has any additional questions we will open it right now for those people to ask their questions. Don't be shy.

MR. TAYLOR: Does that tell me I explained things very well or totally confused?

MS. TORRES: We are still accepting questions via chat if you don't feel comfortable coming off of mute, feel free to submit your question via chat. Or if you are having issues coming off of chat I'm happy to help you.

So we actually do have another question submitted by chat. It's:

What was the outcome of the air sparging system that was onsite that is now demolished?

MR. TAYLOR: That was a system that was in operation in the early 90s, mid-90s. That was replaced by the bioslurping system later on in the late-90s. That system did collect, approximately, 3,000 gallons or so of oil, and it was replaced because of a much more efficient system, bioslurper system was put in use after 1997. So their system that was removed, the state of Florida removed that two years ago, and that's no longer on the property. All the old equipment has been removed now.

MS. TORRES: All right. Thank you, Michael. Still waiting for additional questions in the chat. Folks, if you would like to join, unmute yourselves, or you can write a message into the chat and I will ask that question out loud over the line. Still no additional questions. It looks like someone is having an issue unmuting, let me see if I can help them out. All right. Let me see, can you do it now?

MR. BUCHHEIT: Hi. I can talk now. Quick question on the what type of water system, or what do you think on the water treatment end on this project would be for the discharge criteria and, kind of, just overall treatment of it.

MS. SPENCER: And could you state your name, please?

MR. BUCHHEIT: Josh Buchheit, Envirocon.

MR. TAYLOR: Okay. Now, the groundwater treatment, that's going to be an interim action that we're proposing. What will happen, once the soil and sludge work is completed there will be a short time period of, approximately, a year to year and a half to assess the groundwater and see what the conditions are. We hope they are greatly reduced once we remove the source material or treat the

source material. It will be a multi-treatment system since we have different types of contaminants of concerns with the metals and the chlorinated compounds and the PCBs, et cetera, that one treatment will not address it. So we'll have a multi-treatment set up. And in the proposed plan it goes into more detail, but what it will consist of is, approximately, six wells across the property within the yellow outlined areas that you see. And it will be an oil/water separator system, a filtration system, a pH adjustment, an infiltration gallery. Once we treated the groundwater to try re inject it on the west side of the property, and that's the preferred method. If we are not able to install an infiltration system, then the alternative will be either a POTW or the open lake to the west for an NPDES permit. So there are some options for post-treatment of groundwater, but first we are going to determine if the actual need for groundwater is necessary after that, roughly, 18-month period of soil and sludge treatment.

MR. BUCHHEIT: Okay. Thank you.

MS. TORRES: This is Josie Torres here, taking a look in the question queue in the chat and I don't have any questions to add. Folks, remember, you can

unmute yourself and go ahead and ask a question. Let me know if you are having issues unmuting your phone, happy to help you out.

MS. SPENCER: Also please note if you think of any questions after this is over you can also email your comments or questions to Michael Taylor or Marcia Nale. The comment period doesn't end until February 12th, so if you don't think of anything today or this evening, please feel free to email to Marcia or Mike. And everything that's been recorded today will be a part of the Responsiveness Summary that goes into the Record of Decision. So we'll give a few more minutes, just in case anybody has any other questions.

MS. TORRES: We actually have another question in the chat, a question about the map specifically that we are looking at on the slide. It's:

The area of red lines, are those areas just being monitored after the excavation of?

This person comments that their building is in the top left of that area.

MR. TAYLOR: Yes. Yes, I heard you. What will be involved, keep in mind, once the soil and sludge is addressed, a lot of the monitoring wells that we currently have in position, those will be removed or

destroyed, because of the soil and the depth that we have to reach in some areas. So there will be new wells that have to be installed in some areas that have been affected.

Now, the upper left corner that you are referring to, that would not include soil excavation, so there will still be some wells there. We would be monitoring the existing wells in addition to installing new wells to get a baseline, if you will, on what the conditions are after the treatment of the soil and sludge is completed.

Also, I just want to add, you know, I want to add to everyone, keep in mind, everyone in this area receives groundwater through city sources or county, so there are no wells that are being used that are pumping groundwater or consuming groundwater at this time as we know it. We've done surveys in the area, so no one is pumping groundwater for any potable source or use. Everything is city supplied, so that's -- this is a site that's been what we call a delineated area, so it would require permits from the state to install any type of wells, so I just want to make sure that everyone is aware that no one is drinking the groundwater in this vicinity.

MS. TORRES: Michael, we actually had another

question in the chat.

So is it only buildings south of Ninth Street that are going to be removed, nothing north of Ninth Street -- or 19th Street, excuse me. So are only buildings south of 19th Street presumed to be removed, nothing north of 19th Street?

MR. TAYLOR: Josie, could you go to the slide which shows the five orange colored buildings. That would explain, be a good visual.

MS. TORRES: Is it later in the presentation?

MR. TAYLOR: It will be lower down in the slide deck, yes. There you go.

MS. TORRES: It was back there, that last one?

MR. TAYLOR: I see it now. We can use this, the preferred remedy. 19th Street, I believe it's small, but it's posted on this slide. As you can see, all the buildings that we're looking at for proposed demolition are in orange and they do fall south of 19th Street. There are four on the Pembroke Park warehouse property and one on Kelsey property at 31st Avenue and Carolina Street at the far right corner. Those are the five buildings that fall into the demolition category.

The yellow buildings, again, we're proposing those remain and excavate underneath, since there's

much shallower contamination there. If it is found later, even during the design phase, that there's more extensive contamination or deeper contamination than what we are aware of, there will be an evaluation whether to demolish one of those buildings or try to save it.

Our approach overall was try to save as many buildings as possible, because we don't want to demolish any more than we had to, but it actually came down to these five, based on where contamination and the depth of contamination to accomplish all of the goals that we have for this site that have to be removed to get to the contaminated soil.

MS. TORRES: Great thank you Michael. Looking at the comments the chat I don't see any additional chats. Folks, feel free to enter your questions or comments into that chat, or you have an option to unmute and ask Michael your question directly.

MS. SALGADO: Hey, Michael, this is Maria Salgado, FDOT. I have a question. We have projects working along DOT right-of-way, and as per guidelines from the DEP, we are supposed to look for any Superfund or any contaminated site that shows up on our TIS layers that have a potential impact for

our projects within, either, 500-foot if they are just contaminated sites that are related or are there Superfunds, you know, a little larger radius, we have 1,000 and so on. How soon will this -- and I came a little late to the meeting, so I wasn't sure if you've already discussed it. How soon is this activity going to take place so we can keep it into our radar so with our projects we know what's happening in our surrounding projects?

MR. TAYLOR: Okay. Good question. The schedule for this project, like L'Tonya said, will be closed in the comment period February the 12th, and we'll compile all information from comments we received, prepare a Record of Decision, which we expect to happen maybe by June or July of this year. After the Record of Decision is completed, there's a period that we have to prepare consent decrees and deal with the negotiations, responsible parties. And the design would start after that, about 18 months, so the time the ROD is signed to actually starting physical activity, it could be two years. So if we finish summer of '21, so summer of '23 would be, what I would anticipate, onsite activities to begin.

MS. SALGADO: That was very helpful. Thank

you. So the schedule will be coming out through this PowerPoint, it will have the schedule you are talking about so that we can download and keep in our files for later?

MR. TAYLOR: I think the best way to keep up with the site information is through our web page. Obviously, you can always call the numbers we have listed there for the RPM. Marcia would be probably the best contact for scheduling. If things change, she'll be able to provide information or we'll have it posted as periodic updates on our web page.

We do also list, you know, our beginning of site activities in the local newspapers and mail list we have on file, so we can share that information several ways.

MS. TORRES: Thanks, Michael. Maria, also the presentation is available on You Tube. So I can include a link to the presentation in the chat.

MS. SALGADO: That would be great, thank you.

MS. TORRES: Any other questions from folks?

MS. SPENCER: If we don't have any additional questions, just a reminder, as Michael said, the comment period started January 11th and it will end February 12th, so you have time to get your comments and questions in if you didn't get them in this

evening, and they will still be a part of the Responsiveness Summary that's a part of the Record of Decision, which will be the final decision document.

I want to thank everybody for your time, for attending this evening, and we appreciate you, and we hope to hear from the community and the public with any concerns or suggestions or questions that you may have. So thank you for attending this Proposed Plan Zoom meeting for the Petroleum Products Corporation site. And Josie has put the link down at the bottom for the access to the presentation. And if you received the fact sheets, you have the email address for the EPA website. We also have all the documents downloaded that relate to the decision for this particular site, and the Administrative Record on the site. We also have documents in French and Spanish, just in case someone needs them.

So if there's anything else you need, please feel free to contact me, LaTonya Spencer, Marcia Nale or Michael Taylor or Rudy Tanasijevich. All right. Thank you everybody for attending. We appreciate you.

MR. TAYLOR: Thank you.

(Presentation was concluded at 5:51 p.m. EST).

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APPENDIX C
SELECTED REMEDY – DETAILED COST ESTIMATE SHEETS

Feasibility Study Cost Estimate Summary

Project:	Petroleum Products	Report:	Feasibility Study Cost Estimate		
Location:	Pembroke Park, FL	Project Number:	049088	Revision:	2
Project Phase:	FS	Date:	4/2/2019	Stage:	0
Operable Unit:	N/A	Estimated By:	EMS/CC	Checked By:	CM/EH/CLC

Alternative	Description	Construction Cost	O&M Cost	Yrs	NPW Total
Unsaturated Zone Alternatives					
UZ #1	No Action	$0	$86,065	30	$86,100
UZ #2	Excavation and Off-Facility Disposal in Subtitle D Landfill	$14,372,128	$0	0	$14,372,100
UZ #3	Excavation, Ex Situ Stabilization/ Solidification (S/S), and On-Facility Disposal	$12,785,005	$0	0	$12,785,000
UZ #4	In Situ S/S and Limited Soil Excavation with Ex Situ S/S and Off-Facility Disposal	$12,339,829	$0	0	$12,339,800
UZ #5	Excavation, Ex Situ Thermal Treatment and S/S with On-Site Disposal	$15,610,105	$0	0	$15,610,100
-	-	-	-	-	-
Main Source Area Alternatives					
MSA #2	Excavation and Off-Facility Disposal in Subtitle D Landfill	$28,437,671	$0	0	$28,437,700
MSA #3	In Situ Stabilization/Solidification (S/S) with Large Diameter Augers (LDA)	$11,610,974	$0	0	$11,611,000
MSA #4	Excavation, Ex Situ Thermal Treatment and S/S with On-Site Disposal	$25,015,631	$0	0	$25,015,600
MSA #5	In Situ Thermal Treatment with Chemical Reduction	$19,840,676	$3,828,386	10	$23,669,100
-	-	-	-	-	-
Extended Plume Alternatives					
EP #2	Groundwater Recovery and Treatment (GR&T)	$812,193	$3,171,654	15	$3,983,800
EP #3	In Situ Carbon Injection and In Situ Reduction Permeable Barriers	$2,855,400	$3,017,987	15	$5,873,400
EP #4	Monitored Natural Attenuation	$0	$329,802	30	$329,800
-	-	-	-	-	-
Sitewide Costs Applicable to each Alternative					
SW	Sitewide Costs	$0	$101,882	30	$101,900
Common Scope to UZ Alternatives (Cost shown included in UZ Alternatives, except Bamboo Trailer Park)					
COM #1	Bamboo Trailer Park Excavation	$141,500	$0	0	$141,500
COM #2	Building Demolition Overlying MSA	$1,690,900	$0	0	$1,690,900
COM #3A	Shallow Excavation Under Buildings A - Retain Buildings	$4,572,400	$0	0	$4,572,400
COM #3B	Shallow Excavation Under Buildings B - Demolish Buildings	$5,635,100	$0	0	$5,635,100

Total: **$34,886,500**

Feasibility Study Cost Estimate

Total NPW Cost: **$101,900**

Alternative #:	SW		
Project:	Petroleum Products	Title:	Sitewide Costs
Location:	Pembroke Park, FL	Project Number:	049088
Project Phase:	FS	Date:	4/2/2019
		Base Year:	2016
		Revision:	0

Task Description: Sitewide costs applicable to each remedial alternative. Includes costs for 5YRs, maintenance of land use restrictions, site inspections. Includes LTM costs for sampling COCs and natural attenuation parameters (NAPs) every 5 years for 30 years.

Cost Basis: Detailed estimate

Item	Qty	Unit	Unit Cost	Note	Cost ($)
Capital Costs					
			Subtotal - Capital Costs:		$ -
Capital Contingency	15%	of Capital Cost			$ -
Legal Fees, Licenses & Permits[1]	0.5%				$ -
Engineering & Administrative[1]	8%				$ -
Contractor Fee[2]	10%	of Capital Cost			$ -
			Total Capital Cost:		$ -

[1] Applied to capital subtotal and contingency
[2] Applied to capital subtotal, contingency, fees, and E&A

O&M Costs

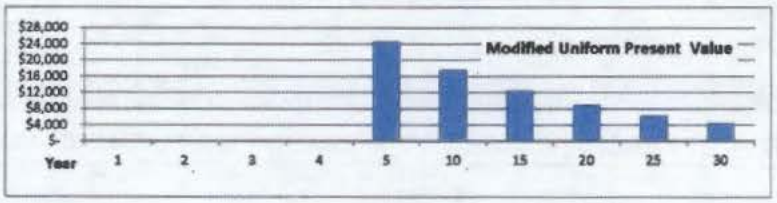
O&M Period: 30 | Discount Rate: 7.00% | Constant Escalation Factor: 0.00%

1.0 Site-Wide Costs and Monitoring (Year 1 to Year 30)

Gauge 12 wells for field parameters, COCs and natural attenuation parameters (NAPs) every 5 years for 10 years (2 events); 8 hour day - 2 day effort, 2 personnel, 4 hr travel, 4 hr prep. Site maintenance. Complete 5-Yr Reviews and general support to EPA.

							Annual Cost
Labor	30	yr	1	total	$ 20,948		$ 20,948
Travel	30	yr	1	total	$ 705		$ 705
Materials/Equipment/Subcontractors	30	yr	1	total	$ 3,580		$ 3,580
Analytical - Soil	30	yr	1	total	$ -		$ -
Analytical - Water	30	yr	1	total	$ 9,327		$ 9,327
							$ 34,560

5 Frequency of Periodic Annual Cost (yrs)



Net Present Worth (NPW) Subtotal: $ 74,573

O&M Contingency	15%	of NPW Cost	$ 11,186
Engineering & Administrative[1]	8%		$ 6,861
Contractor Fee[2]	10%		$ 9,262

[1] Applied to O&M subtotal and contingency
[2] Applied to O&M subtotal, contingency, and E&A
Net Present Worth derived from summation of Modified Uniform Present Value

Subtotal - O&M Costs: $ 101,882

Net Present Worth Formula

$$P = A_o \times \left(\frac{1+e}{d-e}\right) \times \left[1 - \left(\frac{1+e}{1+d}\right)^n\right]$$

where: P = Present Value ($), Ao = Annual Amount ($), d = discount rate, e = escalation factor, n = time period (yrs)

Total NPW Cost Estimate: $ 101,900

1. Professional rates are averaged to reflect typical labor rates for personnel required for project.
2. Cost basis derived from professional judgment and experience unless specified directly.
3. Costs are derived to be (-30% to +50%)

4/8/2019

Feasibility Study Cost Estimate

Total NPW Cost: $12,339,800

Alternative #:	UZ #4	UZ Alternative #4	
Project:	Petroleum Products	Title:	In Situ S/S and Limited Soil Excavation with Ex Situ S/S and Off-Facility Disposal
Location:	Pembroke Park, FL	Project Number:	049088
Project Phase:	FS	Date:	4/2/2019
Base Year:	2018	Revision:	1

Task Description: Excavation of 27,490 bcy of contaminated soil including UZ soil to ~ 2-ft bls; soil between UZ and MSA from 2-5-ft bls; soil in smaller MSA area to ~ 6-ft bls; plus 1,000 bcy sidewall slope. Assumes 100% of top 2-ft of soil requires stabilization with off-site disposal at Subtitle D Landfill, and 100% remaining soils stabilized ex situ and placed in excavation. In situ solidification/Stabilization (S/S) of approximately 21,800 bcy of sludge/NAPL contaminated soil exterior to surviving buildings between 2 to 5-ft bls using large diameter auger (LDA) soil mixing. 18-ft auger assumed; no overlap. Use 2 LDA rigs. On Site S/S Batch Plant.

Cost Basis: Detailed estimate with subcontractor quotes

Item	Qty.	Unit	Unit Cost	Note	Cost ($)
Volume of Impacted Soil and Sidewalls to be Excavated/Stabilized:	63,833	bcy	Unit Cost ($/yd3)=		$ 193
Capital Costs					
1.0 Remedial Design/Bench Scale/Pilot Tests					
Remedial Design Professional Labor	1	ls	$ 44,696		$ 44,696
Remedial Design Travel	1	ls	$ 1,810		$ 1,810
Materials/Equipment/Subcontractors	1	ls	$ 16,000		$ 16,000
Bench Scale Testing	1	ls	$ -		$ -
Pilot Scale Testing	1	ls	$ -		$ -
			Design/Bench/Pilot Testing Subtotal:		$ 62,506
2.0 Mobilization/Demobilization of Equipment and Personnel					
General mobilization/demobilization of equipment and personnel					
Labor	1	ls	$ 19,951		$ 19,951
Travel	1	ls	$ 5,066		$ 5,066
Materials/Equipment/ Subcontractors	1	ls	$ 194,156		$ 194,156
			Mobilization Subtotal:		$ 219,172
3.0 Site Preparation					
Utility protection, grubbing, clearing, pre excavation meeting, materials (3 days):					
Labor	1	ls	$ -		$ -
Travel	1	ls	$ -		$ -
Materials/Equipment/ Subcontractors	1	ls	$ 32,146		$ 32,146
Building Demolition	1	ls	$ -		$ -
			Site Preparation Subtotal:		$ 32,146
4.0 Soil Mixing - LDA					
In situ soil mixing with installation of ~3,330 LDA locations for S/S soil mixing between ~2 to 5 ft bls. 10-ft auger assumed with overlap. S/S of ~21,800 bcy. Stabilization chemical agents added via augers during downward movement. Estimated 90 days injection/LDA using 2 rigs.					
Labor	1	ls	$ 65,966		$ 65,966
Travel	1	ls	$ 28,356		$ 28,356
LDA Rig Mobilization/Demobilization	1	ls	$ 90,000		$ 90,000
Tracked Excavator/LDA Rig	1	ls	$ 908,333		$ 908,333
ISM Subcontractor	1	ls	$ 683,463		$ 683,463
			Soil Mixing - LDA Subtotal:		$ 1,776,119

Feasibility Study Cost Estimate

Project: Petroleum Products
Location: Pembroke Park, FL

Alternative #: UZ #4
Title: UZ Alternative #4 In Situ S/S and Limited Soil Excavation with Ex Situ S/S and Off-Facility Disposal

Item	Qty.	Unit	Unit Cost	Note	Cost ($)
5.0 Soil Excavation and Staging - Exterior to Buildings					
Excavation of approximately 27,500 bcy of soil: includes 18,440 bcy contaminated UZ soil to ~ 2-ft bls; 5,850 bcy contaminated soil between UZ and MSA from 2-5-ft bls; 2,210 bcy contaminated soil in smaller MSA area to ~ 6-ft bls; plus 1,000 bcy sidewall slope. Top 2-ft of soil (~18,440 bcy) excavated first (assumes 100% requires stabilization) and off-site disposal at Subtitle D Landfill, followed by excavation of remaining soils (~9,060 bcy), stabilization (assumes 100%), and placement in excavation. Placement of 2-ft clean fill. Staging of soils; backfill; site restoration. Assume 2.5 weeks of effort.					
Labor	1	ls	$ 19,436		$ 19,436
Travel	1	ls	$ 2,945		$ 2,945
Excavation/Sheet Pile Subcontractor Costs	1	ls	$ 2,092,420		$ 2,092,420
Transport and Disposal	1	ls	$ 2,265,471		$ 2,265,471
Backfill Subcontractor Costs	1	ls	$ 405,162		$ 405,162
Site Restoration	1	ls	$ 552,854		$ 552,854
			Soil Excavation and Staging Subtotal:		**$ 5,338,287**
6.0 Soil Stabilization Ex Situ					
Stabilize 18,440 cy of excavated soils 0 - 2 ft bls and shallow soil under building plus 100% of excavated soils between the UZ and MSA from 2 - 5 ft bls and the smaller MSA area from 0 -6 ft bls ex situ with Portland cement and ground blast furnace slag. Employs a batch plant to mix stockpiled soil ex situ. Assumes 27,500 bcy of excavated soil stabilized					
Labor	1	ls	$ 27,916		$ 27,916
Travel	1	ls	$ 4,374		$ 4,374
Excavation Subcontractor	1	ls	$ 1,530,083		$ 1,530,083
	1	ls	$ -		$ -
			Ex Situ Soil Stabilization Subtotal:		**$ 1,562,373**

Notes:

1)
2)
3)

		Subtotal - Capital Costs:	**$ 8,990,604**
Capital Contingency	15%	of Capital Cost	$ 1,348,591
Legal Fees, Licenses & Permits[1]	0.5%		$ 51,696
Engineering & Administrative[1]	8%		$ 827,136
Contractor Fee[1]	10%	of Capital Cost	$ 1,121,803
		Total Capital Cost:	**$ 12,339,829**

[1] Applied to capital subtotal and contingency
[2] Applied to capital subtotal, contingency, fees, and E&A

Feasibility Study Cost Estimate

Project: Petroleum Products
Location: Pembroke Park, FL

Alternative #: UZ #4
Title: UZ Alternative #4 In Situ S/S and Limited Soil Excavation with Ex Situ S/S and Off-Facility Disposal

O&M Costs

O&M Period: 0

7.00% Discount Rate
0.00% Constant Escalation Factor

Item	Qty		Unit	Unit Cost	Note	Cost ($)
7.0 O&M Costs						**Annual Cost**
None						
Labor	0	yr	1	total	$ -	$ -
Travel	0	yr	1	total	$ -	$ -
Materials/Equipment/Subcontractors	0	yr	1	total	$ -	$ -
						$ -
					Net Present Worth (NPW) Subtotal:	$ -
O&M Contingency			15%	of NPW Cost		$ -
Engineering & Administrative[1]			8%			$ -
Contractor Fee[2]			10%			$ -
					Subtotal - O&M Costs:	$ -

[1] Applied to O&M subtotal and contingency
[2] Applied to O&M subtotal, contingency, and E&A

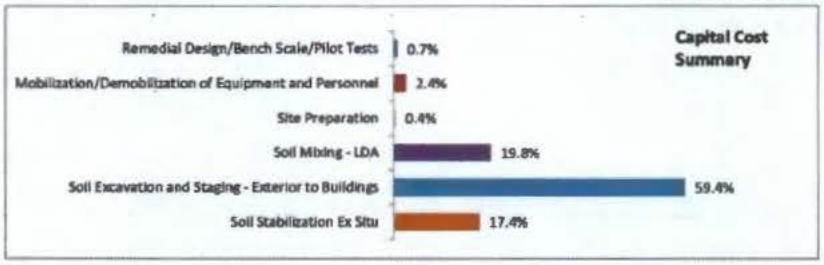
Net Present Worth Formula

$$P = A_o \times \left(\frac{1+e}{d-e}\right) \times \left[1-\left(\frac{1+e}{1+d}\right)^n\right]$$

where: P = Present Value ($)
Ao = Annual Amount ($)
d = discount rate
e = escalation factor
n = time period (yrs)

Note: Net Present Worth derived from summation of Modified Uniform Present Value (UPV*).

Total NPW Cost Estimate: $ 12,339,800



General Assumptions

1. Professional rates are averaged to reflect typical labor rates for personnel required for project.
2. Cost basis derived from professional judgment and experience unless specified directly.
3. Costs are derived to be (-30% to +50%)

Feasibility Study Cost Estimate				Total NPW Cost:	$4,572,400
		Alternative #:	COM #3A	Shallow Excavation A	
Project:	Petroleum Products	Title:	Retain Buildings Outside MSA; Sub-Building Excavation; Disposal in Subtitle D Landfill		
Location:	Pembroke Park, FL	Project Number:	049088	Base Year:	2018
Project Phase:	FS	Date:	4/2/2019	Revision:	1
Task Description:	Excavation of 7,200 bcy of sludge/NAPL contaminated soil beneath seven (7) buildings to ~5-ft bls. Buildings retained. Disposal of 100% of excavated soil at a Subtitle D Landfill. Solidification/Stabilization of approximately 40% of excavated soil to meet TCLP limits and Land Ban requirements. Flowable fill placement under shallow soil excavations beneath building. Backfill remaining soil with clean compacted sand fill.				
Cost Basis:	Detailed estimate with subcontractor quotes				

Item	Qty.	Unit	Unit Cost	Note	Cost ($)
Volume of Impacted Soil and Sidewalls to be Excavated:	7,200	bcy	Unit Cost ($/yd3):		$ 635
Capital Costs					
1.0 Remedial Design/Bench Scale/Pilot Tests					
Remedial Design Professional Labor	1	ls	$ 44,696		$ 44,696
Remedial Design Travel	1	ls	$ 1,810		$ 1,810
Materials/Equipment/Subcontractors	1	ls	$ 6,000		$ 6,000
Bench Scale Testing	1	ls	$ -		$ -
Pilot Scale Testing	1	ls	$ -		$ -
			Design/Bench/Pilot Testing Subtotal:		$ 52,506
2.0 Mobilization/Demobilization of Equipment and Personnel					
General mobilization/demobilization of equipment and personnel					
Labor	1	ls	$ 19,951		$ 19,951
Travel	1	ls	$ 5,066		$ 5,066
Materials/Equipment/ Subcontractors	1	ls	$ 167,578		$ 167,578
			Mobilization Subtotal:		$ 192,594
3.0 Site Preparation					
Utility protection, grubbing, clearing, pre excavation meeting, materials (3 days);					
Labor	1	ls	$ -		$ -
Travel	1	ls	$ -		$ -
Materials/Equipment/ Subcontractors	1	ls	$ 30,475		$ 30,475
Building Demolition	1	ls	$ -		$ -
			Site Preparation Subtotal:		$ 30,475
4.0 Soil Excavation and Staging - Below Buildings					
Pneumatic excavation of approximately 7,200 bcy of CVOC-laden soil to a depth of 5-ft bls (plus sidewall slope). Staging of soils; transport and disposal at Subtitle D Landfill; shoring under buildings, backfill; site restoration; assumes 40% of soils are deemed as needing S/S prior to disposal. Approximately 6 months effort.					
Labor	1	ls	$ 38,628		$ 38,628
Travel	1	ls	$ 6,038		$ 6,038
Excavation/Sheet Pile Subcontractor Costs	1	ls	$ 1,506,498		$ 1,506,498
Transport and Disposal	1	ls	$ 631,352		$ 631,352
Backfill Subcontractor Costs	1	ls	$ 756,981		$ 756,981
Site Restoration	1	ls	$ -		$ -
					$ 2,939,496

Feasibility Study Cost Estimate

Project: Petroleum Products
Location: Pembroke Park, FL

Alternative #: COM #3A
Title: Shallow Excavation A
Retain Buildings Outside MSA; Sub-Building Excavation; Disposal in Subtitle D Landfill

Item	Qty.	Unit	Unit Cost	Note	Cost ($)
5.0 Soil Stabilization Ex Situ					
Stabilize 40% of excavated soils considered hazardous (TCLP lead) ex situ with Portland cement and ground blast furnace slag. Employs a batch plant to mix stockpiled soil ex situ. Assumes 3,197 lcy of soil stabilized.					
Labor	1	ls	$ 3,577		$ 3,577
Travel	1	ls	$ -		$ -
Excavation Subcontractor	1	ls	$ 112,698		$ 112,698
	1	ls	$ -		$ -
					$ 116,275

Notes:

1)
2)
3)

Subtotal - Capital Costs:			$ 3,331,347
Capital Contingency	15%	of Capital Cost	$ 499,702
Legal Fees, Licenses & Permits[1]	0.5%		$ 19,155
Engineering & Administrative[1]	8%		$ 306,484
Contractor Fee[2]	10%	of Capital Cost	$ 415,669
Total Capital Cost:			$ 4,572,356

[1] Applied to capital subtotal and contingency
[2] Applied to capital subtotal, contingency, fees, and E&A

Feasibility Study Cost Estimate

Project: Petroleum Products
Location: Pembroke Park, FL

Alternative #: COM #3A — Shallow Excavation A
Title: Retain Buildings Outside MSA; Sub-Building Excavation; Disposal in Subtitle D Landfill

Item		Qty.	Unit	Unit Cost	Note	Cost ($)
O&M Costs						
	O&M Period	7.00%	Discount Rate			
		0.00%	Constant Escalation Factor			
6.0 O&M Costs	0					Annual Cost
None						
Labor	0 yr	1	total	$ -		$ -
Travel	0 yr	1	total	$ -		$ -
Materials/Equipment/Subcontractors	0 yr	1	total	$ -		$ -
						$ -
					Net Present Worth (NPW) Subtotal:	$ -
O&M Contingency		15%	of NPW Cost			$ -
Engineering & Administrative[1]		8%				$ -
Contractor Fee[2]		10%				$ -
					Subtotal - O&M Costs:	$ -

[1] Applied to O&M subtotal and contingency
[2] Applied to O&M subtotal, contingency, and E&A

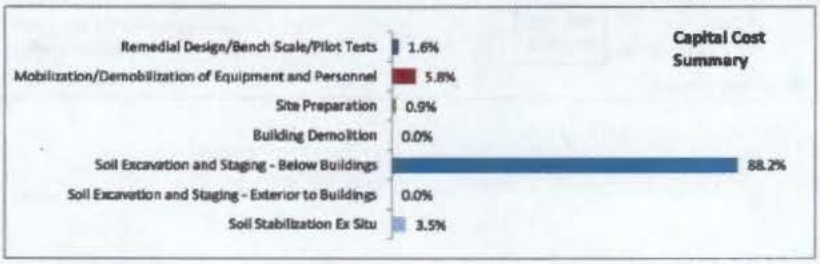
Net Present Worth Formula

$$P = A_o \times \left(\frac{1+e}{d-e}\right) \times \left[1 - \left(\frac{1+e}{1+d}\right)^n\right]$$

where:
P = Present Value ($)
Ao = Annual Amount ($)
d = discount rate
e = escalation factor
n = time period (yrs)

Note: Net Present Worth derived from summation of Modified Uniform Present Value (UPV*).

Total NPW Cost Estimate: $ 4,572,400



General Assumptions

1. Professional rates are averaged to reflect typical labor rates for personnel required for project.
2. Cost basis derived from professional judgment and experience unless specified directly.
3. Costs are derived to be (-30% to +50%)

Feasibility Study Cost Estimate

Total NPW Cost: $11,611,000

Alternative #:	MSA #3	MSA Alternative #3	
Project:	Petroleum Products	Title:	In Situ Stabilization/Solidification (S/S) with Large Diameter Augers (LDA)
Location:	Pembroke Park, FL	Project Number:	049088
Project Phase:	FS	Date:	4/2/2019
		Base Year:	2018
		Revision:	1

Task Description: In situ solidification/Stabilization (S/S) of approximately 116,270 bcy of sludge/NAPL contaminated soil exterior to surviving buildings between 5 and ~21-ft bls (24-ft maximum). Solidification/Stabilization of 100% of soil. Uses large diameter auger (LDA) soil mixing. 10-ft auger assumed; no overlap. Use 2 LDA rigs. Assumes excavation of unsaturated soils. Excess admixture/swell volume partially used to fill in unsaturated zone. On Site S/S Batch Plant.

Cost Basis: Detailed estimate with subcontractor quotes

Volume of Impacted Soil and Sidewalls to be Excavated: 116,267 bcy Unit Cost ($/yd3): $ 100

Capital Costs

Item	Qty.	Unit	Unit Cost	Note	Cost ($)
1.0 Remedial Design/Bench Scale/Pilot Tests					
Remedial Design Professional Labor	1	ls	$ 57,270		$ 57,270
Remedial Design Travel	1	ls	$ 1,810		$ 1,810
Materials/Equipment/Subcontractors	1	ls	$ 16,000		$ 16,000
Bench Scale Testing	1	ls	$ 120,000		$ 120,000
Pilot Scale Testing	1	ls	$ -		$ -
			Design/Bench/Pilot Testing Subtotal:		**$ 195,080**
2.0 Mobilization/Demobilization of Equipment and Personnel					
General mobilization/demobilization of equipment and personnel					
Labor	1	ls	$ 19,951		$ 19,951
Travel	1	ls	$ 5,066		$ 5,066
Materials/Equipment/ Subcontractors	1	ls	$ 170,887		$ 170,887
			Mobilization Subtotal:		**$ 195,903**
3.0 Site Preparation					
Utility protection, grubbing, clearing, pre excavation meeting, materials (3 days);					
Labor	1	ls	$ -		$ -
Travel	1	ls	$ -		$ -
Materials/Equipment/ Subcontractors	1	ls	$ 33,691		$ 33,691
Building Demolition	1	ls	$ -		$ -
			Site Preparation Subtotal:		**$ 33,691**
4.0 Soil Mixing - LDA					
In situ soil mixing with installation of ~3,330 LDA locations for S/S soil mixing between ~5 to 21 ft bls. 10-ft auger assumed with overlap. Stabilization chemical agents added via augers during downward movement. Estimated 145 days injection/LDA using 2 rigs.					
Labor	1	ls	$ 748,208		$ 748,208
Travel	1	ls	$ 132,293		$ 132,293
LDA Rig Mobilization/Demobilization	1	ls	$ 330,000		$ 330,000
Tracked Excavator/LDA Rig	1	ls	$ 1,744,000		$ 1,744,000
ISM Subcontractor	1	ls	$ 1,309,438		$ 1,309,438
			Soil Mixing - LDA Subtotal:		**$ 4,263,939**
5.0 Soil Stabilization In Situ					
Stabilize mixture and chemcial costs using Portland cement and ground blast furnace slag. Employs a batch plant to mix stockpiled soil ex situ. Assumes 116,270 bcy of soil stabilized.					
Labor	1	ls	$ 64,390		$ 64,390
Travel	1	ls	$ 12,595		$ 12,595
Excavation Subcontractor	1	ls	$ 3,693,974		$ 3,693,974
	1	ls	$ -		$ -
			In Situ Soil Stabilization Subtotal:		**$ 3,770,959**

Feasibility Study Cost Estimate

Project:	Petroleum Products	Alternative #:	MSA #3 — MSA Alternative #3
Location:	Pembroke Park, FL	Title:	In Situ Stabilization/Solidification (S/S) with Large Diameter Augers (LDA)

Item	Qty.	Unit	Unit Cost	Note	Cost ($)
Notes:					
1)					
2)					
3)					
			Subtotal - Capital Costs:		**$ 8,459,572**
Capital Contingency	15%	of Capital Cost			$ 1,268,936
Legal Fees, Licenses & Permits[1]	0.5%				$ 48,543
Engineering & Administrative[1]	8%				$ 778,281
Contractor Fee[2]	10%	of Capital Cost			$ 1,055,543
			Total Capital Cost:		**$ 11,610,974**

[1] Applied to capital subtotal and contingency

[2] Applied to capital subtotal, contingency, fees, and E&A

Feasibility Study Cost Estimate

Project: Petroleum Products
Location: Pembroke Park, FL

Alternative #: MSA #3 — MSA Alternative #3
Title: In Situ Stabilization/Solidification (S/S) with Large Diameter Augers (LDA)

Item		Qty.	Unit	Unit Cost	Note	Cost ($)
O&M Costs						
	O&M Period	7.00%	Discount Rate			
		0.00%	Constant Escalation Factor			
6.0 O&M Costs	0					Annual Cost
None						
Labor	0 yr	1	total	$ -		$ -
Travel	0 yr	1	total	$ -		$ -
Materials/Equipment/Subcontractors	0 yr	1	total	$ -		$ -
						$ -
					Net Present Worth (NPW) Subtotal:	$ -
O&M Contingency		15%	of NPW Cost			$ -
Engineering & Administrative[1]		8%				$ -
Contractor Fee[2]		10%				$ -
					Subtotal - O&M Costs:	$ -

[1] Applied to O&M subtotal and contingency
[2] Applied to O&M subtotal, contingency, and E&A

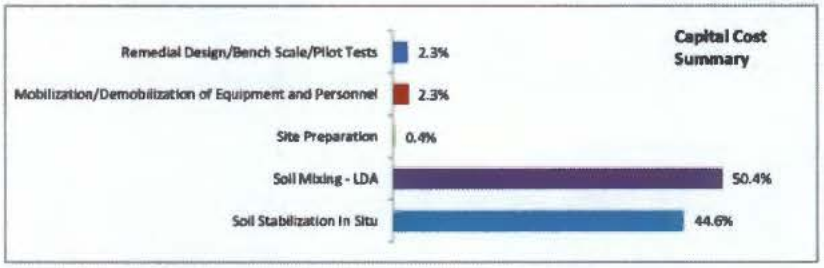
Net Present Worth Formula

$$P = A_o \times \left(\frac{1+e}{d-e}\right) \times \left[1 - \left(\frac{1+e}{1+d}\right)^n\right]$$

where:
P = Present Value ($)
Ao = Annual Amount ($)
d = discount rate
e = escalation factor
n = time period (yrs)

Note: Net Present Worth derived from summation of Modified Uniform Present Value (UPV*).

Total NPW Cost Estimate: $ 11,611,000



General Assumptions

1. Professional rates are averaged to reflect typical labor rates for personnel required for project.
2. Cost basis derived from professional judgment and experience unless specified directly.
3. Costs are derived to be (-30% to +50%)

Feasibility Study Cost Estimate — Total NPW Cost: $3,983,800

Alternative #:	EP #2	EP Alternative #2	
Project:	Petroleum Products	Title:	Groundwater Recovery and Treatment (GR&T)
Location:	Pembroke Park, FL	Project Number:	049088
Project Phase:	FS	Date:	4/2/2019
		Base Year:	2018
		Revision:	0

Task Description: Installation of seven (6) groundwater recovery wells to 40-ft bls for capture and hydraulic containment of the COC plume in the surfical aquifer. Assumes treatment train consisting of air stripping, metals sequestration, and GAC with discharge to five (5) infiltration galleries.

Cost Basis: Detailed estimate

Capital Costs

	Item	Qty.	Unit	Unit Cost	Note	Cost ($)
1.0	**Remedial Design/Bench Scale/Pilot Tests**					
	Remedial Design Professional Labor	1	ls	$ 31,855		$ 31,855
	Remedial Design Travel	1	ls	$ 870		$ 870
	Materials/Equipment/Subcontractors	1	ls	$ -		$ -
	Bench Scale Testing	1	ls	$ -		$ -
	Pilot Scale Testing	1	ls	$ 15,000		$ 15,000
				Design/Bench/Pilot Scale Subtotal:		**$ 47,725**
2.0	**Site Preparation**					
	Utility protection, grubbing, clearing, pre excavation meeting, materials (3 days):					
	Labor	1	ls	$ 5,656		$ 5,656
	Travel	1	ls	$ -		$ -
	Materials/Equipment/ Subcontractors	1	ls	$ 14,602		$ 14,602
				Site Preparation Subtotal:		**$ 20,258**
3.0	**Install GR&T Extraction Wells**					
	Drilling of (6) 4-inch cluster extraction wells for GR&T. Drilling to 40 ft bls. Wells screened from ~5 to ~40 ft bls in in the surficial aquifer. Flush Mount in pre-cast concrete vaults. Assumes 2 well drilled/day. Use 1 rig/day. 9 hr day. Task includes well development.					
	Labor	1	ls	$ 8,413		$ 8,413
	Travel	1	ls	$ 1,777		$ 1,777
	Drilling Subcontractor Well Install	240	ft	$ 60		$ 14,400
	Drilling Subcontractor - Other	1	ls	$ 14,121		$ 14,121
	Well Materials	1	ls	$ 11,237		$ 11,237
	Materials/Equipment/ Other Subs/Consumables	1	ls	$ 10,024		$ 10,024
				Install Well Subtotal:		**$ 59,972**
4.0	**Install Extraction System Piping/Wellheads**					
	Installation of 7 wellheads, lateral lines, below ground piping; Approximatley 1900-feet of trenching, electrical, and probe line from extraction wells. Assume existing equipment compound reused/modified.					
	Labor	1	ls	$ 12,143		$ 12,143
	Travel	1	ls	$ 3,063		$ 3,063
	Materials Equipment/Subcontractor	1	ls	$ 56,158		$ 56,158
				Install Piping/Wellheads Subtotal:		**$ 71,365**
5.0	**Construct/Install Groundwater Treatment System**					
	Install GW Treatment system. Trailer enclosed equipment. Assumes treatment train consisting of O/W seperation, filtration, air stripping, metals sequestration, and GAC. Ten day installation assumed. Includes construction of					
	Labor	1	ls	$ 36,035		$ 36,035
	Travel	1	ls	$ 9,922		$ 9,922
	Extraction Wells Main Header	1	ls	$ 4,364		$ 4,364
	Water Treatment System	1	ls	$ 232,800		$ 232,800
	Effluent Manifold	1	ls	$ 19,195		$ 19,195
				Delivery System Subtotal:		**$ 302,316**

Feasibility Study Cost Estimate

Project: Petroleum Products
Location: Pembroke Park, FL

Alternative #: EP #2
Title: EP Alternative #2
Groundwater Recovery and Treatment (GR&T)

Item	Qty	Unit	Unit Cost	Note	Cost ($)
6.0 Construct Infiltration Galleries					
Install (5) infiltration galleries; assume 14 days; assume two (2) 150-ft by 6-ft by 2.5-feet deep infiltration galleries. Asphalt replacement.					
Labor	1	ls	$ 52,707		$ 52,707
Travel	1	ls	$ 5,385		$ 5,385
General Subcontractor Costs	1	ls	$ 32,024		$ 32,024
			Gallery Construction Subtotal:		**$ 90,116**

Notes:

1)
2)
3)

		Subtotal - Capital Costs:	**$ 591,751**
Capital Contingency	15% of Capital Cost	$	88,763
Legal Fees, Licenses & Permits[1]	0.5%	$	3,403
Engineering & Administrative[1]	8%	$	54,441
Contractor Fee[2]	10% of Capital Cost	$	73,836
		Total Capital Cost:	**$ 812,193**

[1] Applied to capital subtotal and contingency
[2] Applied to capital subtotal, contingency, fees, and E&A

Feasibility Study Cost Estimate

Project: Petroleum Products
Location: Pembroke Park, FL

Alternative #: EP #2
Title: EP Alternative #2 Groundwater Recovery and Treatment (GR&T)

Item			Qty	Unit	Unit Cost	Note	Cost ($)
O&M Costs							
	O&M Period		7.00%	Discount Rate			
			0.00%	Constant Escalation Factor			
7.0 GR&T Operation	15						**Annual Cost**
System operation for 10 years; carbon changeouts; metal fixation units changeouts; refurbishments; 2 visits per month							
Labor	10	yr	1	total	$ 93,399		$ 93,399
Travel	10	yr	1	total	$ 29,829		$ 29,829
Materials/Equipment	10	yr	1	total	$ 141,000		$ 141,000
							$ 264,228
8.0 Performance Sampling Costs							
Monitor system performance for CVOCs (influent and effluent, psot AS, post GAC, each RW (13 samples)) weekly first month, quarterly for Year 1 (8 events), quarterly through year 15 (64 events); 16 hr effort (2 hr travel, 2 hr prep) per sample							
Labor	15	yr	1	ls	$ 17,757		$ 17,757
Travel	15	yr	1	ls	$ 4,299		$ 4,299
Materials/Equipment/Subcontractors	15	yr	1	ls	$ 2,144		$ 2,144
Analytical - Water	15	yr	1	ls	$ 26,930		$ 26,930
					Sampling Subtotal:		$ 51,130
					Net Present Worth (NPW) Subtotal:		$ 2,321,515
O&M Contingency			15%	of NPW Cost			$ 348,227
Engineering & Administrative[1]			8%				$ 213,579
Contractor Fee[2]			10%				$ 288,332
					Subtotal - O&M Costs:		$ 3,171,654

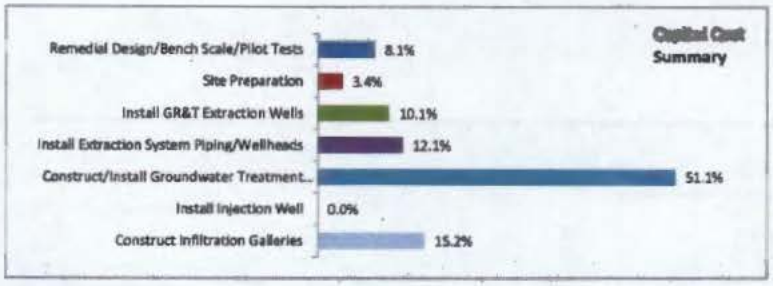
[1] Applied to O&M subtotal and contingency
[2] Applied to O&M subtotal, contingency, and E&A

Net Present Worth Formula

where:
P = Present Value ($)
Ao = Annual Amount ($)
d = discount rate
e = escalation factor
n = time period (yrs)

Note: Net Present Worth derived from summation of Modified Uniform Present Value (UPV*).

Total NPW Cost Estimate: $ 3,983,800



General Assumptions

1. Professional rates are averaged to reflect typical labor rates for personnel required for project.
2. Cost basis derived from professional judgment and experience unless specified directly.
3. Costs are derived to be (-30% to +50%)

APPENDIX D
STATE CORRESPONDENCE

FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center
[redacted]

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

Memorandum

TO: Killian Talley, Environmental Specialist III
Waste Cleanup Program

THROUGH: Brian Dougherty, Program Manager
District & Business Support Program, DWM

Digitally signed by Leah J. Smith
Date: 2021.05.28 08:27:57 -04'00'

FROM: Jeff Wagner, PG II
District & Business Support Program, DWM

SUBJECT: Petroleum Products CERCLA Site
3150 W Pembroke Road, Pembroke Park, Broward County
Draft Record of Decision, April 2021
Site ID: ERIC_3796

DATE: May 27, 2021

The District and Business Support Program (DBSP) has reviewed the EPA Draft Record of Decision dated April 2021. The following review comments are provided to assist the Waste Cleanup Program staff with their review. DBSP's review comments should not be inferred to be an approval of the subject document.

The Draft Record of Decision (ROD) dated April 2021 prepared by the EPA does not differ technically from the approach previously agreed to by the Department.

The Applicable or Relevant and Appropriate Requirements (ARARs) deleted from the ARAR Table appear to be duplications in some cases. ARARs relevant to landfill vegetative cover and grade appear to be cited sufficiently. However, all ARARs relevant to RCRA have been removed even though they are cited in the Feasibility Study. NPDES ARARs are not cited in the table.

DBSP has no further comments for this draft ROD.

Please contact me at [redacted] if you have any questions.