Fourth Five-Year Review Report
for
Airco Plating Co.
FLD004145140

Miami
Miami-Dade County, Florida

September 2016

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

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Date: 9/22/16

11050336

Fourth Five-Year Review Report
for
Airco Plating Co.
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Miami
Miami-Dade, Florida

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List of Acronyms

APC	Airco Plating Company
ARAR	Applicable or Relevant and Appropriate Requirement
bls	Below Land Surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CRA	Conestoga-Rovers & Associates
COC	Contaminant of Concern
DCE	Dichloroethylene
EMWD	Environmental Measurement While Drilling
EPA	United States Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FYR	Five-Year Review
HI	Hazard Index
HDD	Horizontal Directional Drilling (HDD)
IC	Institutional Control
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/kg/day	milligrams per kilogram per day
mg/L	milligrams per liter
N/A	Not Applicable
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Tetrachloroethylene
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
RW	Recovery Well
SMCL	Secondary Maximum Contaminant Level
SVE	Soil Vapor Extraction
TBC	To-Be-Considered
TCE	Trichloroethylene
UAO	Unilateral Administrative Order
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

Executive Summary

The 2-acre Airco Plating Co. Superfund site (the Site) is located in Miami, Miami-Dade County, Florida. The Site contains the Airco Plating Company (APC) electroplating shop, which has operated at the Site since 1957. The APC facility primarily plates steel, copper and brass with zinc, but also plates various items with brass, cadmium, copper, nickel and tin. Since 1957, cyanide, acids and caustic compounds have been used in the electroplating process, and tetrachloroethylene (PCE) was previously used as a cleaning fluid. Until 1973, wastewaters from the plating operations were disposed of in three on-site percolation ponds, pursuant to a permit from the Florida State Board of Health. From 1973 until 1981, plating wastes were pretreated and released into the Miami municipal sewage system. In 1981, the wastewater treatment system was upgraded to remove sludge from the treated effluent prior to discharge to the Miami municipal sewage system. This treatment train continues at the Site.

The U. S. Environmental Protection Agency began site investigations in July 1985. EPA proposed the Site to the National Priorities List (NPL) in June 1988. The EPA finalized the Site on the NPL in February 1990. In the early 1990s, investigations detected various metals, cyanide, PCE and trichloroethylene (TCE) in soil at the Site. Elevated levels of cadmium and volatile organic compounds (VOCs), such as PCE, were detected in shallow groundwater on site. Elevated levels of cadmium and PCE were detected in deeper groundwater.

The Site remedy currently protects human health and the environment in the short term because source control remediation has been completed, the groundwater treatment system operates at the Site and there are no complete exposure pathways. However, in order for the remedy to be protective in the long term, a capture zone evaluation should be completed, the type of chromium at the Site should be determined, vapor intrusion risks should be further evaluated, the EPA should determine whether the selected remedy can reduce metal concentrations to cleanup goals, groundwater sampling should monitor bis(2-ethylhexyl) phthalate concentrations, and additional institutional controls should be implemented.

The EPA designated one operable unit (OU) to address the Site's soil and groundwater contamination. The triggering action for this five-year review (FYR) was the signing of the previous FYR on September 12, 2011.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Airco Plating Co.		
EPA ID: FLD004145140		
Region: 4	**State:** FL	**City/County:** Miami-Dade

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

REVIEW STATUS
Lead agency: EPA
Author name: Peter Thorpe (EPA), Sarah Alfano (Skeo Solutions) and Treat Suomi (Skeo Solutions)
Author affiliation: EPA and Skeo Solutions
Review period: October 2015 – September 2016
Date of site inspection: February 24, 2016
Type of review: Statutory
Review number: 4
Triggering action date: 09/12/2011
Due date *(five years after triggering action date)*: 09/12/2016

Five-Year Review Summary Form (continued)

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1 (Sitewide)	Issue Category: Remedy Performance			
	Issue: Groundwater flow directions at the Site are variable and the extent of capture by the recovery wells is unclear.			
	Recommendation: Complete a capture zone evaluation to determine how actual capture zones compare to target capture zones to demonstrate that the current groundwater extraction and treatment system is capable of capturing and treating groundwater contamination that exceeds cleanup standards.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

OU(s): 1 (Sitewide)	Issue Category: Changed Site Conditions			
	Issue: Early remedial work at the Site did not distinguish between trivalent chromium and hexavalent chromium, but the toxicity for hexavalent chromium is higher than what was used in the risk assessment.			
	Recommendation: Determine whether there was hexavalent or trivalent chromium on site and determine whether additional remedial action is necessary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

OU(s): 1 (Sitewide)	Issue Category: Institutional Controls			
	Issue: Institutional controls are needed to restrict uses that would disturb the integrity of the rear area cap.			
	Recommendation: Finalize and implement the draft restrictive covenant for the rear area property upon receiving approval from the EPA and Florida Department of Environmental Protection (FDEP).			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

Five-Year Review Summary Form (continued)

OU(s): 1 (Sitewide)	Issue Category: Remedy Performance			
	Issue: PCE and TCE concentrations exceed the vapor intrusion screening level (VISL) in shallow well APS-11 and the EPA issued new guidance for evaluating vapor intrusion.			
	Recommendation: Further evaluate the vapor intrusion pathway for current PCE and TCE concentrations with multiple lines of evidence.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

Sitewide Protectiveness Statement

Protectiveness Determination:
Short-term Protective

Addendum Due Date (if applicable):
Not Applicable

Protectiveness Statement:
The Site remedy currently protects human health and the environment in the short term because source control remediation has been completed, the groundwater treatment system operates at the Site and there are no complete exposure pathways. However, in order for the remedy to be protective in the long term, a capture zone evaluation should be completed, the type of chromium at the Site should be determined, vapor intrusion risks should be further evaluated, the EPA should determine whether the selected remedy can reduce metal concentrations to cleanup goals, groundwater sampling should monitor bis(2-ethylhexyl) phthalate concentrations, and additional institutional controls should be implemented.

Environmental Indicators

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

Are Necessary Institutional Controls in Place?

☐ All ☒ Some ☐ None

Has EPA Designated the Site as Sitewide Ready for Anticipated Use?

☐ Yes ☒ No

Has the Site Been Put into Reuse?

☒ Yes ☐ No (Continued industrial use and commercial reuse)

Fourth Five-Year Review Report
for
Airco Plating Co. Superfund Site

1.0 Introduction

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

The U.S. Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Airco Plating Co. Superfund site (the Site) in Miami, Miami-Dade County, Florida. The EPA's contractor conducted this FYR from October 2015 to September 2016. The EPA is the lead agency for developing and implementing the remedy for the potentially responsible party (PRP)-financed cleanup at the Site. The Florida Department of Environmental Protection (FDEP), as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the fourth FYR for the Site. The triggering action for this statutory review is the signature date of the previous FYR. The FYR is required because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of one operable unit (OU).

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
The EPA discovered improperly treated discharge	1971
The EPA ordered the PRP, Airco Plating Company, to pump out the percolation ponds and change the treatment system	February 1973
APC stopped using the percolation ponds and began discharging treated effluent to the Miami municipal sewer	June 1973
APC improved the their treatment process to separate sludge from the treated effluent before discharge to the sewer	1981
The EPA performed a preliminary site assessment	May 20, 1985
The EPA proposed the Site to the National Priorities List (NPL)	June 24, 1988
The EPA finalized the Site on the NPL	February 21, 1990
The EPA conducted treatability study	September 4, 1990
The EPA and APC executed Administrative Order on Consent; APC began RI/FS	November 14, 1990
The EPA and APC signed Consent Decree	February 24, 1993
The EPA conducted Baseline Risk Assessment	March 19, 1993
The EPA completed Record of Decision (ROD); APC completed RI/FS	October 1, 1993
The EPA issued Unilateral Administrative Order (UAO)	August 22, 1994
APC began first remedial design (RD)	September 20, 1994
APC completed first RD; APC began first remedial action (RA)	December 20, 1995
APC began second RD	February 26, 1998
APC completed first RA; APC began long-term response action	September 23, 1998
APC completed second RD; APC began second RA	May 25, 1999
The EPA prepared Preliminary Close-Out Report; The EPA granted Construction Completion	September 15, 1999
APC completed second RA	September 30, 1999
The EPA completed first FYR	September 25, 2001
The EPA completed second FYR	September 28, 2006
The EPA completed third FYR	September 12, 2011
The EPA and Airco Plating Company (APC) agreed to a restrictive covenant on the APC property	November 20, 2012
APC began biostimulation pilot study	September 2014

3.0 Background

3.1 Physical Characteristics

The 2-acre Site is located at 3636 NW 46th Street, Miami, Florida (Figure 1). The Site is in a predominantly industrial and commercial area, surrounded by other active businesses. Airco Plating Company (APC) operates an electroplating facility at the Site. A mobile home community is located 300 feet south of the Site. The topography of the surrounding area is relatively flat with a land surface elevation of about eight feet above mean sea level. The Miami Canal is about 2/3-mile southwest of the Site; it is the only major surface water body nearby. The Biscayne Aquifer underlies the Site and is about 100 feet thick in that area.

Underlying the Site, below the surficial soils, is a 40-to-45-foot-thick layer of fine- to coarse-grained sand. The sand overlies coral limestone and crystalline calcite, followed by fine-grained limestone. The water table is about 4.5 to 6 feet below land surface (bls). When pumps are not operating, groundwater flows southeast, but opening the locks in the canal can occasionally cause the flow to shift toward the southwest.

3.2 Land and Resource Use

APC began metal plating activities at the Site in the mid-1950s and continues to operate an electroplating facility. Land use in the area has not changed significantly since discovery of site contamination or since the EPA issued the Record of Decision (ROD) in 1993. The new private lessee of the southernmost portion of the Site, Paradise Awnings, an awnings manufacturing and installation company, has made minor physical improvements to the property (parcel folio #30-3121-000-1056), but its use will remain industrial or commercial.

The Biscayne Aquifer underlying the Site is classified as Class GII groundwater for potable water use. It is the sole source of potable water in Miami-Dade County, Florida. There are no private wells in use around the Site and because the area is located in a Florida Groundwater Delineated Area, future well installation is prohibited.

3.3 History of Contamination

The APC facility primarily plates steel, copper and brass with zinc. The facility also plates various items with brass, cadmium, chromium, copper, nickel and tin. Cyanide, acids and caustic compounds have been used in the electroplating process since 1957 and are still used at the facility. APC previously used tetrachloroethylene (PCE) as a cleaning fluid for parts prior to plating.

In 1957, APC obtained a permit from the Florida State Board of Health to discharge treated electroplating wastewater into three percolation ponds. The wastewater treatment process included cyanide destruction, chromium reduction and pH neutralization.

In 1971, the EPA observed wastewater being discharged into the percolation ponds without treatment. The EPA found that the wastewater contained cadmium, copper, zinc and tin. Between June 1972 and January 1973, APC received at least three notices that wastewater discharges exceeded Miami-Dade County discharge requirements.

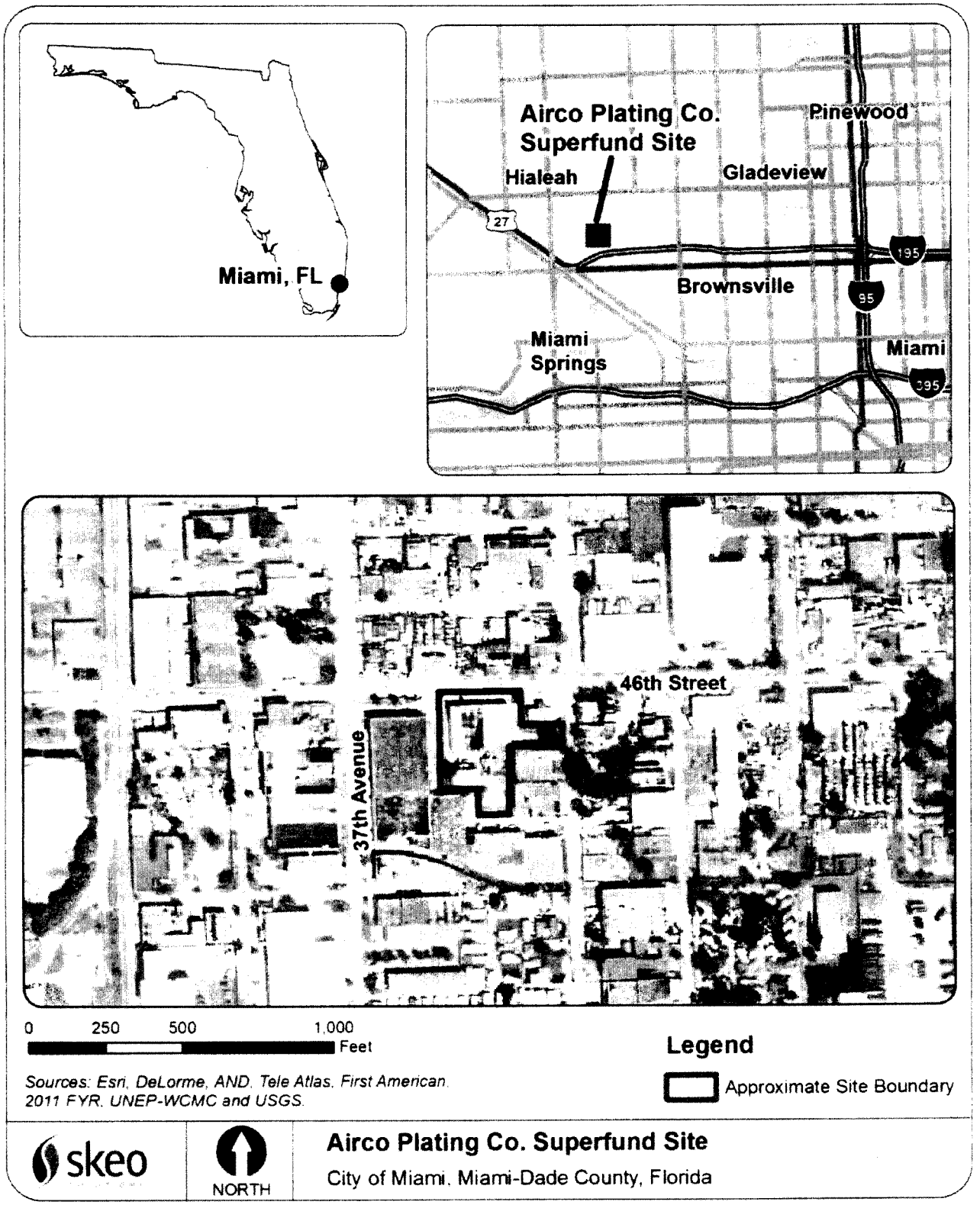
3.4 Initial Response

In February 1973, the EPA ordered APC to pump out the percolation ponds and change the treatment system to comply with regulations. In June 1973, APC stopped using the percolation ponds, backfilled and regraded them, and began discharging treated effluent to the Miami municipal sewer. In 1981, APC improved the treatment process to separate sludge from the treated effluent before discharge to the sewer. APC collected the sludge for off-site disposal.

In May 1985, the EPA conducted a preliminary site assessment and continued with several rounds of investigations between 1985 and 1986. Based on investigations, the EPA proposed the Site for listing on the National Priorities List (NPL) in June 1988. In February 1990, finalized the Site on the NPL.

In July 1990, the Site's PRP, APC, received a special notice letter to conduct an additional Remedial Investigation and Feasibility Study (RI/FS). In November 1990, APC signed an Administrative Order on Consent and began the RI/FS.

Figure 1: Site Location Map



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

3.5 Basis for Taking Action

APC completed an RI in 1993 to define the nature and extent of contamination in soils and groundwater and to assess the current and potential risk to public health and the environment. Soil samples contained metals, including cadmium, chromium, lead and zinc, and PCE above levels considered protective of human health. The highest levels of contamination were around the former percolation ponds (see Figure 2) and next to the main APC building. Shallow groundwater (10-20 feet bls) contained cadmium, chromium, nickel, lead and several volatile organic compounds (VOCs), including PCE, trichloroethylene (TCE), cis-1,2-dichloroethylene (DCE), trans-1,2-DCE, chloroform, 1,1-DCE and vinyl chloride, above levels considered protective of human health. Within the APC property, cadmium and VOCs were the primary contaminants in shallow groundwater. Intermediate (35-45 feet bls) and deep (65-75 feet bls) groundwater also contained VOCs above levels considered protective of human health.

The EPA's 1993 Baseline Risk Assessment evaluated potential current and future exposure pathways for site-related contamination. The Baseline Risk Assessment identified ingestion of groundwater as an unacceptable risk. Because the Biscayne Aquifer underlying the Site is a drinking water source for Miami-Dade County, the EPA determined that actual or threatened releases of hazardous substances from the Site may present an imminent and substantial endangerment to the public. The EPA also determined that movement of contaminated soil and dust via surface water or airborne transmigration were secondary environmental pathways of concern. The EPA did not identify completed exposure pathways for ecological risk and did not assess for vapor intrusion pathways.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP. The nine criteria are:

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility or Volume through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

4.1 Remedy Selection

On October 1, 1993, the EPA signed the ROD, which included remedies for soil source contamination and contaminated groundwater. Although the selected remedy did not specify remedial action objectives (RAOs), the goal of the remedy is to address source contamination to prevent exposure to contaminated soil and to prevent further migration of metals and VOCs into the groundwater. In addition, remediation

of groundwater is necessary to protect the Biscayne Aquifer. Major components of the selected remedy include:

- Conducting soil vapor extraction (SVE) of organic compounds, such as PCE concentrations above 90 milligrams per kilogram (mg/kg), that are present in site soils to a depth of 5-6 feet bls, or just above the water table, whichever is lower.
- Placing a Resource Conservation and Recovery Act (RCRA)-type cap over soils with cadmium concentrations above 73 mg/kg or PCE concentrations above 0.060 mg/kg.
- Implementing institutional controls, including deed restrictions, to preserve the integrity of the cap and to prohibit activities that are not compatible with the remedy.
- Extracting contaminated groundwater with subsequent treatment by air stripping at the Site.
- Discharging treated water to the publicly owned treatment works (POTW) or the surficial aquifer via a recharge gallery in accordance with all applicable regulations and other performance standards.
- Evaluating the need for treatment of inorganics in groundwater will be conducted during the remedial design (RD).
- Modeling air emissions and analyzing actual air emissions from the air-stripping tower and the SVE system will be conducted during the RD in order to determine the need for air emission control equipment.

The 1993 ROD identified 16 groundwater contaminants of concern (COCs) (Table 2). The ROD's cleanup goals are based on federal and state maximum contaminant levels (MCLs). There were no MCLs for acetone or bis(2-ethylhexyl) phthalate in 1993; therefore, chemical-specific cleanup goals were only identified for the remaining 14 groundwater COCs.

Table 2: Groundwater COC Cleanup Goals from 1993 ROD

Groundwater COC	ROD Cleanup Goal (µg/L)
Acetone	Not Available[e]
Chloroform	100[a]
cis-1,2- DCE	70[a]
trans-1,2-DCE	100[a]
1,1-DCE	7[a]
PCE	3[b]
TCE	3[b]
Vinyl chloride	1[b]
bis(2-ethylhexyl)phthalate	Not Available[e]
Cyanide	200[a]
Cadmium	5[a]
Chromium	100[a]
Copper	1,300[c]
Lead	15[d]
Nickel	100[a]
Zinc	5,000[f]

µg/L – micrograms per liter

a. Federal maximum contaminant level (MCL).
b. Florida MCL.
c. Federal maximum contaminant level goal (MCLG).
d. Federal action level.
e. The 1993 ROD noted that acetone and bis(2-ethylhexyl)phthalate, listed as COCs from the risk assessment, may not be site-related. It is possible that these compounds are laboratory compounds that contaminated a groundwater sample during the RI, but are not actually present in site groundwater.
f. Federal secondary maximum contaminant level (SMCL).

The ROD also selected cleanup goals for eight soil COCs (Table 3).

Table 3: Soil COC Cleanup Goals

Soil COC	ROD Cleanup Goal (mg/kg)
PCE	0.060[a]
Cadmium	73[b]
Chromium	1,350[c]
Copper	9,990[c]
Cyanide	5,940[c]
Lead	500[c]
Nickel	5,400[c]
Zinc	8,100[c]

a. The ROD determined that site soils with PCE concentrations of 0.06 to 90 mg/kg would be contained beneath a RCRA-type cap. Site soils with PCE concentrations above 90 mg/kg (the Summers Model calculation for protection of groundwater) would first be treated with SVE to reduce the concentration to 90 mg/kg before being consolidated under the RCRA-type cap.
b. Based on Summers Model calculation for protection of groundwater.
c. Based on Baseline Risk Assessment calculation for protection of human health for contact with soil.

4.2 Remedy Implementation

In August 1994, the EPA issued a Unilateral Administrative Order (UAO) directing the PRP to perform the RD and remedial action (RA) for the Site. The PRP completed an initial RD in December 1995. Based on RD findings, the EPA divided the remedy into two phases. The first phase of RA focused on organic contaminants and the SVE and air stripping systems. The second phase focused on construction of the on-site RCRA-type cap.

Soil

The PRP designed the SVE system to address a limited area of contamination, and included four shallow vapor extraction wells. The PRP installed the SVE system during spring 1995 and operated it from December 1995 to June 1999. Contaminant concentrations in SVE emissions declined significantly over the four years it operated, indicating that the targeted source area was removed.

In May 1999, the PRP completed a second RD for the on-site RCRA-type cap. Before construction of the cap, the PRP excavated over 60 cubic yards of contaminated soil and transported it to an approved off-site disposal facility. The PRP placed a 40-millimeter geomembrane liner over areas of elevated soil contamination, and installed a 4-to-6-inch-thick reinforced concrete cap over the liner. The RCRA-style cap covers about 17,000 square feet. The cap has three main areas where the former percolation ponds were (see Figure 2). The cap includes:

- West alley – a corridor running north to south on the far west side of the main building.
- Middle area – immediately behind the main plant.
- Rear area – the far south portion of the Site, behind the treatment facility and stripping towers.

The cap is discontinuous because it was constructed between existing structures, which act like a cap themselves.

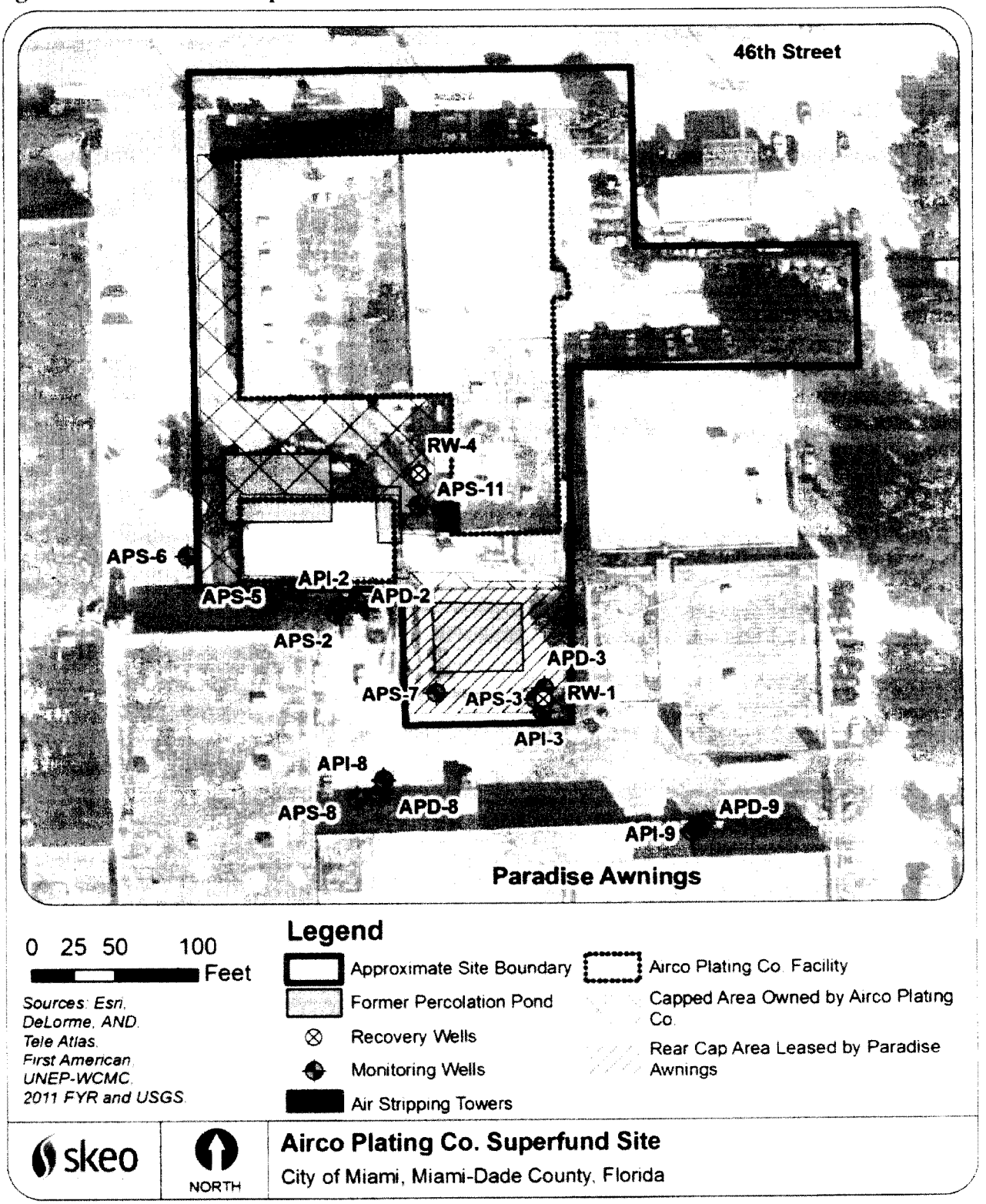
Groundwater

The PRP completed construction of the groundwater extraction and treatment system in June 1997; the system has operated since then. The system operates 24 hours a day, Monday through Friday. Groundwater is extracted from two recovery wells (RW-1 and RW-4), then passed through two sequential air stripping towers for treatment to a holding tank, then through a metals polishing unit to another holding tank before the water is used as rinse water for plating operations. APC's treatment plant then treats the rinse water before discharging it to the POTW. Water treated by the air stripping towers but not used as rinse water for APC operations can be sent to the sewer system. APC applied for and received additional discharge capacity under their existing wastewater pretreatment permit with Miami-Dade County. APC currently operates under an annual discharge permit No: PSO-000682-2015/2016 (PVT) –PVT.

The EPA conducted a pre-final construction inspection in August 1999; no deficient items were noted. The EPA issued a Preliminary Closeout Report in September 1999 to document the construction completion of all remedy components.

Based on recommendations from the 2011 FYR and previous data observations, in September 2014, the PRP initiated a biostimulation treatability injection event. This pilot study injected emulsified oil substrate through six injection points in and around RW-4 to enhance bioremediation of chlorinated solvents. It required temporary suspension of the groundwater system from September 2014 through December 2014.

Figure 2: Detailed Site Map



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

4.3 Operation and Maintenance (O&M)

The PRP prepared the O&M Plan for the Site in January 1996. The EPA approved the plan in August 1997. The plan describes O&M requirements for the groundwater extraction and treatment system, as well as the soil SVE system. The PRP finalized the plan prior to discontinuation of the soil SVE system in June 1999 and completion of on-site cap construction in September 1999. Soil SVE system O&M is not needed because this system is inactive and decommissioned. The PRP amended the O&M plan in January 2007 to include O&M activities for the on-site cap.

Each year, the PRP submits a groundwater sampling schedule and plan to the EPA for approval. Cleanup standards and a five-year confirmatory monitoring period have been achieved at several monitoring wells; these wells are no longer included in the monitoring program.

O&M activities at the Site include operation of the groundwater treatment system and quarterly sampling of groundwater monitoring wells, groundwater recovery wells, treated groundwater in the on-site holding tank, and vapor effluent from air stripper tower #1. The fourth quarterly sampling event is the same as the annual sampling event. PRP contractors prepare the data from this event and submit it to the EPA and FDEP in annual operating reports.

O&M obligations also include monthly inspections of the groundwater recovery and monitoring wells and the groundwater treatment system. The PRP inspects the on-site cap daily.

The 1993 ROD estimated that annual O&M total costs would be $92,600 during initial years of remediation. Table 4 includes annual O&M costs over the last five years.

Table 4: Annual O&M Costs

Year	Total Cost
2011	$11,600
2012	$11,300
2013	$9,100
2014	$34,700 (includes biostimulation)
2015	$17,500

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2011 FYR for the Site stated the following:

The Site remedy currently protects human health and the environment in the short term because source control remediation has been completed in accordance with the selected remedy, the groundwater treatment system continues to operate at the Site and there are no complete exposure pathways. However, in order for the remedy to be protective in the long term, issues regarding ground water remedy optimization, groundwater recovery rates, unexplained spikes in cadmium and nickel concentrations, and soil institutional controls should be addressed.

The 2011 FYR included five issues and recommendations. This report summarizes each recommendation and its current status below.

Table 5: Progress on Recommendations from the 2011 FYR

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
The groundwater treatment system should be operated continuously in accordance with the 1996 O&M Plan for the Site. The system should be assessed to determine whether it effectively captures the contaminant plume when operated according to the O&M Plan. If the assessment determines that system improvements are necessary, those changes should be implemented, as appropriate.	PRP	3/30/2013	APC increased their groundwater treatment system operating hours to 24 hours a day, five days a week. The EPA, FDEP and APC are investigating whether additional operation hours or alternate or additional remedial action is appropriate.	Ongoing
Evaluate potential seasonal, hydrologic, environmental or other factors that might be responsible for spikes in cadmium and nickel concentrations in groundwater monitoring well APS-11.	PRP	3/30/2013	APC initiated a pilot study to determine the potential impact of biostimulation injections on nickel and cadmium, as well as VOCs.	9/2014
Evaluate the cause(s) of the reduced average rate of groundwater recovery and evaluate and perform an analysis of groundwater recovery to determine whether the current configuration of recovery wells adequately contains the entire groundwater plume area. Take next steps, as appropriate, to address findings of these evaluations.	PRP	9/28/2012	APC continues monitoring efforts but has not specifically evaluated whether the monitoring well and recovery well system is adequately containing the contaminated groundwater.	Ongoing
Continue efforts to explain remedial components, liability concerns and owner/operator responsibilities to the new owner of the parcel south of the APC property. Implement a restrictive covenant for the parcel to prevent activities and land uses that would be incompatible with the remedy.	PRP/EPA	9/28/2012	The EPA remedial project manager (RPM) met with the property lessee, Paradise Awnings. The lessee understands the maintenance required for the rear cap area and use restrictions. The lessee is trying to purchase the property and is amenable to a restrictive covenant on the rear cap area once the purchase is complete. EPA Region 4 has performed a prospective purchaser inquiry call with the awnings company staff.	Ongoing
Finalize and implement the draft restrictive covenant for the APC property upon receiving approval from EPA and FDEP.	PRP	9/28/2012	A restrictive covenant was filed with Dade County to restrict use of the APC property and related contaminated groundwater. Efforts to implement and finalize a second restrictive covenant, on the rear cap area, are still underway.	11/20/2012

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in October 2015 and scheduled its completion for September 2016. The EPA remedial project manager (RPM) Peter Thorpe led the EPA site review team, which also included the EPA site attorney Stephen Smith, the EPA community involvement coordinator L'Tonya Spencer, and contractor support provided to the EPA by Skeo Solutions. In November 2015, the EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

6.2 Community Involvement

In September 2016, the EPA published a public notice in the SunSentinel newspaper announcing the commencement of the FYR process for the Site, providing contact information for Peter Thorpe and L'Tonya Spencer, and inviting community participation. The press notice is available in Appendix B. No one contacted the EPA as a result of the advertisement.

The EPA will make the final FYR Report available to the public. Upon completion of the FYR, the EPA will place copies of the document in the designated site repository: John F. Kennedy Public Library, located at 190 West 49th Street in Hialeah, Florida.

6.3 Document Review

This FYR included a review of relevant site-related documents, including the ROD, remedial action reports and recent monitoring data. Appendix A provides a complete list of the documents reviewed.

<u>ARARs Review</u>

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

Groundwater ARARs

The 1993 ROD selected the following ARARs for groundwater, stating that groundwater shall be treated until federal and/or state groundwater standards are attained at the wells designated by the EPA as compliance points. The ARARs also apply to treated groundwater discharged to a recharge gallery.

- National Primary and Secondary Drinking Water Standards (Maximum Contaminant Levels (MCLs))
- Federal National Maximum Contaminant Level Goals (MCLGs)
- Florida Drinking Water Standards

This FYR compared the groundwater ARARs in the 1993 ROD with current values of these ARARs (see Table G-1).

Since the 1993 ROD, the ARAR for chloroform has become more stringent, new federal and state ARARs were issued for bis(2-ethylhexyl)phthalate, and the remaining ARARs did not change. Federal and state ARARs for acetone have not been established[1].

Surface Water ARARs
The 1993 ROD identified several potential chemical-specific ARARs to protect surface water, because the selected remedy called for discharge of treated groundwater to the POTW, on-site recharge gallery, or both. Because treated effluent is discharged to a POTW, the standards issued by the Miami-Dade County Environmental Resources Management in an annual waste pretreatment operating permit apply. APC is in compliance with its current discharge standards; ARAR changes from those in the ROD do not call into question the protectiveness of the remedy.

Soil ARARs
The 1993 ROD did not identify chemical-specific ARARs for soil. See section 4.1 of this FYR for a discussion of the Site's soil cleanup levels.

Air ARARs
The 1993 ROD selected several ARARs and To-Be-Considered (TBC) criteria for air quality, which apply to air emissions from the air stripper. The ARARs and TBC criteria include:

- EPA Directive 9355.0-28, which provides guidelines for the control of air emissions from air stripping towers at Superfund groundwater sites.
- Florida standards for air emissions, Florida Administrative Code 17-2.300.

The 1993 ROD stated that source control is needed if air emissions of total VOCs exceed 3 pounds per hour, 15 pounds per day or 10 tons per year. This TBC criterion has not changed.

Institutional Control Review

The following deed information pertaining to the Site is available at the Miami-Dade County Public Records Office and online (Table 6).

[1] The 1993 ROD noted that acetone and bis(2-ethylhexyl)phthalate, listed as COCs from the risk assessment, may not be site-related. It is possible that these compounds are laboratory compounds that contaminated a groundwater sample during the RI, but are not actually present in site groundwater.

Table 6: Deed Documents from Miami-Dade County Public Records Office

Date	Type of Document	Description	Book #	Page #
04/21/1969	Warranty Deed	Warranty deed transferring property from the 3650 Corporation to Airco Plating Company, Inc.	6375	709
06/02/1969	Warranty Deed	Warranty deed transferring property from the Allied Products Corporation to Airco Plating Company, Inc.	6496	706
08/22/1994	UAO	Order directing the PRP to develop the RD for the site remedy described in the ROD.	16529	851
11/24/2010	Warranty Deed	Warranty deed transferring property from BRB Cabinets, Inc. to another private owner.	27504	67
11/20/2012	Restrictive Covenant	The restrictive covenant restricts drilling for water, alteration of existing remedial components (including the cap), and the unapproved handling or use of contaminated groundwater; requires proper cap maintenance; and restricts all land uses other than industrial and commercial uses.	28422	1597

Institutional controls to protect the cap and to limit land use are called for in decision documents; controls are in place around the APC facility. However, additional institutional controls are needed to restrict uses that would disturb the integrity of the rear cap area. Paradise Awnings is working with the PRP and the EPA to ensure the integrity and continued maintenance of the cap. Table 7 lists the institutional controls associated with areas of interest at the Site.

Decision documents call for groundwater institutional controls; the ROD requires institutional controls to prohibit activities that are not compatible with the remedy. They are in place to restrict installation of groundwater wells and groundwater use in the form of the 2012 restrictive covenant on the APC property and the Florida Groundwater Delineated Area, which covers the entire site.

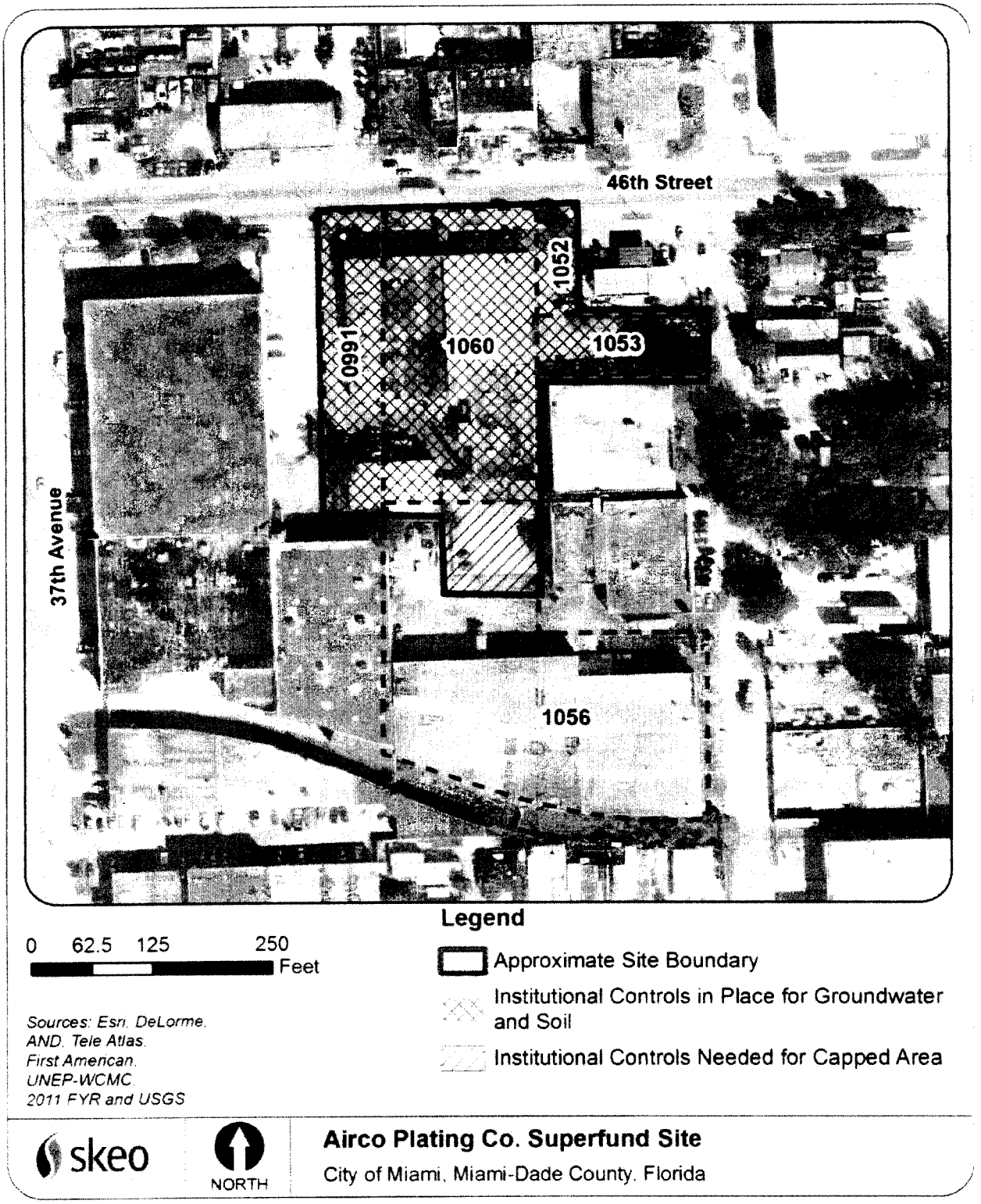
Table 7: Institutional Control (IC) Summary Table

Media	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
Groundwater	Yes	Yes	30-3121-000-1060, 30-3121-000-0991, 30-3121-000-1053, 30-3121-000-1052	Restrict installation of groundwater wells and groundwater use	The Site lies within a Florida Groundwater Delineated Area, which is managed by the South Florida Water Management District[a] and restricts well placement.[b] A restrictive covenant restricts groundwater use and handling (see Table 6).
Groundwater	Yes	Yes	30-3121-000-1056	Restrict installation of groundwater wells and groundwater use	The Site lies within a Florida Groundwater Delineated Area, which is managed by the South Florida Water Management District[a] and restricts well placement[b]
Soil	Yes	Yes	30-3121-000-1060, 30-3121-000-0991, 30-3121-000-1053, 30-3121-000-1052	Restrict land uses to prevent exposure to contamination and any uses that would disturb the integrity of the cap	A restrictive covenant restricts land use to commercial and industrial uses and also restricts alterations to the cap. A restrictive covenant requires proper cap maintenance (see Table 6).
Soil	Yes	Yes	30-3121-000-1056	Restrict uses that would disturb the integrity of the cap	The EPA has drafted a restrictive covenant for the rear area of the Site.

a. South Florida Water Management District information is available at: http://www.sfwmd.gov/portal/page/portal/sfwmdmain/home%20page
b. Florida Ground Water Delineated Area information is available at: http://www.dep.state.fl.us/water/groundwater/delineate.htm

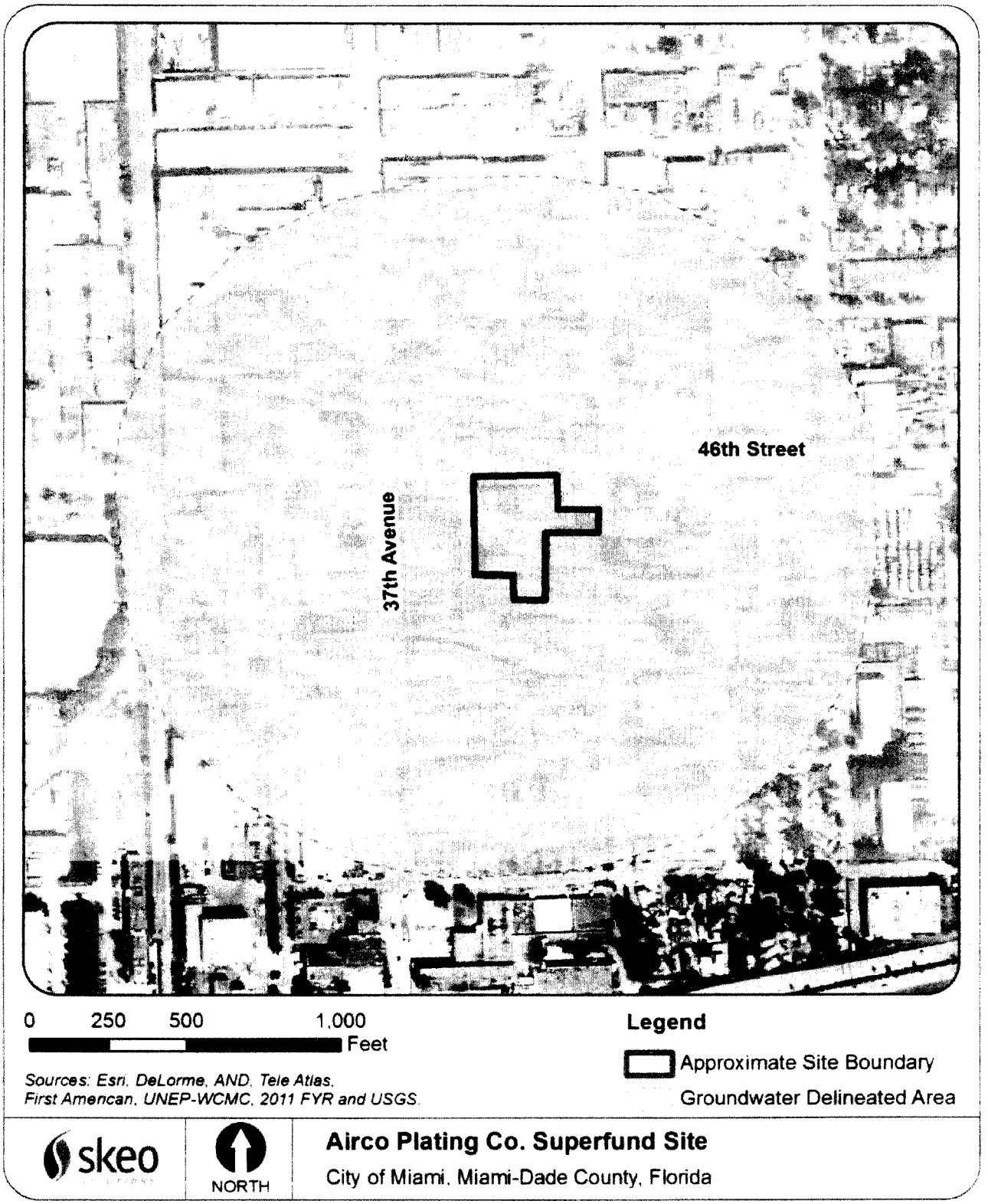
The Site consists of four parcels owned by APC (parcel folios 30-3121-000-1060, 30-3121-000-0991, 30-3121-000-1053 and 30-3121-000-1052) and a portion of a fifth parcel owned by a private party (parcel number 30-3121-000-1056). The fifth parcel is leased by Paradise Awnings. All site parcels are zoned for industrial land uses.

Figure 3: Detailed Site Map with Parcel Boundaries



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

Figure 4: Delineated Area



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

6.4 Data Review

Data reviewed for this FYR include sampling results from treated groundwater in the holding tank, vapor effluent from the air stripper, and groundwater in monitoring and recovery wells. Data were originally presented in the 2011 through 2014 Annual Operating Reports, prepared by Conestoga-Rovers and Associates (CRA). Preliminary groundwater data from 2015 and the biostimulation treatability study as well as groundwater elevation data were also reviewed. Key points from this review are provided below:

- The groundwater treatment system is effectively removing VOCs from groundwater. All holding tank VOC results were below applicable discharge standards during this FYR period.
- Total VOCs in air stripping tower effluent were below the 15 pounds per day discharge standard during all sampling events. VOCs levels in vapor effluent have been below detection limits since 2006.
- Cadmium, nickel and chlorinated VOC concentrations continue to exceed cleanup standards in groundwater.
- Cadmium is the most prevalent COC in groundwater. Cadmium levels in wells API-3, APS-5 and APS-6 are generally higher during this FYR period than the previous FYR period. Concentrations in other wells are generally consistent with historic results.
- Nickel concentrations in well APS-6 are increasing.
- VOC contamination at the Site appears limited in extent. RW-4 and APS-11 are the only wells to report VOC concentrations above cleanup standards during this FYR period.
- Preliminary results of the biostimulation study indicate that injections may be effective at remediating VOCs in targeted areas of the Site.
- PCE concentrations in well APS-11 increased by several orders of magnitude between September 2015 (7.23 micrograms per liter [µg/L]) and December 2015 (1,390 µg/L). The cause of this increase is unknown, but APS-11 and areas downgradient of APS-11 should continue to be monitored. If elevated concentrations persist, additional targeted injections should be considered.
- Groundwater flow directions at the Site are variable and the extent of capture by the recovery wells is unclear. A capture zone evaluation is recommended to determine how actual capture zones compare to target capture zones.

Treated Groundwater

Treated groundwater in the holding tank was sampled at least semi-annually for VOCs to determine the treatment system effectiveness and to comply with the POTW discharge standards. Treated groundwater in the holding tank (prior to being recycled as plating rinse water) was below POTW discharge standards for all COCs between 2011 and 2014.

During the second and third quarters of 2012, two holding tank samples indicated concentrations of compounds not historically detected in the holding tank. Several trihalomethanes and other VOCs were detected at elevated concentrations. None of the constituents were found in the influent samples from recovery wells RW-1 or RW-4, which supply water to the tank. The 2013 Annual Operating Report concludes that the compounds may have been introduced during maintenance or cleaning of the air stripping towers. The towers received a periodic cleaning during the 2nd quarter of 2013 with particular

attention to the cleaning procedure. VOCs were not detected in holding tank samples in 2013 and 2014, so the presence of VOCs in 2012 appears to be an isolated incident.

Vapor Effluent
Vapor effluent from the top of air stripping tower #1 is sampled at least semi-annually for VOCs to determine compliance with the total VOC discharge standard of 15 pounds per day. Total VOC concentrations were well below the discharge standard during all sampling events. VOC levels in vapor effluent have been below detection limits since 2006.

Groundwater
Groundwater samples were collected quarterly from recovery wells RW-1 and RW-4 and shallow aquifer monitoring well APS-11. Samples were collected semi-annually from intermediate aquifer well API-9, and at least annually from shallow aquifer monitoring wells APS-2, APS-5, APS-6 and APS-7 and intermediate aquifer wells API-2 and API-3. The parameter list varied by well but typically included nickel, cadmium or VOCs, or a combination of these parameters. Appendix F includes a summary of historical results by well. Figure 2 shows well locations. Note that figures in the 2011, 2012 and 2013 Annual Operating Reports show RW-4 in a different location than the 2014 Annual Operating Report.

Cadmium is the most prevalent COC in groundwater; cadmium exceeded its cleanup standard at least once in 9 of the 10 wells sampled during the past 5 years. Cadmium concentrations consistently exceeded cleanup goals in recovery wells RW-1 and RW-4 and in monitoring wells API-3, APS-5, APS-6 and APS-11. Time concentration graphs for RW-1 and RW-4 show that cadmium concentrations in these wells have been relatively consistent, with only minor fluctuations in concentration since the cap was installed in 1999 (Appendix F). The exception is a spike in 2013 in RW-1, when cadmium was detected at levels as high as 0.44 milligrams per liter (mg/L) (compared to the cleanup standard of 0.005 mg/L). The cause of the elevated concentrations is unknown, but cadmium levels in RW-1 have since returned to historical levels. Cadmium levels in API-3, APS-5 and APS-6 are generally higher during this FYR period than they were during the previous FYR. Concentrations in APS-11 are consistent with historic results.

Nickel concentrations exceeded the cleanup standard (0.1 mg/L) in five wells (RW-4, APS-5, APS-6, APS-7 and APS-11) during the FYR period, with the most consistent exceedances in APS-6. Nickel concentrations in APS-6 during this FYR period are higher than in the past. As shown in the time-concentration graph for APS-6, nickel concentrations are increasing in APS-6 (Appendix F).

RW-4 and APS-11 are the only wells to report VOC concentrations above cleanup standards during this FYR period. COCs above cleanup standards include PCE and its degradation products TCE, cis-1,2-DCE and vinyl chloride. Concentrations of these COCs in RW-4 have been relatively consistent since placement of the cap in 1999 (Appendix F). Data in the documents suggested that persistent RW-4 concentrations were related to source material remaining near RW-4, which is now under the concrete cap. In an effort to reach cleanup standards sooner, the PRP began a targeted biostimulation pilot study in September 2014 near RW-4. The study injected an emulsified oil substrate into the subsurface.

Preliminary pilot study results indicate that PCE and TCE concentrations in RW-4 decreased from September 2014 baseline concentrations during the three quarterly sampling events conducted after the injections. Concentrations appeared to rebound in September 2015, but were below detection limits and cleanup standards in December 2015. Cis-1,2-DCE and vinyl chloride concentrations increased after initial injections, which is expected as they are degradation products of PCE, but were below detection

limits in December 2015. Preliminary data show that the biostimulation injections may be effective at remediating VOCs at the Site; however, additional monitoring is necessary to determine if COC concentrations remain below cleanup levels over time.

Post-injection results at APS-11 were similar to RW-4 results immediately after the injections. However, elevated detections of VOCs and metals were detected in monitoring well APS-11 between September 2014 and December 2015, since the EOS injection. Both PCE and TCE concentrations were detected at historical highs at monitoring well APS-11 during the December 2015 sampling event. No explanations were provided in the Annual report for elevated detections of DCE, Cd and Ni at APS-11.

The causes of the PCE, TCE, DCE, Cd and Ni spikes are presently unknown, but could be associated in conjunction with the biostimulation pilot study and changes in the groundwater elevation at the Site coming into contact with an unidentified shallow to intermediate source zone located under the adjacent building's foundation. The detection of the analytical spikes in monitoring well APS-11 and not in recovery well RW-4 could be due to the completion depth of the wells. The EPA reviewed documentation on file for the Site and could not locate the well completion diagrams for wells RW-4 and APS-11. EPA is recommending that further investigations be conducted under the adjacent building's foundation area to confirm the location of the source zone(s). If vertical access through the buildings foundation for environmental monitoring can't be granted due to operational constraints, the EPA is recommending that horizontal directional drilling (HDD) and environmental measurement while drilling (EMWD) should be considered as a possible way of collecting soil samples from locations under the building's foundation from outside of the building. Soil samples collected from the HDD/EMWD can be retrieved with a split spoon sampler attachment. Also, the EPA is requesting that the PRP's consultant provide a complete set of well completion diagrams and supporting documentation for all wells currently in existence on Site to the SSS for review.

Groundwater Elevations
Groundwater potentiometric surface maps in the 2011 through 2014 Annual Operating Reports present varied groundwater flow directions at the Site. The 2011 and 2012 reports suggest groundwater in the shallow aquifer flows in a southeasterly direction, whereas the 2013 and 2014 reports suggest shallow groundwater flows to the northeast. In all cases, it is unclear if the recovery wells were operating during the elevation measurements. None of the shallow zone maps appear to show inward gradients toward the recovery wells. The extent of capture compared to target capture zones is unclear. Based on the variability in flow directions and uncertainty regarding capture zones, it is recommended that a capture zone analysis be conducted consistent with the EPA guidance to demonstrate that the current groundwater extraction and treatment system is capable of capturing and treating groundwater contamination that exceeds cleanup standards.[2]

6.5 Site Inspection

The site inspection was held on February 24, 2016. In attendance were Peter Thorpe, EPA RPM; Michael King of APC; and Treat Suomi and Sarah Alfano of Skeo Solutions. For a full list of site inspection activities, see the Site Inspection Checklist in Appendix D. For photographs of the Site, see Appendix E.

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[2] Methods for Monitoring Pump-and-Treat Performance (EPA/600/R-94/123, June 1994) and A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (EPA/600/R-08/003, January 2008).

The Site is in continued use by the PRP, APC, which incorporated the remedial components into its electroplating process by using treated groundwater during the rinsing processes. Site inspection participants toured the facility; the treatment system appeared to be in good condition. The lessee of the southern portion of the Site, Paradise Awnings, uses part of the cap as a work and staging area. The Site perimeter is fenced with secured gates and "no trespassing" signs on both owners' properties. APC's fence also has signs warning about guard dogs; guard dogs are on the property in the evenings.

Monitoring wells are secured within at least one fence. The monitoring well 8 cluster was not readily accessible, as they are located under a trailer. The concrete cap is in good condition with hairline cracks. The owner of Paradise Awnings met with site inspection participants and explained their plan to fix the cracks.

On February 24, 2016, Skeo staff visited the designated local site repository for the Site: John F. Kennedy Public Library, located at 190 West 49th Street in Hialeah, Florida. Site documents had not been filed yet but were in the library office. Library staff noted that the documents would be displayed for public viewing.

6.6 Interviews

The FYR process included interviews with parties affected by the Site, including the current landowners and regulatory agencies involved in Site activities or aware of the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. All of the interviews took place over email. The interviews are summarized below. Appendix C provides the complete interviews.

Peter Thorpe: Mr. Thorpe stated that the Site is well maintained, APC is taking steps to clean it up, and the biostimulation project implemented in 2014 is working well. The pump-and-treat system is also working well. The Site has had little to no effect on the surrounding community, and Mr. Thorpe is not aware of any community concerns regarding the Site. Mr. Thorpe stated that the future owner of the adjacent property is waiting to become the legal owner of the property before implementing institutional controls.

Kelsey Helton: Ms. Helton is the FDEP representative involved with the Site. Ms. Helton stated that FDEP is pleased to see the reuse of site property. Though the Site is in a delineated area and restrictive covenants are in place for most of the parcels to help mitigate exposure to contaminants, Ms. Helton noted that an additional restrictive covenant is needed for the rear parcel. Ms. Helton believes that persistent levels of contaminants suggest that source material remains beneath the caps and looks forward to future site evaluation, which she stated should include recommendations for future monitoring and remedy optimization. Ms. Helton is not aware of any site-related complaints nor any changes to state laws that might affect the protectiveness of the Site's remedy.

Michael King: Mr. King is the current owner of Airco Plating Co., the PRP. He commented that he believes the remedy is appropriate for the Site and that the pump-and-treat operation works well with production operations of his business. The remedy keeps contaminants hydraulically contained on site and is sensible from both a cost and maintenance standpoint, while also protecting human health and the environment. He noted that there have been no effects of the Site on the surrounding community and since the last FYR, institutional controls have been placed on the property limiting the property's future

uses. Mr. King remains pleased with the performance of the remedy and noted that APC increased the pumping rate of the groundwater remediation system since the last FYR.

Conestoga-Rovers & Associates: Conestoga-Rovers & Associates (CRA) is the O&M contractor for the PRP. They believe the remedy is effective and that O&M costs are reasonable. They commented that the pump-and-treat system works well in conjunction with the business operated at the Site and that bioremediation efforts initiated at the end of 2014 continue to address the organic compounds around RW-4. There have been a few unexpected maintenance issues in the last five years involving the feeding to the POTW and pumps servicing recovery wells RW-1 and RW-4. CRA noted that Miami-Dade County installed a gravity sewer to the east of the Site. This connection will eliminate the existing force main feeding the sewer, which will simplify operations, reduce maintenance costs, and facilitate increasing the volume of water APC remediates. CRA commented that APC handles most site O&M and an outside lab pursuant to an EPA-approved sampling plan performs quarterly and annual sampling.

7.0 Technical Assessment

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

The review of documents, ARARs, risk assumptions and the site inspection indicate that the Site's remedy has been implemented according to decision documents. Contaminated soils were treated with SVE and consolidated under a RCRA-type cap in September 1999. The groundwater treatment system is effectively removing VOCs from groundwater. All holding tank VOC results were below applicable discharge standards during this FYR period.

In an effort to achieve groundwater cleanup goals sooner, the PRP began a targeted biostimulation pilot study in September 2014 near RW-4. The study injected emulsified oil substrate into the subsurface. Preliminary data indicate the biostimulation injections may be effective at remediating VOCs at the Site; additional monitoring is necessary to determine if COC concentrations remain below cleanup levels over time.

Cadmium, nickel and chlorinated VOCs continue to exceed cleanup standards in groundwater. Cadmium levels in wells API-3, APS-5 and APS-6 are generally higher during this FYR period than during the previous FYR period. Concentrations in other wells are generally consistent with historic results. Nickel concentrations in well APS-6 are increasing. Exceedances of COCs in these wells should continue to be monitored and evaluated to ensure the remedy continues to function and is adequate to achieve cleanup goals. Additional research may be warranted to ensure that there are not continuing sources contributing to the elevated concentrations.

Further investigation is needed into monitoring well ASP-11 analytical results for VOCs (PCE, TCE,DCE) and metals (Cd and Ni). EPA recommends that the PRP conduct a follow-up groundwater sampling event to confirm that the analytical results from the December 2015 sampling event.

Groundwater flow directions at the Site are variable and the extent of capture by the recovery wells RW-1 and RW-4 has not been substantiated in the Annual Reports submitted to the EPA. A capture zone evaluation of both recovery wells, consistent with the EPA guidance[3], is recommended to determine

[3] Methods for Monitoring Pump-and-Treat Performance (EPA/600/R-94/123, June 1994) and A Systematic Approach for

how actual capture zones compare to target capture zones to determine how effective the groundwater extraction system is operating at the Site for hydraulic containment of the plume. Data collected will be used to determine if the recovery well system has hydraulic containment of the plume and that the plume is not migrating away from the Site. EPA is also recommending that all the recovery and monitoring wells be sampled in conjunction with the capture zone evaluation of both recovery wells to determine the groundwater conditions and hydraulic containment of the plume at the Site.

Decision documents call for groundwater institutional controls by restricting activities that are not compatible with the remedy. Institutional controls for groundwater are in place and restrict installation of groundwater wells and groundwater use in the plume area. Institutional controls to protect the cap and limit land use are also called for in decision documents and are in place around the APC facility. Additional institutional controls are needed to restrict uses that would disturb the integrity of the rear area cap. The lessee of the rear area cap property is working with the PRP and the EPA to ensure the integrity and continued maintenance of the cap. To ensure long-term protectiveness, the restrictive covenant under review for the rear area cap should be finalized and implemented.

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

The ARAR for chloroform has become more stringent since the 1993 ROD. Chloroform is being monitored in wells APS-2, APS-11, RW-1 and RW-4, where its concentrations are below the more stringent MCL. An ARAR for bis(2-ethylhexyl) phthalate was not available at the time of the 1993 ROD, but an MCL is now available. A cleanup goal for acetone may be selected once a regulatory standard for this COC is available.

A screening-level risk evaluation was conducted on the soil cleanup goals established in the 1993 ROD to determine if they remain valid (Appendix I). Although the cleanup goals for PCE and cadmium were based on protection of groundwater, they have been included in the human health-based risk evaluation to determine current protectiveness of the cleanup goals. The results of the evaluation demonstrate that the cleanup goals for all soil COCs except for chromium and cyanide remain valid in a non-residential setting. The carcinogenic risk estimate for chromium (2.1×10^{-4}) exceeds EPA's cancer risk management range of 1×10^{-6} to 1×10^{-4}. This risk estimate was based on toxicity data for hexavalent chromium, because the ROD did not identify the valence for the chromium cleanup goal. The hazard index (HI) for cyanide (4.95) exceeds EPA's threshold of 1 for noncancer effects. This hazard estimate was based on toxicity data for potassium cyanide in the absence of more specific information related to cyanide in the ROD. Historically, metal plating solutions have been known to include several types of cyanide.

During contaminated soil evaluations and the risk assessment, trivalent chromium was not distinguished from hexavalent chromium. The toxicity for hexavalent chromium is higher than the value used in the risk assessment (Table 8). If the chromium at the Site is hexavalent chromium, it could pose an unacceptable risk to human health and the environment. If the chromium is trivalent chromium, then no further assessment is necessary and the cleanup remains effective. Although there have been changes to toxicity criteria, the land use assumptions used in the 1993 ROD remain unchanged and the RAOs remain valid.

Evaluation of Capture Zones at Pump and Treat Systems (EPA/600/R-08/003, January 2008).

Table 8: Chromium Oral Reference Dose

COC	1993 ROD Baseline Risk Assessment Oral Reference Dose (mg/kg/day)	Current Oral Reference Dose (mg/kg/day)
Chromium	0.005	Trivalent Chromium: 1.5
		Hexavalent Chromium: 0.003

The 2008 FYR Addendum presented results of a preliminary screening for vapor intrusion to indoor air and concluded that vapor intrusion was not a concern. Since then, VOC concentrations in shallow well APS-11 have increased and the EPA issued new guidance for evaluating vapor intrusion. In light of these changes, this FYR re-evaluates the potential for vapor intrusion using the December 2015 groundwater data from APS-11 and recommendations from the EPA's recently-released guidance.

Results of this evaluation found the hypothetical cancer risk under a commercial use scenario is within the EPA's risk management range of 1×10^{-6} to 1×10^{-4}. The noncancer HI (9.5) exceeds the EPA's threshold of 1, primarily due to elevated concentrations of PCE and TCE. These data, along with the uncertainties in evaluating this pathway, result in EPA recommending that a vapor intrusion study be conducted promptly in accordance with EPA Guidance[4] in consultation with EPA staff to determine if vapor intrusions is a threat at the Site. (Appendix J).

The 2008 vapor intrusion evaluation concluded that business practices at APC indicated a well-ventilated work place, which will provide enough ventilation inside the buildings to address any potential risks associated with an on-site worker. Conditions during the site inspection verified that these ventilation practices are still occurring. However, after additional analysis is completed, enforceable institutional controls or other control mechanisms should be considered to ensure that current land use and workplace practices will be sustained and will remain protective.

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

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

7.4 Technical Assessment Summary

Site documents and the site inspection indicate that the Site's remedy has been implemented according to decision documents. Contaminated soils were treated and capped, and the groundwater treatment system effectively removes VOCs. In September 2014, the PRP began a targeted biostimulation pilot study near RW-4. Preliminary data indicate the biostimulation injections may help remediate VOCs at the Site; however, it is not clear if the technique will remain effective. Cadmium, nickel and chlorinated VOCs continue to exceed cleanup standards in groundwater. Concentrations of these VOCs are either increasing or remaining steady. A capture zone evaluation is recommended to demonstrate that the current groundwater extraction and treatment system is capable of capturing and treating groundwater contamination above cleanup standards.

[4] OSWER Technical Guide for Assessing and mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, OSWER 9200.2-154.

Site data indicate that the groundwater remedy may not have the capacity to reduce metal concentrations to cleanup levels. Future groundwater sampling should continue to assess whether the remedy has the capacity to meet MCLs for metals.

Additional institutional controls are needed to restrict uses that would disturb the integrity of the rear area cap. In the interim, the lessee of the rear area cap property is working with the PRP and the EPA to ensure the integrity and continued maintenance of the cap.

The ARAR for chloroform has become more stringent since the 1993 ROD; chloroform is below the more stringent MCL in site groundwater. An ARAR for bis(2-ethylhexyl) phthalate was not available at the time of the 1993 ROD, but an MCL is now available and the COC should be added to sampling plans.

During contaminated soil evaluations and the risk assessment, trivalent chromium was not distinguished from hexavalent chromium. If chromium at the Site is hexavalent, it could pose an unacceptable risk to human health and the environment.

VOC concentrations in shallow well APS-11 have increased and the EPA issued new guidance for evaluating vapor intrusion,[5] but the hypothetical cancer risk is under a commercial use scenario. However, the noncancer HI (9.5) exceeds EPA's threshold of 1, primarily due to elevated concentrations of PCE and TCE. The APC facility is well ventilated, which reduces potential vapor intrusion risks for on-site workers. Due to historical use of TCE at the Site, 1,4-dioxane may be present at the Site. 1,4-dioxane has been identified by the EPA as an emerging COC, but investigations have not analyzed groundwater for this compound.

[5] EPA's Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, June 2015

8.0 Issues, Recommendations and Follow-up Actions

Table 9: Issues and Recommendations Identified in the Five-Year Review

OU(s): 1	Issue Category: Remedy Performance			
	Issue: Groundwater flow directions at the Site are variable and the extent of capture by the recovery wells is unclear.			
	Recommendation: Complete a capture zone evaluation to determine how actual capture zones compare to target capture zones to demonstrate that the current groundwater extraction and treatment system is capable of capturing and treating groundwater contamination that exceeds cleanup standards.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

OU(s): 1	Issue Category: Changed Site Conditions			
	Issue: Early remedial work at the Site did not distinguish between trivalent chromium and hexavalent chromium, but the toxicity for hexavalent chromium is higher than what was used in the risk assessment.			
	Recommendation: Determine whether there was hexavalent or trivalent chromium on site and determine whether additional remedial action is necessary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

OU(s): 1	Issue Category: Institutional Controls			
	Issue: Institutional controls are needed to restrict uses that would disturb the integrity of the rear area cap.			
	Recommendation: Finalize and implement the draft restrictive covenant for the rear area property upon receiving approval from the EPA and FDEP.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

OU(s): 1	Issue Category: Remedy Performance			
	Issue: PCE and TCE concentrations exceed the VISL in shallow well APS-11 and the EPA issued new guidance for evaluating vapor intrusion.			
	Recommendation: Further evaluate the vapor intrusion pathway for current PCE and TCE concentrations with multiple lines of evidence.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	09/30/2018

The following additional items, though not expected to affect protectiveness, warrant additional follow-up:

- The groundwater remedy may not have the capacity to reduce metal concentrations to cleanup levels. Future sampling should continue to assess whether the groundwater remedy has the capacity to meet MCLs for metals.
- Determine which type of cyanide historically impacted the site soils. If potassium cyanide impacted site soils, additional evaluation to determine any additional remedial action may be required.
- Figures in the 2011, 2012 and 2013 Annual Operating Reports show RW-4 in a different location than the 2014 Annual Operating Report. This discrepancy should be clarified in future reports.

9.0 Protectiveness Statements

Table 10: Protectiveness Statements

Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	*Addendum Due Date (if applicable):* *Not Applicable*
Protectiveness Statement: The Site remedy currently protects human health and the environment in the short term because source control remediation has been completed, the groundwater treatment system operates at the Site and there are no complete exposure pathways. However, in order for the remedy to be protective in the long term, a capture zone evaluation should be completed, the type of chromium at the Site should be determined, vapor intrusion risks should be further evaluated, the EPA should determine whether the selected remedy can reduce metal concentrations to cleanup goals, groundwater sampling should monitor bis(2-ethylhexyl) phthalate concentrations, and additional institutional controls should be implemented.	

10.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

Airco Operation and Maintenance Plan, January 1996, A. L. Simons Consultants, Inc.

Annual Operating Report 2010: Airco Plating NPL Site for the Airco Plating Company. March 2011.

Annual Operating Report 2011: Airco Plating NPL Site for the Airco Plating Company. May 2012.

Annual Operating Report 2012: Airco Plating NPL Site for the Airco Plating Company. May 2013.

Annual Operating Report 2013: Airco Plating NPL Site for EPA Region 4. April 2014.

Annual Operating Report 2014: Airco Plating NPL Site for EPA Region 4. March 2015.

Biostimulation Treatability Study Work Plan-Airco Plating NPL Site. May 2014.

EPA Region IV Unilateral Administrative Order for Remedial Design and Remedial Action. September 1994.

EPA Superfund Preliminary Close-Out Report. September 15, 1999.

EPA Superfund Record of Decision: Airco Plating Company, Inc. Miami, Miami-Dade County FL. October 1993.

Feasibility Study for Airco Plating NPL Site. Blasland Bouck and Lee, May 1993.

Operations and Maintenance Plan Airco Plating Company, Inc., A. L. Simmons Consultants, Inc. January 1996.

Post-Biostimulation Monitoring Report- Airco Plating NPL Site. Conestoga-Rovers & Associates. May 2015.

Preliminary Design for Airco Plating Company, Inc., Clark Engineers-Scientists, Inc. October 1994.

Proposed 2016 Sampling Schedule. February 2016.

Remedial Design (RD) Work Plan for Airco Plating Company, Inc., Clark Engineers-Scientists, Inc. October 1994.

Remedial Investigation, Airco Plating NPL Site Miami, Florida, Volume I and Volume II, December 1992, M. P. Brown & Associates, Inc. Consulting Hydrogeologists, Geologists and Engineers.

Soil Cap Remedial Action Report Airco Plating Company, Inc., A.L. Simmons Consultants, Inc. September 1999.

Superfund Five-Year Review Addendum Airco Plating Co. Inc. Miami, Miami-Dade County Florida. September 2008.

Superfund Five-Year Review Report Airco Plating Co. Inc. Miami, Miami-Dade County Florida. September 2001.

Superfund Five-Year Review Report Airco Plating Co. Inc. Miami, Miami-Dade County Florida. September 2006.

Superfund Five-Year Review Report Airco Plating Co. Inc. Miami, Miami-Dade County Florida. September 2011.

Written agreement between Airco Plating Co., Inc and BRB Cabinets USA allowing Airco to access BRB Cabinets USA property for maintenance and sampling operations. February 2012.

EPA Office of Emergency and Remedial Response. Comprehensive Five-Year Review Guidance (OSWER No. 9355.7-03B-P). June 2001.

Appendix B: Press Notice

SunSentinel FPG FORUM PUBLISHING GROUP

Product(s): Sun Sentinel, Affidavit, Floridapublicnotices.com, Classified.ss.com_Legal
AdSize(s): 1 Column,
Run Date(s): Thursday, September 08, 2016
Color Spec. B/W

Preview

THE U. S. ENVIRONMENTAL PROTECTION AGENCY, REGION 4 ANNOUNCES THE FOURTH FIVE-YEAR REVIEW FOR THE AIRCO PLATING CO. SUPERFUND SITE, MIAMI, MIAMI-DADE COUNTY, FLORIDA

Purpose/Objective: The U.S. Environmental Protection Agency (EPA) is conducting the fourth Five-Year Review of the remedy for the Airco Plating Co. Superfund site (the Site) in Miami, Florida. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect human health and the environment.

Site Background: The 2-acre Site has been home to the Airco Plating Co. (APC) electroplating shop since 1957. The APC facility plates steel, copper, brass with zinc, cadmium, copper, nickel and tin. The electroplating process uses cyanide, acids and caustic compounds and operators used tetrachloroethene (PCE) as a cleaning fluid for parts prior to plating. Until 1973, operators disposed of wastes from plating operations, including sludge, in three on-site seepage ponds. In the early 1990s, investigators detected metals, cyanide, PCE and trichloroethene in site soils and elevated levels of cadmium and volatile organic compounds in shallow and deep groundwater. EPA began conducting site investigations in July 1985 and proposed the Site to the National Priorities List (NPL) in June 1988. EPA listed the Site on the Superfund program's National Priorities List (NPL) in February 1990. Contaminants of concern at the Site included metals, cyanide and PCE in site soils as well as PCE and cadmium in site groundwater.

Cleanup Actions: EPA designated one operable unit (OU) to address the Site's soil and groundwater contamination. EPA selected the Site's final remedy in the Site's October 1993 Record of Decision (ROD). It included soil vapor extraction (SVE) of organic compounds, installation

of a reinforced concrete cap, institutional controls to preserve the integrity of the remedy, extraction of contaminated groundwater with subsequent treatment by air stripping, discharge of treated water to the local publicly owned treatment works, analysis of air emissions from the air stripping tower and SVE system, and an evaluation of the need for treatment of inorganic compounds in groundwater. Air stripping systems and the SVE system were installed during the spring of 1995. The concrete cap was put in place in 1999. After significant decreases in vapor emission contaminant concentrations, the SVE system ceased operation in June 1999. Construction of the remedy finished in September 1999. Since then, periodic monitoring and sampling has continued to ensure that the Site's remedy is functioning properly

Five-Year Review Schedule: The National Contingency Plan requires review of remedial actions resulting in any hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure every five years to ensure the protection of human health and the environment. The fourth of the Five-Year Reviews for the Site will be completed by September 2016.

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

Peter Thorpe, Remedial Project Manager
Phone: 404-562-9688
Email: thorpe.peter@epa.gov

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

Mailing Address: EPA Region 4, 61 Forsyth St. S.W., Atlanta, GA 30303-8960

Additional information is also available at

the Site's document repository, located at John F. Kennedy Memorial Library, 190 West 49th Street, Hialeah, Florida 33012-3712, or online at https://cumulis.epa.gov/supercpad/CurSites/csitinfo.cfm?id=0400561&msspp=med.
9/8/2016

Appendix C: Interview Forms

Airco Plating Co. Superfund Site **Five-Year Review Interview Form**

Site Name: Airco Plating Co. **EPA ID No.:** FLD004145140
Interviewer Name: Sarah Alfano **Affiliation:** Skeo Solutions
Subject Name: Pete Thorpe **Affiliation:** EPA
Subject Contact Information: Thorpe.Peter@epa.gov
Time: N/A **Date:** 03/23/2016
Interview Location: N/A

Interview Format (circle one): In Person Phone (E-Mail) Other:

Interview Category: EPA Remedial Project Manager

1. What is your overall impression of the project; including cleanup, maintenance, and reuse activities (as appropriate)?
   The site is well maintained. The property owner of Airco Plating is taking steps to clean up the site and being aggressive with the biostimulation project.

2. What have been the effects of this Site on the surrounding community, if any?
   Very little effects to the surrounding community. Most of the people I talk to don't seem to think the site has any effect on the community.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?
   None

4. What is your assessment of the current performance of the remedy in place at the Site?
   The biostimulation that was used last year seems to working well. The pump-and-treat system is working well and has few O&M issues.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?
   The adjacent future property owner knows institutional controls need to be placed on the property. He is waiting to become the legal owner of the property before he implements the institutional controls.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.
   None

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   None

Airco Plating Co. Superfund Site **Five-Year Review Interview Form**

Site Name: Airco Plating Co. **EPA ID No.:** FLD004145140
Interviewer Name: **Affiliation:** EPA
Subject Name: Kelsey Helton **Affiliation:** FDEP
Time: _____ **Date:** 08/15/2016

Interview Format (circle one): In Person Phone Mail Other: Email

Interview Category: State Agency

1. What is your overall impression of the project; including cleanup, maintenance, and reuse activities (as appropriate)? Construction of the site remedy, including installation of the caps and pump and treat system, has been completed and O&M is underway. We are pleased to see ongoing re-use of the property.

2. What is your assessment of the current performance of the remedy in place at the Site? The cap is mitigating direct contact, however, the persistent levels of cadmium and nickel in groundwater above remedial goals suggests that source material remains beneath the cap(s). We are pleased to see that steps are being taken to increase the pumping rate and days of operation of the groundwater remedial system. We look forward to completion of the recommended capture zone evaluation and implementation of the resulting optimization of the groundwater recovery system to ensure effective capture of the metals plume. We agree that insitu bioremediation looks promising for treatment of chlorinated solvents in site groundwater.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years? No, not to the best of my knowledge.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities. Site related activities have consisted primarily of DEP review of O&M and monitoring reports.

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

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues? The site is located in a Florida designated delineated area and restrictive covenants (RC) are on the majority of site parcels. These instruments should ensure appropriate land use, cap maintenance and mitigate exposure to groundwater. A restrictive covenant has not been executed on the rear parcel and is necessary to similarly ensure appropriate land use, maintenance of the cap on that parcel and appropriate management of soil or groundwater brought to the surface. We understand that EPA is working with the lessee/prospective purchaser of the rear parcel to fix the cracks in the cap and that the same party is amenable to implementation of a RC.

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

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy? We strongly support the proposed capture evaluation to determine where improvements can be made to ensure that the recovery well system is adequately capturing the plume. We recommend the evaluation include recommendations for monitoring to document the performance of the system and progress of groundwater remediation. Site monitoring wells should be repaired and properly secured, where needed. As noted in the FYR and supported by monitoring data to date, the presence of source material below the cap(s) will likely hamper the progress of groundwater cleanup.

Airco Plating Co. Superfund Site **Five-Year Review Interview Form**

Site Name: Airco Plating Co. **EPA ID No.:** FLD004145140
Interviewer Name: Sarah Alfano **Affiliation:** Skeo Solutions
Subject Name: Michael King **Affiliation:** Airco Plating Co.
Time: N/A **Date:** 04/11/2016
Interview Location: N/A

Interview Format (circle one): In Person Phone (E-Mail) Other:

Interview Category: **Potentially Responsible Parties (PRPs)**

1. What is your overall impression of the remedial activities at the Site?
   I think the remedy remains very appropriate for the site. The pump-and-treat operation works in concert with the production operations of our business and the remedy has performed very well in keeping contaminants hydraulically contained on the site. The remedy is sensible from both a cost and maintenance standpoint and remains protective of human health and the environment.

2. What have been the effects of this Site on the surrounding community, if any?
   There have been no effects of the Site on the surrounding community. The contaminants are contained well within the site boundaries. There are no on-site or off-site receptors or exposure pathways. The area is almost exclusively industrial and commercial. Since the prior five-year review, institutional controls (deed restrictions) have been place on the property limiting the property's future uses, which will provide an additional long term safeguard for the area.

3. What is your assessment of the current performance of the remedy in place at the Site?
   I remain pleased with the performance of the remedy at the site. It is a slower, long-term remedy but with our on-site operations a faster pace is not needed. I believe we have made progress with the few remaining organics above MCLs in and around RW-4 with the bio-stimulation project performed in Q4 of 2014. Our 2016 sampling plan continues with additional sampling for VOCs in RW-4 and APS-11 to better evaluate if additional bioremediation injections should be considered. The prior five-year review noted spikes in metals, particularly nickel recorded in APS-11. These spikes have not continued. In the twelve samples taken since December 2012 in APS-11, only two had nickel results over MCLs, and these results were an order of magnitude lower than the spikes recorded between 2009 and 2011. In the last couple of years, progress has been made with issues arising out of a change in ownership of the small parcel of land making up the southernmost portion of the site. Since the last five-year review, efforts made to increase the quantity of water remediated have been very effective. In years 2011 – 2015, an average of 6,000,000 gallons of water was pumped annually, verses an average of 2,700,000 gallons pumped annually over the preceding five-year period (2006 – 2010). Additional progress in this area is likely.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   There have not been any complaints from any residents or neighboring businesses regarding environmental issues or the remedial action.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   I work closely with the RPM, Peter Thorpe. We have what I regard as an excellent working relationship. I feel well informed about site.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   We have a great advantage in the management of the remedy given that we are onsite every work day operating our business at the site. This allows us to recognize and address maintenance problems very quickly. We remain committed to the operation of the remedy and are fully committed to its continued success.

Airco Plating Co. Superfund Site		Five-Year Review Interview Form	
Site Name:	Airco Plating Co.	**EPA ID No.:**	FLD004145140
Interviewer Name:	Sarah Alfano	**Affiliation:**	Skeo Solutions
Subject Name:	Conestoga-Rovers & Associates	**Affiliation:**	Conestoga-Rovers & Associates.
Subject Contact Information:	NA		
Time:	N/A	**Date:**	04/15/2016
Interview Location:	N/A		

Interview Format (circle one): In Person Phone (E-Mail) Other:

Interview Category: O&M Contractor

1. What is your overall impression of the project; including cleanup, maintenance, and reuse activities (as appropriate)?
   The remedy is effective and its ongoing O&M costs are reasonable. The pump-and-treat system works well in conjunction with the business operated at the site as the extracted groundwater is used in production activities. The mechanics of the system are relatively trouble free.

2. What is your assessment of the current performance of the remedy in place at the Site?
   Groundwater results continue to progress favorably; the groundwater remediation system is working. Bio-remediation efforts initiated in Q4 of 2014 are addressing the few lingering organic compounds in and around RW-4 with the need for additional bio-stimulation being considered. Efforts to significantly increase the volume of water remediated at the site in recent years has been effective with additional volume increases likely. These higher pump rates should speed up the pace of the remediation. Site contaminants are hydraulically contained and there are no on- or off-site receptors or exposure pathways present.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?
   As mentioned above, the bio-stimulation program has reduced the only organic compounds present at the site (in and around RW-4) with results in March and December of 2015 below MCLs for all VOCs of concern for the first time at the Site. As for metals, both recovery wells have seen significant reductions in cadmium concentration in recent years. Average readings in RW-1 and RW-4 for the years 2006-2010 were 0.043 mg/L and .0115 mg/L respectively, verses average readings of .0115 mg/L and .054 mg/L respectively in the eight samples taken in 2014-2015, representing respective cadmium reductions of 73.3 percent and 32.5 percent. Nickel is below MCLs in samples taken from both recovery wells. Samples from monitoring wells APS-2, API-2, APS-7 and API-9 remain below MCLs for cadmium and nickel with the exception of a slight cadmium exceedance averaging 0.0076 mg/L over the last five years for APS-7. Over the last four years, monitoring well API-3 has recorded average cadmium levels of .0266 mg/L, which is slightly above MCLs with RW-1 within 10 feet or so of API-3 and screened at a similar intermediate depth with readings below MCLs for cadmium. Cadmium has been found in samples from shallow monitoring wells APS-5 and APS-6 over the past five years with average readings of 0.069 mg/L and 0.1115 mg/L, respectively. Nickel has been detected over its MCL in APS-6, averaging 0.345 mg/L. These exceedences are isolated in contrast with the findings in neighboring downgradient wells APS-2 and API-2, which are below MCLs for both metals. In sum, trends at the site are

favorable with respect to organic contamination and improving for metals, although metals are not that mobile in a limestone aquifer environment, and, in any event, are contained on site presenting no risk since there are no receptors.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.
The O&M of the site is primarily handled by the personnel of APC. APC is on site generally 6 days per week with personnel assigned to monitor the water treatment operations verifying that the primary equipment in the groundwater recovery systems is performing properly and remain in good operating condition. Routine equipment maintenance is performed on site on an as needed basis. Quarterly and annual sampling is performed by an outside lab firm pursuant to an EPA-approved sampling plan.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.
The O&M requirements of the site have not changed much through the years. Pumps, check valves, cap conditions, and the like are checked on a regular basis as has been the case for years. Modifications to the sampling plan are suggested from time to time to adjust to changing site conditions. These changes are discussed with the RPM, Peter Thorpe, as they are being made. For example, we have added to sampling requirements in and around RW-4 to better gauge the success of the Q4, 2014 biostimulation project and to evaluate if additional bio-remediation injections should be considered. In early 2012, production wells began running 24 hours per day, five days per week, dramatically increasing the quantity of water remediated annually. Such changes made to the operations of the site are designed to enhance the protectiveness and effectiveness of the remedy.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details. The system runs smoothly with unexpected maintenance issues coming up from time to time. During the 2013 and 2014 calendar years, the force main feeding the POTW became partially constricted requiring a contractor to clear blockages to maintain groundwater pump rates. Occasional constrictions of naturally occurring iron have been encountered on both the suction and discharge side of pumps servicing recovery wells RW-1 and RW-4. These maintenance issues have been minor in nature with relatively minor impact to site maintenance costs.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies. A gravity sewer has been installed by Miami-Dade County immediately east of the site. Airco has produced engineering drawings to hook up into the new sewer line. This connection will eliminate our existing force main feeding the sewer which will simplify operations, reduce maintenance costs, and facilitate increasing the volume of water APC remediates by changing the recovery well pump schedule from 24 hours, 5 days per week to 24 hours, 7 days per week.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

Remedial activities run efficiently with the advantage of having personnel on site daily preforming oversight and O&M functions. The execution of the remedy further benefits from the strong working relationship established between APC and the site RPM.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site name: Airco Plating Co.	**Date of inspection: 02/24/2016**
Location and Region: Miami, FL, Region 4	**EPA ID: FLD004145140**
Agency, office, or company leading the five-year review: EPA	**Weather/temperature: moderate and sunny 80° F**

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other _____
- ☐ Monitored natural attenuation
- ☒ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Conestoga-Rovers & Associates (Name) 04/15/2016 (Date)

Interviewed ☐ at site ☐ at office ☐ by phone
Problems, suggestions; ☒ Report attached see Appendix C for emailed form

2. **O&M staff** _____ (Name) _____ (Title) mm/dd/yyyy (Date)

Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency EPA, Region 4
Contact Peter Thorpe (Name) RPM (Title) 03/23/2016 (Date) (404) 562-9688 (Phone No.)
Problems; suggestions; ☒ Report attached see Appendix C

Agency Florida Department of Environmental Protection
Contact Name Kelsey Helton (Name) Environmental Specialist (Title) 08/15/2016 (Date)
Problems; suggestions; ☒ Report attached see Appendix C

4. **Other interviews** (optional) ☐ Report attached

Agency Paradise Awnings
Contact Manny Alcibar (Name) _____ (Title) 02/24/2016 (Date) 786-488-8304 (Phone No.)
Problems; suggestions; ☐ Report attached EPA staff and Skeo staff met with Manny Alcibar at Paradise Awnings to check in and explain the FYR process. Mr. Alcibar did not have any concerns and provided information on the progress of acquiring the property and regular cap maintenance.

Agency APC

Contact Name Michael King | President (Title) | 04/11/2016 (Date)

Problems; suggestions; ☒ Report attached see Appendix C for emailed form

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	**O&M Documents**			
☒	O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☐	As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☒	Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☒ Up to date	☐ N/A
☒	Contingency plan/emergency response plan	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
3.	**O&M and OSHA Training Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
4.	**Permits and Service Agreements**			
☐	Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐	Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☒	Waste disposal, POTW	☒ Readily available	☒ Up to date	☐ N/A
☐	Other permits _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: Permit No: PSO-000682-2015/2016 (PVT) -PVT			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
☐	Air	☐ Readily available	☐ Up to date	☒ N/A
☐	Water (effluent)	☒ Readily available	☐ Up to date	☐ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State

☒ PRP in-house ☒ Contractor for PRP

☐ Federal Facility in-house ☐ Contractor for Federal Facility

☐ _____

2. **O&M Cost Records**

☒ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate $1,900,000 ☐ Breakdown attached

Total annual cost by year for review period if available

From 01/2011 Date	To 01/2012 Date	$11,600	☐ Breakdown attached
From 01/2012 Date	To 01/2013 Date	$11,300	☐ Breakdown attached
From 01/2013 Date	To 01/2014 Date	$9,100	☐ Breakdown attached
From 01/2014 Date	To 01/2015 Date	$34,700 (includes biostimulation)	☐ Breakdown attached
From 01/2015 Date	To 01/2016 Date	$17,500	☐ Breakdown attached

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

Describe costs and reasons: _____.

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

A. Fencing

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

Remarks: _____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: Airco fencing features "no trespassing" signs and guard dog warning signs

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

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

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

Type of monitoring (e.g., self-reporting, drive by) Daily use and subsequent inspection by workers

Frequency daily

Responsible party/agency Airco Plating Co.

Michael King	President of Airco Plating Co. Inc.	02/02/2011	(305) 633-2476
Contact Name	Title	Date	Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

Remarks: See Section 6.5

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

Remarks: _____

D. General

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

Remarks: _____

2. **Land use changes on site** ☐ N/A

Remarks: An awnings company is using the cap for awning assembly and other operations.

3. **Land use changes off site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. Roads damaged ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

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

Arial extent _____ Depth _____

Remarks: _____

2. **Cracks**	☐ Location shown on site map	☒ Cracking not evident
Lengths _____	Widths _____	Depths _____
Remarks: Minor normal wear and tear is addressed through O&M.		
3. **Erosion**	☐ Location shown on site map	☒ Erosion not evident
Arial extent _____		Depth _____
Remarks: _____		
4. **Holes**	☐ Location shown on site map	☒ Holes not evident
Arial extent _____		Depth _____
Remarks: _____		
5. **Vegetative Cover**	☐ Grass	☐ Cover properly established
☐ No signs of stress	☐ Trees/Shrubs (indicate size and locations on a diagram)	
Remarks: _____		
6. **Alternative Cover** (armored rock, concrete, etc.)		☐ N/A
Remarks: Concrete cap is intact.		
7. **Bulges**	☐ Location shown on site map	☒ Bulges not evident
Arial extent _____		Height _____
Remarks: _____		
8. **Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
☐ Wet areas	☐ Location shown on site map	Arial extent _____
☐ Ponding	☐ Location shown on site map	Arial extent _____
☐ Seeps	☐ Location shown on site map	Arial extent _____
☐ Soft subgrade	☐ Location shown on site map	Arial extent _____
Remarks: _____		
9. **Slope Instability**	☐ Slides	☐ Location shown on site map
☒ No evidence of slope instability		
Arial extent _____		
Remarks: _____		
B. Benches	☐ Applicable	☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1. **Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
Remarks: _____		
2. **Bench Breached**	☐ Location shown on site map	☐ N/A or okay
Remarks: _____		
3. **Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
Remarks: _____		

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement

Arial extent _____ Depth _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type_____ Arial extent _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Arial extent _____ Depth _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Arial extent _____ Depth _____

Remarks: _____

5. **Obstructions** Type _____ ☐ No obstructions

☐ Location shown on site map Arial extent _____

Size _____

Remarks: _____

6. **Excessive Vegetative Growth** Type _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Arial extent _____

Remarks: _____

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

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

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A

Remarks: _____

2. **Gas Monitoring Probes**

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

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

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

☐ Evidence of leakage at penetration ☒ Needs Maintenance ☐ N/A

Remarks: Some monitoring wells had broken caps and were not properly secured.

4. **Extraction Wells Leachate**

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

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A

Remarks: _____

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

Remarks: _____

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

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks: _____

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

☐ Good condition ☐ Needs Maintenance

Remarks: _____

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

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

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

Remarks: _____

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

Remarks: _____

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

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

☐ Siltation not evident

Remarks: _____

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

☐ Erosion not evident

Remarks: _____

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

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

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

Horizontal displacement _____ Vertical displacement _____

Rotational displacement _____

Remarks: _____

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

Remarks: _____

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

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

Area extent _____ Depth _____

Remarks: _____

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

☐ Vegetation does not impede flow

Area extent _____ Type _____

Remarks: _____

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

Area extent _____ Depth _____

Remarks: _____

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

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

Area extent _____ Depth _____

Remarks: _____

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

☐ Performance not monitored

Frequency _____ ☐ Evidence of breaching

Head differential _____

Remarks: _____

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

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

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

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

Remarks: _____

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

☒ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

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

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

☐ Good condition ☐ Needs Maintenance

Remarks: _____

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

☐ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

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

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☒ Air stripping ☐ Carbon adsorbers

☐ Filters _____

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

☐ Others _____

☒ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☒ Quantity of groundwater treated annually 2,068,600 gallons

☐ Quantity of surface water treated annually _____

Remarks: _____

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

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks: _____

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

☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemical and equipment properly stored

Remarks: _____

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

☐ Properly secured/locked ☒ Functioning ☒ Routinely s mpled ☐ Good condition

☐ All required wells located ☒ Needs Maintenance ☐ N/A

Remarks: Located a monitoring well that was not previously on the site map. Two wells were unsecured and required maintenance.

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring data suggests:**

☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

☐ All required wells located ☐ Needs Maintenance ☒ N/A

Remarks: _____

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

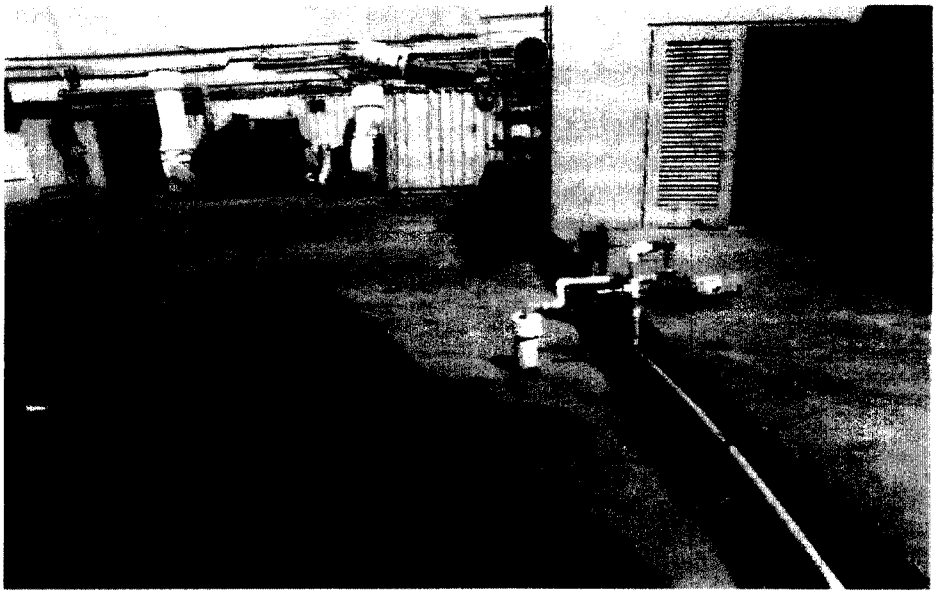
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy was designed to contain contaminated groundwater on site for treatment. Extracted groundwater is treated by air stripping and a concrete cap was installed to prevent exposure to soil contamination and reduce infiltration. The cap is in place and functioning as intended. The groundwater monitoring results indicated that the remedy may not achieve cleanup goals, so APC implemented a biostimulation pilot study. Though effective for VOCs, some contaminants, particularly metals, remain at concentrations above site cleanup goals and indicate that the remedy may not work in the long term.

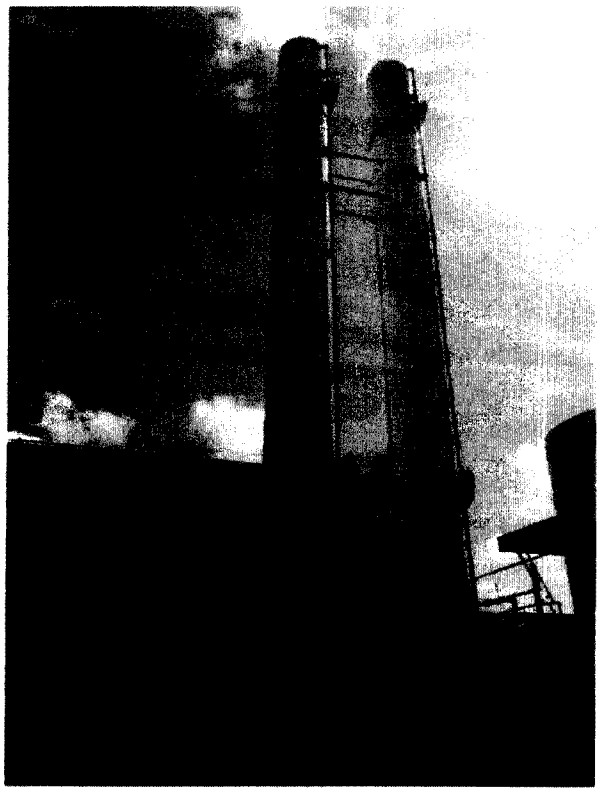
B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. O&M for this site continues to keep the cap well maintained and the recovery/monitoring wells and air strippers are in working condition, secure and well documented.
C. Early Indicators of Potential Remedy Problems
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. A change in land use and land users on the southern portion of the Site has occurred since the last FYR. The new lessee has expressed interest in working cooperatively with the EPA to keep the capped rear area in reuse. The lessee is amenable to a restrictive covenant and is currently trying to purchase the property from the owner (who previously refused to sign a restrictive covenant).
D. Opportunities for Optimization
Continue to evaluate the impact biostimulation technologies at the Site.

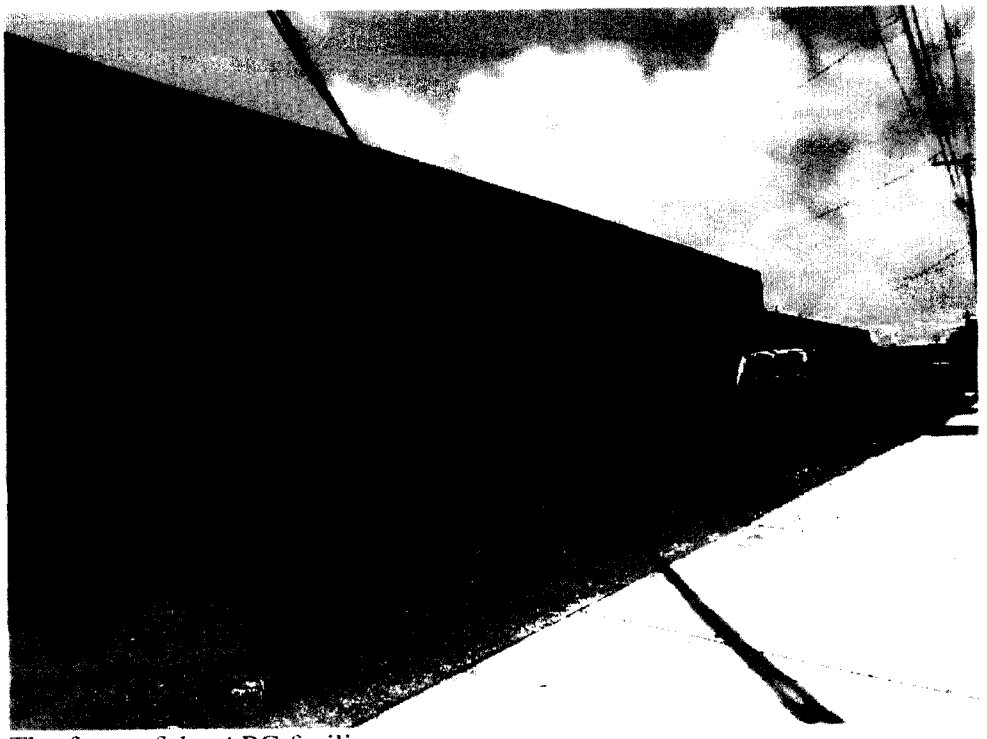
Appendix E: Photographs from Site Inspection Visit



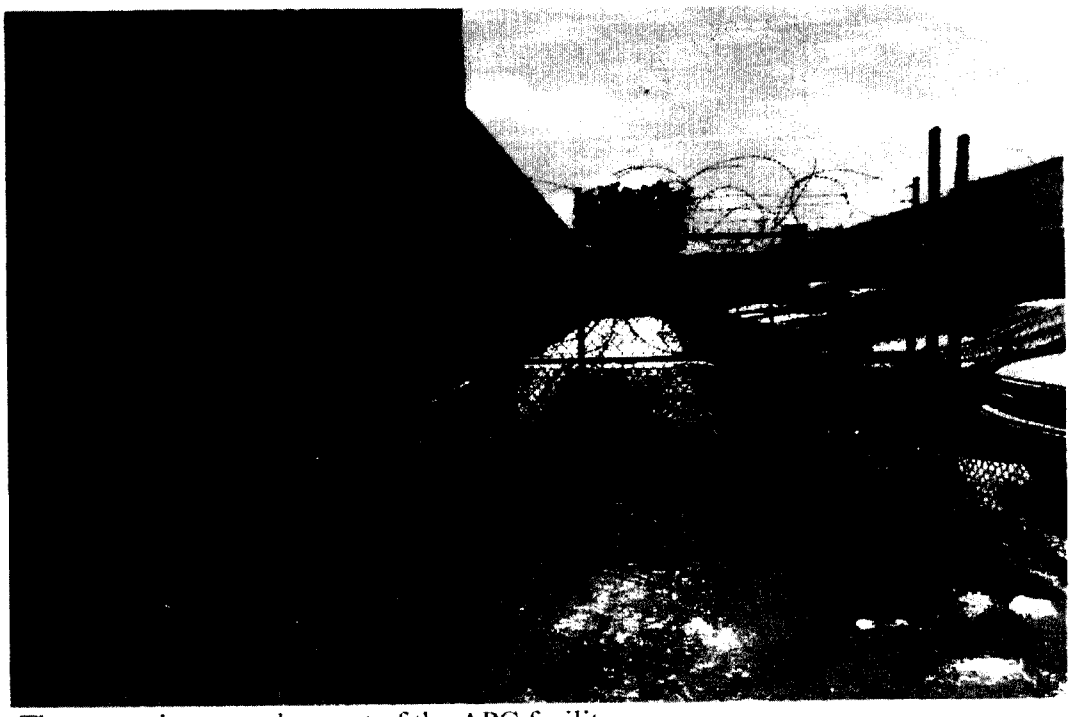
RW-4 and biostimulation injection points at the APC plant.



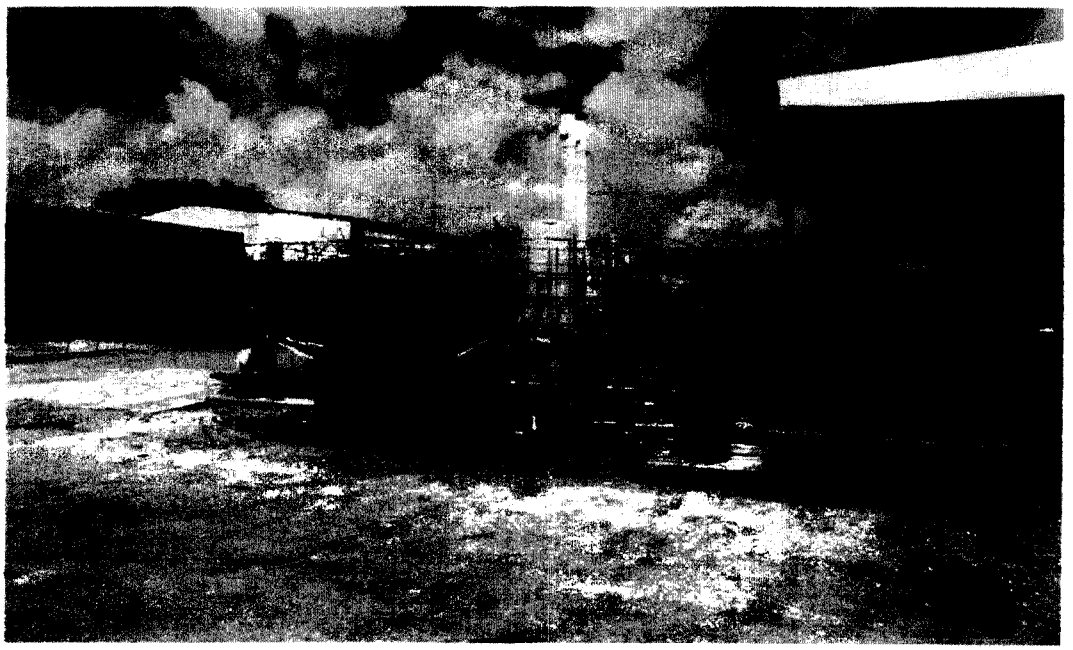
Vapor effluent towers on the Site.



The front of the APC facility.



The capped area to the west of the APC facility.



A view of the Site and Paradise Awning operations.

The Paradise Awnings office, adjacent to the Site.

Perimeter fencing and guard dogs in the evening help keep the Site secure.

Monitoring well cluster APS-8, APD-8 and API-8 under a mobile trailer.

Appendix F: Data Review Figures and Data

Figure F-1: Cadmium in RW-1 and RW-4

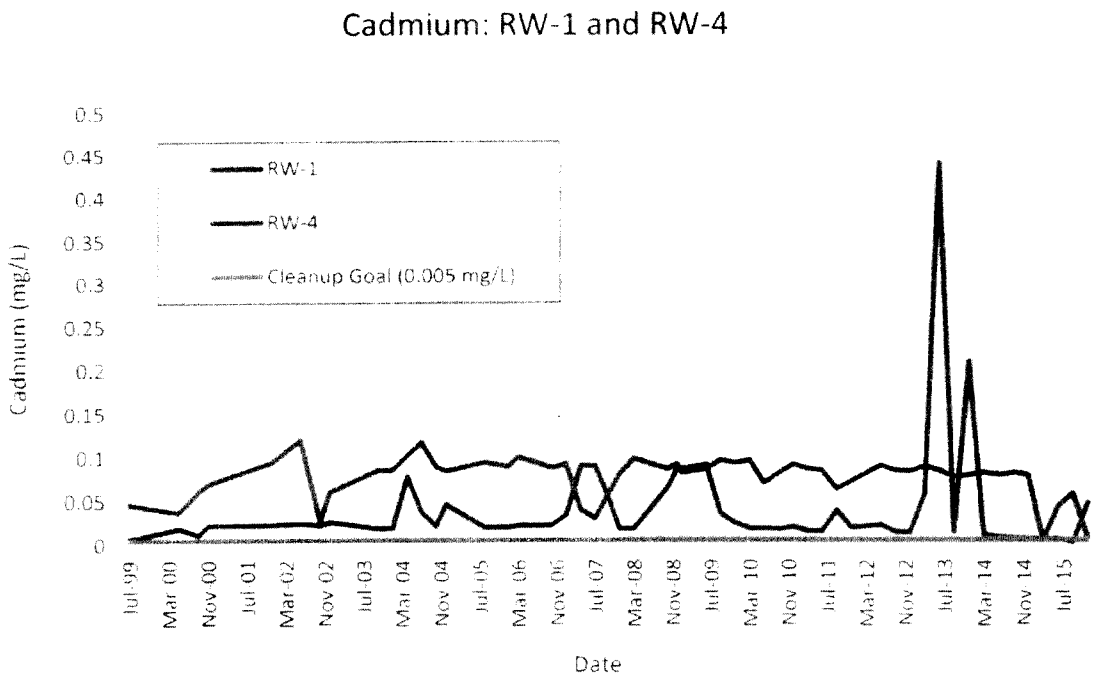


Figure F-2: Nickel in APS-6

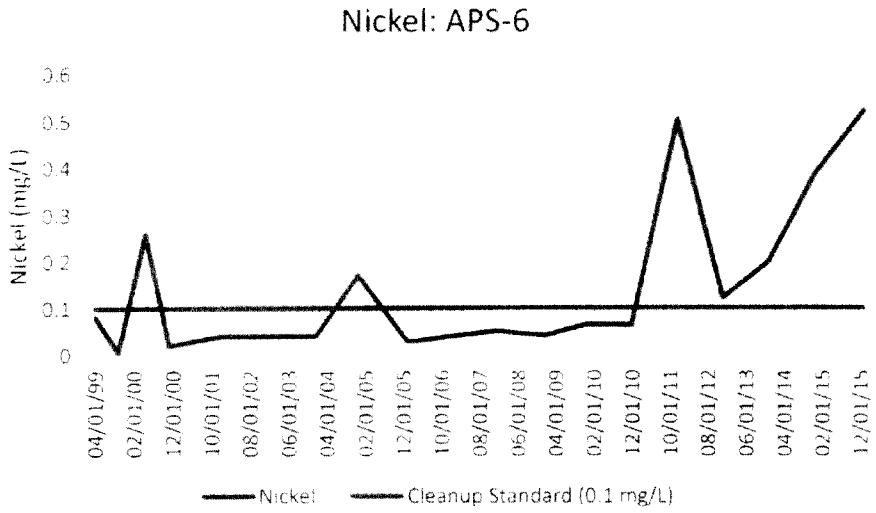


Figure F-3: VOCs in RW-4

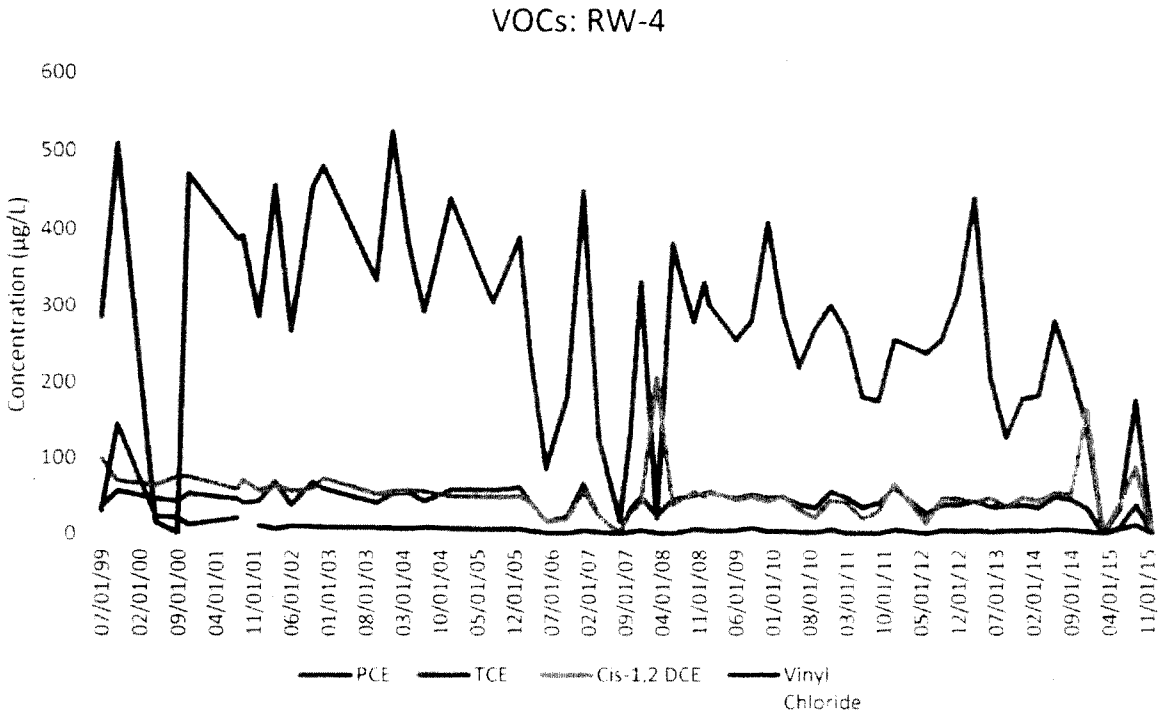


Table F-1: Historical Data Tables

Table 4a. Historical Groundwater Treatment
Recovery Well RW-1 Influent
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
05/09/95	—	—	1.7	—	—	—	4.33	—	—	0.007	0.021	0.008	—	0.06
06/28/95	—	—	—	—	6.3	—	—	—	—	0.005	—	—	0.025	0.02
02/14/96	—	100	—	—	—	—	—	—	—	0.007	0.01	—	0.005	0.04
01/03/97	—	—	—	—	4.28	—	—	—	0.006	0.011	—	—	—	—
07/03/97	—	—	1.9	—	3.1	2.54	—	—	—	—	—	—	0.024	0.06
10/30/97	—	1.13	—	—	—	—	—	—	—	—	—	0.013	—	0.08
01/29/98	—	—	—	—	—	—	—	—	—	—	—	—	0.018	0.11
04/29/98	—	—	—	—	—	—	—	—	—	—	—	—	0.027	0.11
07/31/98	—	—	—	—	—	—	1.06	—	0.007	—	—	—	0.025	0.08
10/30/98	—	—	—	—	—	—	—	—	0.006	—	—	—	0.01	0.11
02/03/99	—	—	—	—	—	—	—	—	0.013	—	0.023	—	0.019	0.09
04/28/99	—	—	—	—	—	—	—	—	—	—	0.008	—	0.019	0.11
07/29/99	—	—	—	—	—	—	—	0.005	0.007	0.006	—	—	0.017	—
10/27/99	—	—	—	—	—	—	—	—	0.02	—	0.005	—	0.014	0.091
05/17/00	—	—	2.86	—	12.5	1.55	—	0.005	0.019	0.015	—	—	0.015	0.123
09/14/00	—	—	—	—	—	—	—	—	0.011	—	—	—	0.02	0.058
11/20/00	—	—	—	—	7.8	—	—	—	0.022	0.02	—	—	0.028	0.093
12/18/01	—	—	—	—	—	—	—	—	0.023	—	—	—	0.015	0.1
03/12/02	—	—	—	—	—	—	—	—	0.019	—	—	—	0.009	0.074
06/06/02	—	—	—	—	—	—	—	—	0.024	—	—	—	—	0.1
10/16/02	—	—	—	—	—	—	—	—	0.022	—	—	—	—	0.1
12/16/02	—	—	—	—	—	—	—	—	0.026	—	—	—	0.014	0.1
10/03/03	—	—	—	—	—	—	—	—	0.018	0.037	0.005	—	0.033	0.096
01/06/04	—	—	—	—	—	—	—	—	0.019	—	—	—	0.016	—
04/09/04	NA	NA	NA	NA	NA	NA	NA	NA	0.078	NA	NA	NA	0.043	NA
07/20/04	NA	NA	NA	NA	NA	NA	NA	NA	0.037	NA	NA	NA	0.028	NA
10/15/04	NA	NA	NA	NA	NA	NA	NA	NA	0.021	NA	NA	NA	0.016	NA
12/29/04	NA	NA	NA	NA	NA	NA	NA	NA	0.046	NA	NA	NA	0.030	NA
08/02/05	NA	NA	NA	NA	NA	NA	NA	NA	0.020	NA	NA	NA	0.017	NA
11/02/05	NA	NA	NA	NA	NA	NA	NA	NA	0.021	NA	NA	NA	0.017	NA
01/12/06	NA	NA	NA	NA	NA	NA	NA	NA	0.020	NA	NA	NA	0.018	NA
03/29/06	NA	NA	NA	NA	NA	NA	NA	NA	0.022	NA	NA	NA	0.016	NA
10/23/06	NA	NA	NA	NA	NA	NA	NA	NA	0.022	NA	NA	NA	0.016	NA
01/18/07	NA	NA	NA	NA	NA	NA	NA	NA	0.034	NA	NA	NA	0.016	NA
04/17/07	NA	NA	NA	NA	NA	NA	NA	NA	0.09	NA	NA	NA	0.04	NA
07/20/07	NA	NA	NA	NA	NA	NA	NA	NA	0.09	NA	NA	NA	0.06	NA
10/02/07	NA	NA	NA	NA	NA	NA	NA	NA	0.05	NA	NA	NA	0.06	NA
12/21/07	NA	NA	NA	NA	NA	NA	NA	NA	0.018	NA	NA	NA	0.011	NA
03/04/08	NA	NA	NA	NA	NA	NA	NA	NA	0.018	NA	NA	NA	0.025	NA
10/16/08	NA	NA	NA	NA	NA	NA	NA	NA	0.065	NA	NA	NA	0.033	NA
12/03/08	NA	NA	NA	NA	NA	NA	NA	NA	0.087	NA	NA	NA	0.041	NA
01/07/09	NA	NA	NA	NA	NA	NA	NA	NA	0.087	NA	NA	NA	0.047	NA
06/03/09	NA	NA	NA	NA	NA	NA	NA	NA	0.091	NA	NA	NA	0.041	NA
09/04/09	NA	NA	NA	NA	NA	NA	NA	NA	0.035	NA	NA	NA	0.023	NA
12/11/09	NA	NA	NA	NA	NA	NA	NA	NA	0.024	NA	NA	NA	0.020	NA
03/08/10	NA	NA	NA	NA	NA	NA	NA	NA	0.018	NA	NA	NA	0.013	NA
06/07/10	NA	NA	NA	NA	NA	NA	NA	NA	0.018	NA	NA	NA	0.012	NA
09/03/10	NA	NA	NA	NA	NA	NA	NA	NA	0.017	NA	NA	NA	0.011	NA
12/03/10	NA	NA	NA	NA	NA	NA	NA	NA	0.020	NA	NA	NA	0.011	NA
03/02/11	NA	NA	NA	NA	NA	NA	NA	NA	0.015	NA	NA	NA	0.017	NA
06/03/11	NA	NA	NA	NA	NA	NA	NA	NA	0.015	NA	NA	NA	0.013	NA
09/12/11	NA	NA	NA	NA	NA	NA	NA	NA	0.039	NA	NA	NA	0.024	NA
12/08/11	NA	NA	NA	NA	NA	NA	NA	NA	0.019	NA	NA	NA	0.014	NA
06/05/12	NA	NA	NA	NA	NA	NA	NA	NA	0.022	NA	NA	NA	0.024	NA
09/14/12	NA	NA	NA	NA	NA	NA	NA	NA	0.014	NA	NA	NA	0.011	NA
12/04/12	NA	NA	NA	NA	NA	NA	NA	NA	0.013	NA	NA	NA	0.010	NA
03/06/13	NA	NA	NA	NA	NA	NA	NA	NA	0.057	NA	NA	NA	0.012	NA
04/05/13	<0.077	<0.107	<0.213	<0.059	<0.084	<0.050	<0.084	NA	NA	NA	NA	NA	NA	NA
06/10/13	NA	NA	NA	NA	NA	NA	NA	NA	0.44	NA	NA	NA	0.047	NA
09/12/13	NA	NA	NA	NA	NA	NA	NA	NA	0.014	NA	NA	NA	0.014	NA
12/05/13	NA	NA	NA	NA	NA	NA	NA	NA	0.209	NA	NA	NA	0.016	NA
03/05/14	NA	NA	NA	NA	NA	NA	NA	NA	0.0110	NA	NA	NA	0.0130	NA
06/03/14	NA	NA	NA	NA	NA	NA	NA	NA	0.00770	NA	NA	NA	0.0110	NA
09/15/14	<0.077	<0.107	<0.213	<0.059	<0.084	<0.050	<0.084	NA	0.00700	NA	NA	NA	0.0130	NA
12/09/14	<0.0770	<0.107	<0.213	<0.0590	<0.0840	<0.0500	<0.0840	NA	0.00600	NA	NA	NA	0.0100	NA
03/18/15	-	-	-	-	-	-	-	NA	0.00555	NA	NA	NA	0.0119	NA
06/02/15	-	-	-	-	-	-	-	NA	0.00599	NA	NA	NA	0.0104	NA
09/11/15	4.71	U (0.107)	U (0.213)	0.0590	U (0.0840)	U (0.0500)	U (0.0840)	NA	0.00190	NA	NA	NA	0.0008	NA
12/01/15	-	-	-	-	-	-	-	NA	0.0470	NA	NA	NA	0.0287	NA
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.187	7.8	0.5	0.7	0.38	6.8

Notes:
— = Below Detection Limit
NA = Parameter Not Analyzed
NDS = No Discharge Standard
( ) - indicates that the concentration detected is greater than the method detection limit and less than the practical quantitation limit, therefore the concentration can not be quantified

Table 4b. Historical Groundwater Treatment
Recovery Well RW-2 Influent
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
03/08/95	1.3	—	—	—	—	—	—	—	0.095	0.024	0.044	—	—	0.052
06/28/95	—	—	—	—	—	—	—	—	0.097	0.158	0.156	0.011	0.179	1014
02/14/96	100	—	10.1	—	34.5	15.6	—	—	—	—	0.01	—	—	0.23
01/03/97	—	—	3.31	—	10	4.87	—	—	0.045	0.007	—	—	—	—
07/03/97	—	—	1.62	—	9.57	3.1	—	—	0.037	0.01	0.02	—	0.015	0.14
10/30/97	—	—	1.4	—	3.13	—	—	—	—	0.005	—	0.012	—	0.17
01/29/98	—	—	—	—	3.5	—	—	—	0.021	—	0.01	—	0.013	0.22
04/29/98	—	—	—	—	—	—	—	—	0.02	0.006	0.02	—	0.022	0.22
07/31/98	—	—	—	—	—	—	—	—	0.016	—	0.01	—	0.019	0.15
10/30/98	—	—	—	—	—	—	—	—	0.019	0.005	0.023	—	—	0.17
02/03/99	—	—	—	—	—	—	—	0.004	0.022	0.007	0.036	—	0.014	0.1
04/28/99	—	—	1.25	—	2.81	2.38	—	—	0.015	—	0.025	—	0.015	0.16
07/29/99	—	1.3	2.57	—	—	1.18	—	—	0.019	0.011	—	—	0.014	0.13
10/27/99	—	—	—	—	—	—	—	—	0.062	0.043	0.044	—	0.018	0.228
05/17/00	—	—	2.18	—	1.68	3.62	—	—	0.019	0.015	—	—	0.017	0.137
09/14/00	—	—	—	—	—	1.23	—	—	—	0.022	0.03	—	0.023	0.137
11/30/00	—	—	2.54	—	—	—	—	—	0.02	0.017	—	—	0.026	0.12
03/12/01	—	—	1.84	—	—	—	—	—	0.031	—	0.01	—	—	0.162
08/28/01	—	—	—	—	—	—	—	—	0.018	0.022	0.04	—	0.023	0.139
09/27/01	—	—	—	—	—	—	—	—	—	—	0.03	—	—	0.19
12/18/01	—	—	—	—	—	—	—	—	0.046	0.011	0.02	—	0.022	0.21
03/12/02	—	—	—	—	1.3	1	—	—	—	0.011	0.04	—	0.019	0.204
06/06/02	—	—	1.95	—	—	2	—	—	0.041	0.015	0.02	—	—	0.15
10/16/02	—	—	1.08	—	1.19	1.23	—	—	0.014	0.005	0.02	—	—	.024
12/16/02	—	—	—	—	—	—	—	—	0.056	0.017	—	—	0.021	.022
10/03/03	—	—	—	—	—	—	—	—	0.048	0.029	0.044	—	0.036	0.307
01/06/04	—	—	—	—	—	—	—	0.027	0.043	0.006	0.030	—	0.026	—
04/06/04	NA	NA	NA	NA	NA	NA	NA	NA	.061	NA	NA	NA	.040	NA
07/20/04	NA	NA	NA	NA	NA	NA	NA	NA	.048	NA	NA	NA	.032	NA
10/15/04	NA	NA	NA	NA	NA	NA	NA	NA	.068	NA	NA	NA	.049	NA
12/29/04	NA	NA	NA	NA	NA	NA	NA	NA	.020	NA	NA	NA	.016	NA
2005	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.187	7.6	0.5	0.7	0.39	6.8

Notes:
— = Below Detection Limit
NA = Parameter Not Analyzed
NDS = No Discharge Standard
* = Well abandoned due to infiltration of fine sand

Table 4c. Historical Groundwater Treatment
Recovery Well RW-4 Influent (RW-4 replaced RW-3 in April 1996)
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
05/09/95	16	—	—	—	409	—	48.9	0.014	0.233	0.01	0.096	0.017	—	1.58
06/28/95	10.6	—	—	9.43	2330	478	116	0.1	0.157	0.088	0.229	—	0.15	0.78
02/14/96	100	2.7	178	1.73	3483	109	28.3	—	0.06	—	0.07	—	0.12	0.47
01/03/97	—	17.8	143	—	3921	123	8.29	0.008	0.099	0.047	—	—	—	—
07/03/97	—	14.7	—	2.02	3010	167	33.4	0.08	0.09	0.137	0.09	—	0.072	0.22
10/30/97	—	17	121	—	2080	91.4	25.4	—	0.049	0.065	0.07	0.013	0.078	0.19
01/29/98	—	23.7	101	3.6	2060	80.9	39.2	0.038	0.04	0.022	0.06	—	0.04	0.22
04/28/98	—	3.52	106	—	719	67.3	7.69	—	0.048	0.094	0.07	—	0.06	0.23
07/31/98	—	9.41	108	—	692	57.8	27.6	0.057	0.034	0.029	0.07	—	0.041	0.15
10/30/98	—	2.96	45.3	—	621	18.6	9.06	0.046	0.055	0.16	0.074	—	0.049	0.19
02/03/99	—	7.3	—	2.47	488	41	32.3	0.037	0.054	0.031	0.08	—	0.034	0.2
04/28/99	—	4052	82.9	1.51	824	61.7	22.9	—	0.061	0.022	0.06	—	0.033	0.17
07/29/99	—	7.77	99.8	2.22	284	35	30.2	0.019	0.046	0.078	0.07	—	0.036	0.21
10/27/99	—	3.64	70.6	1.02	510	57.2	144.4	—	—	0.023	0.054	—	0.031	0.208
05/17/00	—	3.24	84.8	1.09	15.8	47.1	23.5	0.011	0.037	0.023	—	—	0.023	0.166
08/14/00	—	2.38	76.5	—	2.18	43.3	21.7	0.025	0.06	0.042	0.05	—	0.032	0.127
11/30/00	—	—	78.4	—	471	53.9	13	—	0.069	0.064	—	—	0.039	0.119
03/12/01	—	—	—	—	—	—	—	0.007	0.086	—	0.01	—	—	0.158
08/28/01	—	2.39	59.3	1.41	388	46.4	21.2	—	0.053	0.036	0.04	—	0.041	0.125
09/27/01	—	3.88	72	1.81	392	41.4	—	—	0.077	—	0.02	—	—	0.16
12/18/01	—	4.12	57.8	1.03	285	43.8	11.5	—	0.084	0.013	0.02	—	0.042	0.17
03/12/02	—	1.6	64.7	—	467	69.7	6.76	0.004	—	0.016	0.02	—	0.03	0.172
06/06/02	—	2.88	57.4	—	268	38	11.1	0.029	0.12	0.037	0.02	—	—	0.18
10/16/02	—	2.42	60.5	1.56	455	69.2	9.93	0.03	0.026	0.042	0.05	—	—	0.22
12/16/02	—	3.31	74.3	1.47	481	60	9.26	0.015	0.06	0.013	—	—	0.034	0.17
10/03/03	1.36	2.20	53.3	—	335	41.2	8.51	0.009	0.085	0.031	0.020	—	0.053	0.254
01/06/04	—	2.48	57.5	—	526	53.9	8.17	NA	0.085	0.011	0.026	—	0.046	—
04/08/04	—	2.67	58.2	1.21	384	55.2	7.62	NA	0.102	NA	NA	NA	0.049	NA
07/20/04	—	1.94	56.5	—	282	43.3	9.15	NA	0.117	NA	NA	NA	0.054	NA
10/15/04	NA	NA	NA	NA	NA	NA	NA	NA	0.089	NA	NA	NA	.0046	NA
12/29/04	—	2.0	50.0	—	440	59	7.2	NA	0.084	NA	NA	NA	0.045	NA
06/02/05	—	2.9	48.0	1.3	305	58	6.5	NA	0.094	NA	NA	NA	0.047	NA
01/12/06	0.55	2.0	50.0	0.89	380	62	6.6	NA	0.089	NA	NA	NA	0.049	NA
03/29/06	0.39	1.6	42	0.58	240	43	4.6	NA	0.10	NA	NA	NA	0.055	NA
06/30/06	—	0.93i	16	0.35i	86	17	1.7	NA	0.053	NA	NA	NA	0.032	NA
10/23/06	—	0.66i	20	0.33i	180	23	1.3	NA	0.088	NA	NA	NA	0.045	NA
01/18/07	1.5	1.8	57	0.88	450	67	5.0	NA	0.092	NA	NA	NA	0.052	NA
04/17/07	<0.80	<0.50	24.1	<0.52	126	23.7	2.48	NA	0.04	NA	NA	NA	0.02	NA
07/20/07	NA	NA	NA	NA	NA	NA	NA	NA	0.03	NA	NA	NA	0.02	NA
08/08/07	<0.80	<0.50	<0.11	<0.52	17.4	1.06	<0.34	NA	NA	NA	NA	NA	NA	NA
10/02/07	<0.80	<0.50	28.8	<0.52	133	33.6	3.30	NA	0.06	NA	NA	NA	0.06	NA
12/21/07	<0.80	1.19 i	41.8	<0.52	333	49.8	5.36	NA	0.080	NA	NA	NA	0.052	NA
03/04/08	<0.80	1.00 i	206	<0.52	20.5	24.3	1.71	NA	0.098	NA	NA	NA	0.047	NA
06/03/08	<0.46	<0.95	39.1	<0.77	382	45.4	<0.77	NA	0.084	NA	NA	NA	0.037	NA
10/16/08	1.47	1.75 i	56.3	1.03 i	277	51.3	6.59	NA	0.086	NA	NA	NA	0.047	NA
12/03/08	<0.46	2.67 i	48.8	1.06 i	332	54.1	5.80	NA	0.092	NA	NA	NA	0.043	NA
01/07/09	1.80	2.00 i	56.9	<0.77	301	54.4	4.19	NA	0.082	NA	NA	NA	0.041	NA
06/03/09	2.33	2.99	45.5	1.49	254	47.6	5.43	NA	0.086	NA	NA	NA	0.042	NA
09/04/09	1.84	1.70	49.9	0.870 i	279	52.4	8.00	NA	0.096	NA	NA	NA	0.046	NA
12/11/09	1.4 i	1.7	43.0	0.71 i	410	48.0	3.9	NA	0.093	NA	NA	NA	0.036	NA
03/08/10	<0.27	2.06	51.0	<0.19	287	49.9	4.28	NA	0.096	NA	NA	NA	0.042	NA
06/07/10	0.90	1.76	31.8	0.70 i	219	39.0	2.89	NA	0.070	NA	NA	NA	0.033	NA
09/03/10	0.41 i	1.72	21.4	<0.19	288	34.5	2.71	NA	0.081	NA	NA	NA	0.040	NA

Table 4c. Historical Groundwater Treatment
Recovery Well RW-4 Influent (RW-4 replaced RW-3 in April 1996)
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
12/03/10	<0.27	2.21	43.7	<0.19	300	56.2	6.21	NA	0.097	NA	NA	NA	0.042	NA
03/02/11	<0.27	2.48	41.1	1.04 i	283	48.1	<0.79	NA	0.088	NA	NA	NA	0.040	NA
06/03/11	<0.27	1.04	19.8	<0.42	190	35.0	<0.79	NA	0.084	NA	NA	NA	0.037	NA
09/12/11	<0.27	0.76	28.8	0.91 i	175	41.4	0.91 i	NA	0.063	NA	NA	NA	0.031	NA
12/06/11	<0.27	4.09	67.00	1.8	256	61.8	5.86	NA	0.072	NA	NA	NA	0.036	NA
06/06/12	<0.27	0.66	13.60	0.72	237	28.1	<0.48	NA	0.060	NA	NA	NA	0.039	NA

Table 4c. Historical Groundwater Treatment
Recovery Well RW-4 Influent (RW-4 replaced RW-3 in April 1996)
Arco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
09/14/12	2.11	2.72	47.3	<0.06	266	38.8	6.14	NA	0.084	NA	NA	NA	0.040	NA
12/04/12	<0.077	1.49	47	<0.0580	315	38.2	5.82	NA	0.065	NA	NA	NA	0.041	NA
03/06/13	<0.077	1.76	42	0.63	441	43.3	4.72	NA	0.089	NA	NA	NA	0.038	NA
06/10/13	3.77	1.34	47.8	0.7	206	35.3	3.99	NA	0.094	NA	NA	NA	0.041	NA
09/13/13	13.8	1.9	38	0.88	128	38.3	4.11	NA	0.077	NA	NA	NA	0.038	NA
12/06/13	18	1	48.3	0.48	178	37.3	4.34	NA	0.079	NA	NA	NA	0.040	NA
03/06/14	13.4	0.470	43.4	0.410	182	34.2	3.78	NA	0.0820	NA	NA	NA	0.0410	NA
06/03/14	8.77	0.820	54.8	0.530	278	48.6	5.84	NA	0.0780	NA	NA	NA	0.0430	NA
09/15/14	6.08	1.11	51.8	0.47	216	44.4	5.10	NA	0.0820	NA	NA	NA	0.0420	NA
12/08/14	2.37	<0.107	185	< 0.0580	139	32.8	3.08	NA	0.0780	NA	NA	NA	0.110	NA
03/16/15	U (0.0770)	U (0.107)	U (0.213)	U (0.0580)	0.580	U (0.0500)	U (0.0840)	NA	0.00428	NA	NA	NA	0.0113	NA
06/02/15	4.32	1.02	38.6	0.980	31.6	8.40	6.34	NA	0.0429	NA	NA	NA	0.0283	NA
09/11/15	6.1	1.34	47.7	U (0.110)	176	37.2	11.2	NA	0.0684	NA	NA	NA	0.0396	NA
12/01/15	U (0.0770)	U (0.107)	U (0.213)	U (0.0580)	U (0.0840)	U (0.0500)	U (0.0840)	NA	0.00728	NA	NA	NA	0.0111	NA
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.197	7.8	0.5	0.7	0.39	6.8

Notes:
-- = Below Detection Limit
NA = Parameter Not Analyzed
NDS = No Discharge Standard Supervised

Table 4d. Historical Groundwater Treatment
Monitoring Well API-2
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
08/14/91	—	—	—	—	—	—	—	—	0.009	0.059	0.029	—	0.012	0.117
05/09/95	—	—	—	—	—	—	—	NA	—	0.018	0.001	0.008	NA	NA
02/14/96	—	100	9.88	—	25.1	14.5	—	—	—	0.006	0.006	—	0.009	0.04
01/03/97	—	—	4.93	—	22.5	7.94	—	—	—	—	—	—	—	—
07/30/97	—	—	1.48	—	—	1.36	—	—	—	—	—	—	0.006	—
10/30/97	—	—	1.9	—	—	1.52	—	—	—	—	—	0.012	0.019	—
04/29/98	—	—	—	—	—	—	—	—	—	—	—	—	—	0.08
10/30/98	—	—	5.82	—	—	7.43	—	—	—	—	—	—	0.014	0.04
04/29/99	—	—	1.56	—	—	4.37	—	0.035	—	—	0.004	—	0.017	—
10/27/99	—	—	—	—	—	—	—	—	—	—	—	—	0.006	—
05/17/00	—	—	3.02	—	2.98	3.95	—	—	—	—	—	—	0.008	—
11/30/00	—	—	—	—	—	—	—	—	—	—	—	—	0.005	0.025
12/18/01	—	—	—	—	—	—	—	—	—	—	—	—	0.006	0.02
12/16/02	—	—	—	—	—	—	—	—	—	0.014	—	—	0.045	0.27
01/09/04	—	—	6.63	1.28	—	1.31	—	—	—	—	—	—	0.017	0.037
01/30/06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.011	NA
12/22/06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0060	NA
01/29/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.006	NA
01/07/09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005	NA
12/11/09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.039	NA
12/15/10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.012	NA
12/08/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.065	NA
12/04/12	NA	NA	NA	NA	NA	NA	NA	NA	0.008	NA	NA	NA	0.007	NA
12/06/13	NA	NA	NA	NA	NA	NA	NA	NA	0.0004	NA	NA	NA	0.012	NA
01/21/15	NA	NA	NA	NA	NA	NA	NA	NA	0.00310	NA	NA	NA	NA	NA
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.187	7.6	0.5	0.7	0.39	6.8

Notes:

— = Below Detection Limit *NA = Parameter Not Analyzed*

NDS = No Discharge Standard

i - indicates that the concentration detected is greater than the method detection limit and less than the practical quantitation limit

Table 4e. Historical Groundwater Treatment
Monitoring Well API-3
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
08/15/91	—	—	6	—	110	4.3	—	—	0.045	0.034	—	—	0.052	0.21
02/14/96	—	—	—	—	—	—	—	—	0.052	0.007	0.02	—	0.039	0.24
01/03/97	—	100	2.73	—	13.1	3.96	—	—	0.039	0.012	—	—	—	—
07/30/97	—	—	4.34	—	15.3	5.28	—	—	0.042	—	—	—	0.052	0.24
10/30/97	—	—	—	—	—	—	—	—	0.022	—	—	0.012	0.057	0.18
04/29/98	—	—	—	—	—	—	—	—	0.022	0.006	0.04	—	0.026	0.15
10/30/98	—	—	—	—	—	—	—	—	0.019	—	—	—	0.019	0.12
04/28/99	—	—	—	—	—	—	—	—	0.095	0.012	0.063	0.013	0.012	0.2
10/27/99	—	—	—	—	—	—	—	—	0.017	—	0.015	—	0.01	0.055
05/17/00	—	—	—	—	—	—	—	—	0.015	—	—	—	0.016	0.08
11/30/00	—	—	—	—	—	—	—	—	0.013	0.007	—	—	0.019	0.07
12/18/01	NA	NA	NA	NA	NA	NA	NA	—	0.018	—	—	—	0.018	0.09
12/16/02	NA	NA	NA	NA	NA	NA	NA	—	0.016	—	—	—	0.019	0.07
01/09/04	NA	NA	NA	NA	NA	NA	NA	—	0.015	—	—	—	0.028	0.062
12/29/04	NA	NA	NA	NA	NA	NA	NA	NA	—	NA	NA	NA	.01	NA
01/12/06	NA	NA	NA	NA	NA	NA	NA	NA	—	NA	NA	NA	0.0066	NA
12/22/06	NA	NA	NA	NA	NA	NA	NA	NA	0.0018i	NA	NA	NA	0.0065	NA
12/21/07	NA	NA	NA	NA	NA	NA	NA	NA	0.011	NA	NA	NA	0.012	NA
01/07/09	NA	NA	NA	NA	NA	NA	NA	NA	0.006	NA	NA	NA	0.012	NA
12/11/09	NA	NA	NA	NA	NA	NA	NA	NA	0.0008	NA	NA	NA	0.0053	NA
12/20/10	NA	NA	NA	NA	NA	NA	NA	NA	0.077	NA	NA	NA	0.031	NA
12/08/11	NA	NA	NA	NA	NA	NA	NA	NA	0.106	NA	NA	NA	0.037	NA
12/04/12	NA	NA	NA	NA	NA	NA	NA	NA	0.037	NA	NA	NA	0.028	NA
12/06/13	NA	NA	NA	NA	NA	NA	NA	NA	0.027	NA	NA	NA	0.013	NA
12/09/14	NA	NA	NA	NA	NA	NA	NA	NA	0.0220	NA	NA	NA	0.0120	NA
12/30/15	NA	NA	NA	NA	NA	NA	NA	NA	0.0203	NA	NA	NA	0.0142	NA
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.187	7.6	0.5	0.7	0.39	6.8

Notes:
— = Below Detection Limit NA = Not Analyzed
NDS = No Discharge Standard
i - Indicates that the concentration detected is greater than the method detection limit and less than the practical quantitation limit, therefore the concentration can not be quantified

Table 4f. Historical Groundwater Treatment
Monitoring Well APS-5
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
08/15/91	—	—	—	—	—	—	—	—	0.051	0.046	0.048	—	—	0.32
05/09/95	—	—	—	—	—	—	—	—	0.047	0.02	NA	—	NA	NA
02/14/96	—	100	12.2	—	14.7	10.7	—	—	0.065	0.037	0.006	—	0.017	0.17
01/03/97	—	—	—	—	1.79	—	—	—	0.061	0.235	—	0.005	—	—
07/30/97	—	—	—	—	—	—	—	—	0.012	—	—	—	—	—
10/30/97	—	—	1.25	—	—	—	—	—	0.013	—	—	0.012	0.012	—
04/29/98	—	—	—	—	—	—	—	—	0.037	0.096	0.04	—	—	0.47
10/30/98	—	—	2.32	—	—	—	—	—	0.005	—	—	—	—	0.04
04/28/99	—	—	1.85	—	3.64	3.26	—	—	0.007	—	0.018	—	0.005	—
10/27/99	—	—	—	—	2.02	—	—	—	0.018	0.06	0.027	—	0.011	0.128
05/17/00	—	—	5.18	—	5.94	7.08	—	—	0.013	0.009	—	—	—	0.04
11/30/00	—	—	—	—	—	—	—	—	0.012	0.023	—	—	0.014	0.068
12/18/01	—	—	—	—	—	—	—	—	0.015	0.005	—	—	0.008	0.03
12/16/02	—	—	—	—	—	—	—	—	0.015	0.012	—	—	0.011	0.06
01/09/04	—	—	—	—	—	—	—	—	0.011	—	—	—	0.006	0.031
12/29/04	NA	NA	NA	NA	NA	NA	NA	NA	0.011	NA	NA	NA	0.0079	NA
01/12/06	NA	NA	NA	NA	NA	NA	NA	NA	0.019	NA	NA	NA	0.021	NA
03/29/06	NA	NA	NA	NA	NA	NA	NA	NA	0.015	NA	NA	NA	0.017	NA
12/22/06	NA	NA	NA	NA	NA	NA	NA	NA	0.017	NA	NA	NA	0.022	NA
12/21/07	NA	NA	NA	NA	NA	NA	NA	NA	0.015	NA	NA	NA	0.02	NA
01/07/09	NA	NA	NA	NA	NA	NA	NA	NA	0.02	NA	NA	NA	0.02	NA
12/11/09	NA	NA	NA	NA	NA	NA	NA	NA	0.056	NA	NA	NA	0.057	NA
12/15/10	NA	NA	NA	NA	NA	NA	NA	NA	0.063	NA	NA	NA	0.122	NA
12/08/11	NA	NA	NA	NA	NA	NA	NA	NA	0.077	NA	NA	NA	0.231	NA
12/04/12	NA	NA	NA	NA	NA	NA	NA	NA	0.048	NA	NA	NA	0.033	NA
12/06/13	NA	NA	NA	NA	NA	NA	NA	NA	0.033	NA	NA	NA	0.045	NA
9/15/2014	23.8	<0.107	<0.213	<0.059	<0.084	<0.050	<0.084	NA	0.0900	NA	NA	NA	0.0320	NA
12/9/2014	NA	NA	NA	NA	NA	NA	NA	NA	0.126	NA	NA	NA	0.0880	NA
03/13/15	U (0.0770)	U (0.107)	U (0.213)	U (0.0590)	U (0.0840)	U (0.0500)	U (0.0840)	NA	NA	NA	NA	NA	NA	NA
09/11/15	U (0.0770)	U (0.107)	U (0.213)	U (0.0590)	U (0.0840)	U (0.0500)	U (0.0840)	NA	NA	NA	NA	NA	NA	NA
12/30/15	NA	NA	NA	NA	NA	NA	NA	NA	0.0674	NA	NA	NA	0.0608	NA
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.187	7.6	0.5	0.7	0.39	6.8

Notes:
NA = Parameter Not Analyzed
NDS = No Discharge Standard
i - indicates that the concentration detected is greater than the method detection limit and less than the practical quantitation limit

Table 4g. Historical Groundwater Treatment
Monitoring Well APS-6
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
08/15/91	—	—	—	—	—	—	—	0.012	0.053	0.26	0.041	0.005	0.05	0.48
05/09/95	—	—	—	—	—	—	—	NA	0.238	0.53	NA	0.011	NA	NA
02/14/96	—	100	—	—	—	—	—	—	0.068	0.01	0.09	—	0.053	0.36
01/17/97	—	—	—	—	—	—	—	0.006	0.049	0.077	0.04	0.006	0.036	0.52
07/30/97	—	—	—	—	—	—	—	0.03	0.046	—	0.05	—	0.025	0.39
10/30/97	—	—	—	—	—	—	—	—	0.051	0.021	—	0.012	0.051	0.44
04/29/98	—	—	1.43	—	—	—	—	—	0.006	0.007	—	—	—	0.06
10/30/98	—	—	—	—	—	—	—	0.01	0.015	0.009	0.024	—	0.019	0.24
04/28/99	—	—	—	—	—	—	—	0.011	0.051	0.04	0.162	—	0.082	0.53
10/27/99	—	—	—	—	1.5	—	—	0.009	0.53	0.03	0.053	—	0.005	0.478
05/17/00	—	—	—	—	—	—	—	—	0.22	0.18	0.1	0.011	0.26	1.66
11/30/00	—	—	—	—	—	—	—	—	0.035	0.016	0.1	—	0.02	0.231
12/18/01	NA	NA	NA	NA	NA	NA	NA	—	0.058	0.032	0.07	0.005	0.04	0.41
12/16/02	NA	NA	NA	NA	NA	NA	NA	—	—	—	—	—	—	0.02
01/09/04	NA	NA	NA	NA	NA	NA	NA	—	0.043	0.012	—	—	0.040	0.341
12/29/04	NA	NA	NA	NA	NA	NA	NA	NA	0.071	NA	NA	NA	0.17	NA
01/12/06	NA	NA	NA	NA	NA	NA	NA	NA	0.047	NA	NA	NA	0.029	NA
03/29/06	NA	NA	NA	NA	NA	NA	NA	NA	0.025	NA	NA	NA	0.029	NA
12/22/06	NA	NA	NA	NA	NA	NA	NA	NA	0.035	NA	NA	NA	0.04	NA
12/21/07	NA	NA	NA	NA	NA	NA	NA	NA	0.016	NA	NA	NA	0.051	NA
01/07/09	NA	NA	NA	NA	NA	NA	NA	NA	0.029	NA	NA	NA	0.041	NA
12/11/09	NA	NA	NA	NA	NA	NA	NA	NA	0.06	NA	NA	NA	0.065	NA
12/15/10	NA	NA	NA	NA	NA	NA	NA	NA	0.059	NA	NA	NA	0.063	NA
12/08/11	NA	NA	NA	NA	NA	NA	NA	NA	0.141	NA	NA	NA	0.503	NA
12/04/12	NA	NA	NA	NA	NA	NA	NA	NA	0.039	NA	NA	NA	0.121	NA
12/06/13	NA	NA	NA	NA	NA	NA	NA	NA	0.064	NA	NA	NA	0.198	NA
12/9/2014	NA	NA	NA	NA	NA	NA	NA	NA	0.226	NA	NA	NA	0.383	NA
1/7/2016	NA	NA	NA	NA	NA	NA	NA	NA	0.0875	NA	NA	NA	0.522	NA
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.187	7.6	0.5	0.7	0.39	6.8

Notes:
— = Below Detection Limit NDS = No Discharge Standard
i - indicates that the concentration detected is greater than the method detection limit and less than the practical quantitation limit

Table 4h. Historical Groundwater Treatment
Monitoring Well APS-7
Airco Plating Co., Inc.
Miami, Dade County, FL
GHD Project No. 090459

Date Collected	Chloroform (µg/L)	Trans-1,2 DCE (µg/L)	Cis-1,2 DCE (µg/L)	1,1 DCE (µg/L)	PCE (µg/L)	TCE (µg/L)	Vinyl Chloride (µg/L)	CN (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Pb (mg/L)	Ni (mg/L)	Zn (mg/L)
08/15/91	---	---	---	---	---	---	---	---	---	0.035	---	---	---	0.1
05/15/96	---	---	---	---	---	---	---	---	---	0.011	0.002	---	0.028	0.04
01/03/97	---	100	12.2	---	18.5	10.3	1.56	---	---	0.27	---	---	---	---
07/30/97	---	---	---	---	---	---	---	---	---	0.043	---	---	0.03	0.07
10/30/97	---	---	---	---	---	---	---	---	---	0.064	---	0.012	0.05	0.19
04/29/98	---	---	---	---	---	---	---	---	---	0.058	---	---	0.06	0.19
10/30/98	---	---	---	---	---	---	---	---	---	0.015	---	---	0.008	0.04
04/28/99	---	---	---	---	---	---	---	---	---	0.01	0.006	---	0.014	---
10/27/99	---	---	---	---	---	---	---	0.083	---	0.099	0.031	---	0.016	0.336
05/17/00	---	---	---	---	---	---	---	---	0.005	0.08	---	---	0.03	0.25
11/30/00	---	---	3.91	---	---	---	1.31	---	---	---	---	---	---	0.081
12/18/01	---	---	---	---	---	---	---	---	---	0.086	0.02	---	0.041	0.28
12/16/02	---	---	---	---	---	---	---	---	---	0.085	---	---	0.017	0.16
01/09/04	---	---	---	---	---	---	---	---	---	0.005	---	---	0.009	0.011
12/29/04	NA	NA	NA	NA	NA	NA	NA	NA	---	NA	NA	NA	0.012	NA
01/30/06	NA	NA	NA	NA	NA	NA	NA	NA	0.0065	NA	NA	NA	0.060	NA
12/22/06	NA	NA	NA	NA	NA	NA	NA	NA	0.012	NA	NA	NA	0.041	NA
01/29/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.010	NA
01/07/09	NA	NA	NA	NA	NA	NA	NA	NA	0.006	NA	NA	NA	0.041	NA
12/11/09	NA	NA	NA	NA	NA	NA	NA	NA	0.01	NA	NA	NA	0.047	NA
12/15/10	NA	NA	NA	NA	NA	NA	NA	NA	0.001	NA	NA	NA	0.008	NA
02/17/12	NA	NA	NA	NA	NA	NA	NA	NA	0.006	NA	NA	NA	0.005	NA
12/04/12	NA	NA	NA	NA	NA	NA	NA	NA	0.004	NA	NA	NA	0.005	NA
12/06/13	NA	NA	NA	NA	NA	NA	NA	NA	0.002	NS	NA	NA	0.1	NA
12/9/2014	NA	NA	NA	NA	NA	NA	NA	NA	0.00830	NA	NA	NA	0.0260	NA
12/30/2015	NA	NA	NA	NA	NA	NA	NA	NA	0.0177	NA	NA	NA	0.191	NA
Treatment Standard	100	100	70	7	3	3	1	0.2	0.005	0.1	1	0.015	0.1	5
POTW Discharge Standard	NDS	NDS	3750	NDS	125	160	80	0.5	0.187	7.6	0.5	0.7	0.39	6.8

Notes:
--- = Below Detection Limit
NA = Parameter Not Analyzed
NDS = No Discharge Standard
I - Indicates that the concentration detected is greater than the method detection limit and less than the practical quantitation limit, therefore the concentration can not be quantified

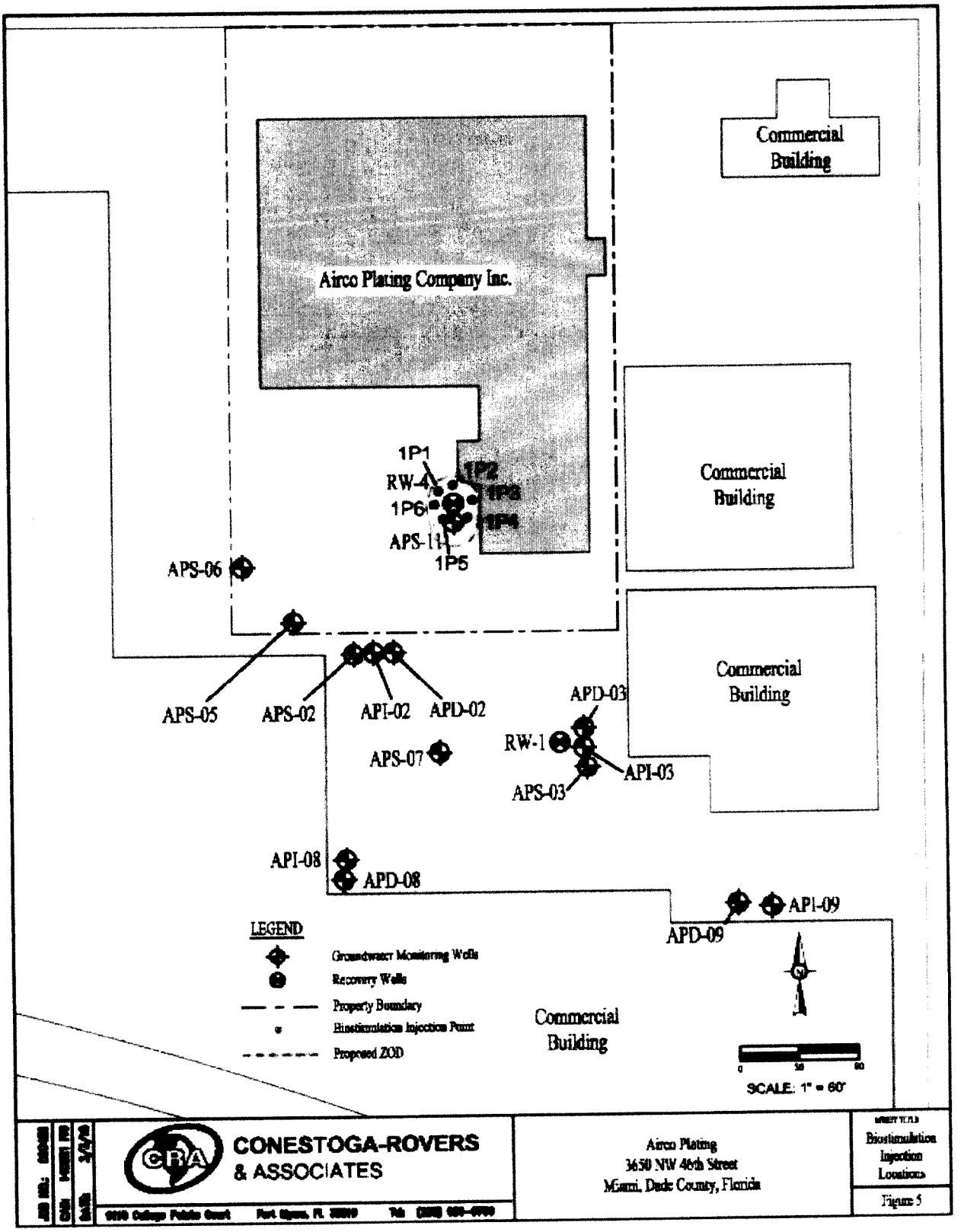
Appendix G: ARAR Review Table

Table G-1: Groundwater ARAR Review

Contaminant	1993 ROD ARAR (µg/L)[a]	Current ARARs (µg/L)		ARAR Change
		Federal[b]	State[c]	
Acetone	N/A	N/A	N/A	No change
Chloroform	100[d]	70[i]	N/A	More stringent
Cis-1,2-Dichloroethylene	70[d]	70	70	No change
Trans-1,2-Dichloroethylene	100[d]	100	100	No change
1,1-Dichloroethylene	7[d]	7	7	No change
Tetrachloroethylene	3[e]	5	3	No change based on original source
Trichloroethylene	3[e]	5	3	No change based on original source
Vinyl Chloride	1[e]	2	1	No change based on original source
Bis (2-ethylhexyl)phthalate	N/A	6[j]	6[j]	New ARAR
Cyanide	200[d]	200	200	No change
Cadmium	5[d]	5	5	No change
Chromium	100[d]	100[k]	100	No change
Copper	1,300[f]	1,300	1,300	No change
Lead	15[g]	15	15	No change
Nickel	100[d]	N/A	100	Less stringent based on original source; no change based on state source
Zinc	5,000[h]	5,000	5,000[g]	No change

Notes:
a) Source: Section 9.0, Subsection B.3.b of the 1993 ROD.
b) Source: Federal MCLs accessed 3/21/2016, available at: https://www.epa.gov/your-drinking-water/table-regulated-drinking-water-contaminants; Values listed are primary MCLs except for chloroform (MCLG), zinc (secondary MCL), copper (action level) and lead (action level).
c) Source: Florida MCLs access 3/21/2016, available at: http://www.dep.state.fl.us/water/drinkingwater/standard.htm.
d) Cleanup standard based on federal MCL.
e) Cleanup standard based on Florida groundwater standard.
f) Cleanup standard based on federal MCLG.
g) Cleanup standard based on federal action level.
h) Cleanup standard based on federal secondary MCL.
i) The MCL for Total Trihalomethanes, which include chloroform, is 80 µg/L. The chloroform-specific MCLG of 70 µg/L is indicated in the table.
j) Federal and state MCLs listed are for di(2-ethylhexyl)phthalate.
k) MCL listed is for total chromium.
g) Florida Secondary Drinking Water Standard.
N/A – Not applicable; no ARAR established.

Appendix H: Biostimulation Injection Points



Appendix I: Risk Evaluation of Soil Cleanup Goals

COC	Soil Cleanup Goal[a] (mg/kg)	Composite Worker Regional Screening Level (RSL)[b] (mg/kg)		Carcinogenic Risk[c]	Noncancer HI[d]
		Target Risk = 1×10^{-6}	Target Hazard Index (HI) = 1		
PCE	0.06	100	390	6×10^{-10}	1.54×10^{-4}
Cadmium	73	9,300	980	7.9×10^{-9}	7.45×10^{-2}
Chromium	1,350	6.3[e]	3,500[e]	**2.1×10^{-4}**	3.86×10^{-1}
Copper	9,990	N/A	47,000	N/A	2.13×10^{-1}
Cyanide	5,940	N/A	1,200[f]	N/A	**4.95**
Lead	500	N/A	800[g]	N/A	N/A
Nickel	5,400	64,000	22,000	8.4×10^{-8}	2.45×10^{-1}
Zinc	8,100	N/A	350,000	N/A	2.31×10^{-2}
			Totals	**2.14×10^{-4}**	**6.52**

a. Obtained from 1994 ROD.

b. Current EPA RSLs, dated November 2015, are available at http://www2.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 4/6/2016).

c. Carcinogenic risks were calculated using the following equation, based on the fact that RSLs are derived based on 1×10^{-6} risk: Carcinogenic Risk = (Soil Cleanup Goal ÷ Carcinogenic-based RSL) × 10^{-6}

d. The noncancer HI was calculated using the following equation: HI = (Soil Cleanup Goal ÷ Non-carcinogenic based RSL)

e. The 1994 ROD did not specify trivalent or hexavalent chromium; therefore, the RSL for hexavalent chromium was used since it is the most conservative.

f. The 1994 ROD did not specify the type of cyanide. Electroplating activities are often associated with cyanide salts; therefore, the RSL for potassium cyanide was used in this risk screening.

g. EPA has no consensus reference dose or cancer slope factor for inorganic lead, so carcinogenic risks and noncancer hazards cannot be calculated similarly to other chemicals in this table. EPA uses the Adult Lead Model to estimate a screening level for lead for an industrial setting. This screening level (800 mg/kg) is intended to protect a fetus that may be carried by a pregnant female worker."

N/A – Not applicable.

Bold = Resulting carcinogenic risk exceeds 1×10^{-6} or resulting HI exceeds 1.

Appendix J: Vapor Intrusion Screening

As part of this FYR, a screening-level risk evaluation of the vapor intrusion pathway was conducted using the most current groundwater data collected from shallow well APS-11, located closest to the on-site building. Consistent with EPA guidance, the vapor intrusion pathway was initially evaluated by determining if VOCs are present in the subsurface. Historic and recent sampling results indicate that groundwater samples have detected VOCs.

EPA's vapor intrusion screening level (VISL) calculator was used to provide a conservative estimate of risk and noncancer hazards. The VISL calculator is an empirical model that predicts indoor air concentrations using conservative "generic" attenuation factors. These factors reflect worst-case conditions and do not take into account any site-specific conditions such as site soil strata, depth to water table and building properties that may reduce the transport of vapors from groundwater through the soil column. The VISL calculator was run in default mode, with the exception of a site-specific groundwater temperature measurement of 26.8 degrees Celsius (recorded at well APS-11 in December 2015). Since the Site is an active industrial facility in a commercial area, a commercial use exposure scenario was selected.

The VISL calculator was run for APS-11 using the December 2015 results. As shown in Table I-1, the hypothetical commercial cancer risk associated with the 2015 concentration in APS-11 is within EPA's risk management range of 1×10^{-6} to 1×10^{-4}; however, the noncancer hazard index (HI) exceeds EPA's threshold of 1. PCE and TCE are primary contributors of the elevated HI.

Table I-1: Evaluation of Vapor Intrusion Using the VISL Calculator

Well	Chemical	December 2015 Concentration (µg/L)	Commercial[a]	
			Carcinogenic Risk	Noncancer Hazard
APS-11	Chloroform	5.87	1.8×10^{-6}	.0022
	PCE	1,390	2.3×10^{-5}	**6.3**
	TCE	64.3	9.4×10^{-6}	**3.2**
	Vinyl Chloride	0.67	2.9×10^{-7}	.0018
		Total	3.45×10^{-5}	**9.5**

a. Risks and HI calculated using the EPA's VISL calculator Version 3.45 obtained at https://www.epa.gov/vaporintrusion/vapor-intrusion-resources (accessed March 30, 2016).

Bold italic – cancer risk exceeds 1×10^{-4} or a noncancer HI of 1.

These data along with the uncertainties in evaluating this pathway, result in EPA recommending that a vapor intrusion study be conducted promptly in accordance with EPA Guidance[6] and in consultation with EPA staff to determine if vapor intrusions is a threat at the Site. Additional data from more than one environmental medium (e.g., groundwater paired with sub-slab vapor and indoor air) are recommended in a more comprehensive vapor intrusion analysis to reduce the uncertainties in this exposure pathway. The evaluation should consider those occupied buildings within 100 feet laterally of the contamination. Since APC is an operating facility, any contributions from background should also be considered.

[6] OSWER Technical Guide for Assessing and mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, OSWER 9200.2-154.

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First Five-Year Review Report
For
Flash Cleaners
FLD083111005

Pompano Beach
Broward County, Florida

August 2016

United States Environmental Protection Agency
Region 4
Atlanta, GA

Approved by:

Franklin E. Hill, Director
Superfund Division

Date:

8/16/16

11051729

First Five-Year Review Report
for
Flash Cleaners
4131 North Federal Highway
Pompano Beach
Broward County, Florida

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
BCDPEP	Broward County Department of Planning and Environmental Protection
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
DCA	Dichloroethane
DCE	Dichloroethene
DPT	Direct-Push Technology
EOS	Emulsified Oil Substrate
EPA	United States Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FYR	Five-Year Review
GAC	Granular Activated Carbon
GCTL	Groundwater Cleanup Target Level
HAP	Hazardous Air Pollutant
HI	Hazard Index
HQ	Hazard Quotient
MCL	Maximum Contaminant Level
mg kg	Milligram per Kilogram
µg kg	micrograms per kilogram
µg L	Microgram per Liter
µg m^3	Microgram per Cubic Meter
MOA	Memorandum of Agreement
NA	Not Applicable
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Perchloroethene, also known as Tetrachloroethene
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI FS	Remedial Investigation Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SCTL	Soil Cleanup Target Level
SFWMD	South Florida Water Management District
SVE	Soil Vapor Extraction
TBC	To-Be-Considered
TCE	Trichloroethene
UST	Underground Storage Tank
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

Executive Summary

The Flash Cleaners Superfund site (the Site) is located at 4131 North Federal Highway, Pompano Beach, Broward County, Florida. The groundwater plume extends some 1,875 feet from the Site into the Lighthouse Point neighborhood to the east and north. Flash Cleaners operated as a dry cleaning facility at the Site from 1977 to 2001. Facility waste handling practices resulted in contamination of soil and groundwater with chlorinated solvents. The United States Environmental Protection Agency selected the remedy in the Site's 2010 Record of Decision (ROD). The selected remedy for soil included excavation and off-site disposal of contaminated soils, and soil vapor extraction for contaminated soils located under the building. The soil remedy met has soil cleanup goals. The selected remedy for groundwater was in-situ enhanced bioremediation and monitoring, with institutional controls until achievement of cleanup goals. Long-term monitoring data indicate that the groundwater remedy has reduced contaminant concentrations in most of the affected plume area to below the ROD cleanup goals. In the source area, elevated levels recently arose at one well, FCMW06, which will require a re-treatment as planned for by the 2010 ROD. The downgradient, offsite groundwater plume shows some minor contamination at four wells as it continues to biodegrade. The triggering action for this policy review is the preparation of the Site's Preliminary Close-Out Report on September 19, 2011.

The remedy at the Site currently protects human health and the environment because there are no completed exposure pathways. For the remedy to be protective over the long term, the following actions need to be taken to ensure protectiveness: evaluate the need for an additional well to monitor the eastern plume boundary; verify confirm that vapor intrusion is not occurring at the residence associated with FCIW02; conduct additional groundwater injection treatments at and around FCMW06; and ensure that the map associated with the institutional control is generated by the EPA, is available for use, and that appropriate water well restrictions (the institutional control) are being enforced.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Flash Cleaners		
EPA ID: FLD083111005		
Region: 4	**State:** FL	**City/County:** Pompano Beach/Broward County

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

REVIEW STATUS
Lead agency: EPA
Author name: Ralph Howard (EPA), Johnny Zimmerman-Ward (Skeo Solutions) and Kirby Webster (Skeo Solutions)
Author affiliation: EPA and Skeo Solutions
Review period: July 2015 – August 2016
Date of site inspection: 10/13/2015
Type of review: Policy
Review number: 1
Triggering action date: 9/19/2011
Due date *(five years after triggering action date)*: 9/19/2016

Five-Year Review Summary Form (continued)

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Monitoring			
	Issue: COCs were measured in wells at the eastern boundary of the plume above cleanup goals.			
	Recommendation: Evaluate the need for an additional well to monitor the eastern plume boundary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/19/2017

OU(s): 1	Issue Category: Monitoring			
	Issue: VOCs were measured in downgradient irrigation well FCIW02, sampled from an uncertain depth interval, at levels which, if present at the water table, could potentially cause vapor intrusion at the associated residence.			
	Recommendation: Verify/confirm the screened depth interval of well FCIW02, and confirm that vapor intrusion is not occurring at the residence associated with FCIW02.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/19/2017

OU(s): 1	Issue Category: Remedy Performance			
	Issue: Elevated levels of PCE and related breakdown-product COCs are present in source area well FCMW06, as well as reduced microbial population levels (necessary to foster reductive dechlorination processes), indicating the need for additional groundwater injection treatments.			
	Recommendation: Conduct additional groundwater injection treatments at and around FCMW06, to support continued biodegradation of the groundwater plume in the source area and downgradient.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/19/2017

OU(s): 1	Issue Category: Institutional Controls			
	Issue: The map described in the institutional control document (MOA), which is necessary to guide well permitting restrictions, was not found during the FYR.			
	Recommendation: Ensure that the map delineating the areas in which well installations are to be restricted is generated by the EPA, is available for use, and that appropriate water well restrictions (the institutional control) are being enforced.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/State	9/19/2017

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Site currently protects human health and the environment because there are no completed exposure pathways. For the remedy to be protective over the long term, the following actions need to be taken to ensure protectiveness: evaluate the need for an additional well to monitor the eastern plume boundary; verify/confirm that vapor intrusion is not occurring at the residence associated with FCIW02; conduct additional groundwater injection treatments at and around FCMW06; and ensure that the map delineating the areas in which well installations are to be restricted is generated by the EPA, is available for use, and that appropriate water well restrictions (the institutional control) are being enforced.

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

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

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

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

First Five-Year Review Report
for
Flash Cleaners Superfund Site

1.0 Introduction

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

The United States Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Flash Cleaners Superfund site (the Site) in Pompano Beach, Broward County, Florida. The EPA's contractor conducted this FYR from July 2015 ton August 2016. The EPA is the lead agency for developing and implementing the remedy for the Superfund-financed cleanup at the Site. The Florida Department of Environmental Protection (FDEP), as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the first FYR for the Site. The triggering action for this policy review is the Preliminary Close-Out Report. The FYR is required because the remedy will take more than five years to attain remedial action objectives (RAOs) and cleanup levels, although it will not result in hazardous substances, pollutants or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure. The Site consists of one operable unit (OU).

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
Flash Cleaners began operating as a dry cleaning facility at the Site	1977
FDEP found two improperly installed dry cleaning machines	1999
Flash Cleaners stopped operating as a dry cleaning facility Laundry drop-off/pick-up for outsourced dry cleaning started	2001
FDEP conducted preliminary assessment in cooperation with the EPA	August 2002
FDEP conducted site inspection in cooperation with the EPA	2003
The EPA conducted expanded site inspection	2005
The EPA issued an Information Request Letter to the potentially responsible parties (PRPs) (owner/operator) and determined that they did not have the financial ability to conduct the remedial investigation and feasibility study (RI/FS)	2007
The EPA proposed the Site for listing on the Superfund program's National Priorities List (NPL)	March 19, 2008
Site listed on the NPL by the EPA	September 3, 2008
The EPA initiated a Superfund-lead RI/FS	September 2008
The EPA issued another Information Request Letter to the PRPs and determined that a Superfund-lead cleanup would be conducted at the Site	2009
The EPA placed a federal lien on the Flash Cleaners property and filed in the Broward County property records office (Appendix J)	May 26, 2010
RI/FS completed by the EPA The EPA signed Site's Record of Decision (ROD)	September 30, 2010
EPA contractor conducted remedial design field activities such as a pilot study for the soil vapor extraction (SVE) system and soil sampling	November 2010
EPA contractor mobilized on site to begin the remedial action (soil removal)	April 25, 2011
SVE system installed by EPA contractors	May 2011
SVE system operations initiated	June 2011
EPA contractors started enhanced bioremediation groundwater injections	June 13, 2011
Enhanced bioremediation groundwater injections completed	August 8, 2011
EPA contractor completed remedial action activities (soil removal)	August 17, 2011
The EPA signed Site's Preliminary Close Out Report Site designated as construction complete by the EPA	September 19, 2011
Laundry drop-off/pickup services closed	2013
4131 Federal LLC purchased the site property	March 20, 2015
EPA contractors shut down and evaluated the SVE system	February 18, 2015
EPA contractors restarted the SVE system	March 27, 2015
EPA contractors shut down the SVE system	December 14, 2015

3.0 Background

3.1 Physical Characteristics

The half-acre Site is located at 4131 North Federal Highway, Pompano Beach, Broward County, Florida (Figure 1). The groundwater plume extends into the Lighthouse Point neighborhood. The property includes a vacant, boarded up rectangular building with a fenced area and utility shed housing the soil vapor extraction (SVE) system on the west side of the building, a two-car parking lot east of the building, and a driveway that connects to a back alley.

Areas near the Site are primarily commercial and residential. North Federal Highway (U.S. Highway 1) is a major thoroughfare east of the Site. It separates the cities of Pompano Beach and Lighthouse Point.

The Site and the surrounding area are relatively flat and typical of south Florida. The Biscayne Aquifer lies beneath the Site and is primarily composed of sand. It is about 350 feet thick in the site area. Because the aquifer is highly permeable and shallow, it is readily susceptible to contamination. Groundwater in the aquifer generally flows eastward toward the coast. However, site groundwater is influenced by nearby surface water, and gradually turns from eastward towards the northeast and north towards the Grand Canal. The relatively impermeable Tamiami Formation forms the upper part of the intermediate confining unit that separates the Biscayne Aquifer from the underlying confined Floridan Aquifer system. The EPA designated the Biscayne Aquifer as a sole-source aquifer because it is a source of freshwater supplies for Broward County and for most of southeast Florida.

Dry cleaning operator waste handling practices resulted in the contamination of site soil and groundwater. The groundwater plume shallows as it approaches and ultimately discharges into the Grand Canal. The fresh brackish water interface within the sediment occurs about 3 feet below the bottom of the canal.

3.2 Land and Resource Use

Flash Cleaners operated as a dry cleaning facility from 1977 to 2001. Dry cleaning operations may have occurred on site before 1977 under a previous owner, but details are not known. Until 2013, the facility was also a drop-off and pickup location for outsourced dry cleaning services. The property has been under new ownership since March 20, 2015. In April 2016, the new property owners began renovation activity in advance of a new tenant moving in to make commercial use of the building and property. The Site parcel is zoned as B-3 General Business; the zoning is not expected to change.

The Biscayne Aquifer is located under the Site and is the source of drinking water in Broward County and for most of southeast Florida.

During the Site's remedial investigation (RI) in 2010, the Florida Department of Health assisted the EPA with a survey of private wells within a quarter-mile radius of the Site. Five private irrigation wells were identified and sampled. Two wells contained cis-1,2- dichloroethene (DCE)

at very low levels below drinking water standards. These wells were located at the northeast edge of the plume and southeast of the Site. The Site's RI Report (Section 5) provides detailed information on the private well sampling results.

3.3 History of Contamination

Waste handling practices from dry cleaning resulted in contamination of soil and groundwater. In February 1999, FDEP conducted an inspection of the facility and found dry cleaning machines with no secondary containment structures. FDEP also found machines containing dry cleaning product and potential disposal of waste material on the ground. In 1999, the owner of Flash Cleaners submitted an application to the state Drycleaning Solvent Cleanup Program. The application was denied. FDEP stated that failure to have secondary containment constituted gross negligence, and the facility was ineligible to participate in the program.

3.4 Initial Response

In 2000, the Broward County Department of Planning and Environmental Protection (BCDPEP) required a Limited Site Assessment Report. Results indicated volatile organic compounds (VOCs) in the soil and groundwater. Analysis of septic tank sludge in 2001 indicated VOCs were present. Flash Cleaners failed to continue with the necessary additional assessment activities or remediate the Site as required by BCDPEP. In 2002, Broward County issued a violation order. Because the potentially responsible party (PRP) became uncooperative, BCDPEP forwarded the Site to FDEP for enforcement. FDEP referred the Site to the EPA because of its ineligibility for the dry cleaning program. In 2002 and 2003, FDEP conducted the preliminary assessment and site inspection for the EPA. In 2003, an oil company caused a 30-gallon diesel fuel spill while loading an aboveground storage tank onto a truck. The company subsequently cleaned it up.

The EPA conducted an expanded site inspection in 2005. Sampling detected tetrachloroethene (PCE) in subsurface soil samples collected next to the on-site septic tank. Groundwater samples collected from the on-site wells contained PCE, trichloroethene (TCE), cis-1,2-DCE, and vinyl chloride above federal maximum contaminant levels (MCLs). The EPA placed the Site on the Superfund program's National Priorities List (NPL) in 2008.

3.5 Basis for Taking Action

The EPA began the Site's RI in September 2008, and completed the RI and the Feasibility Study (FS) in September 2010. The soil investigation suggested that the source area for contamination was underneath the western end of the Flash Cleaners building. Soil contamination was limited to the footprint of the Flash Cleaners building and an area near the west end of the building. Soil contamination was assumed to exist from land surface to the water table at the Site.

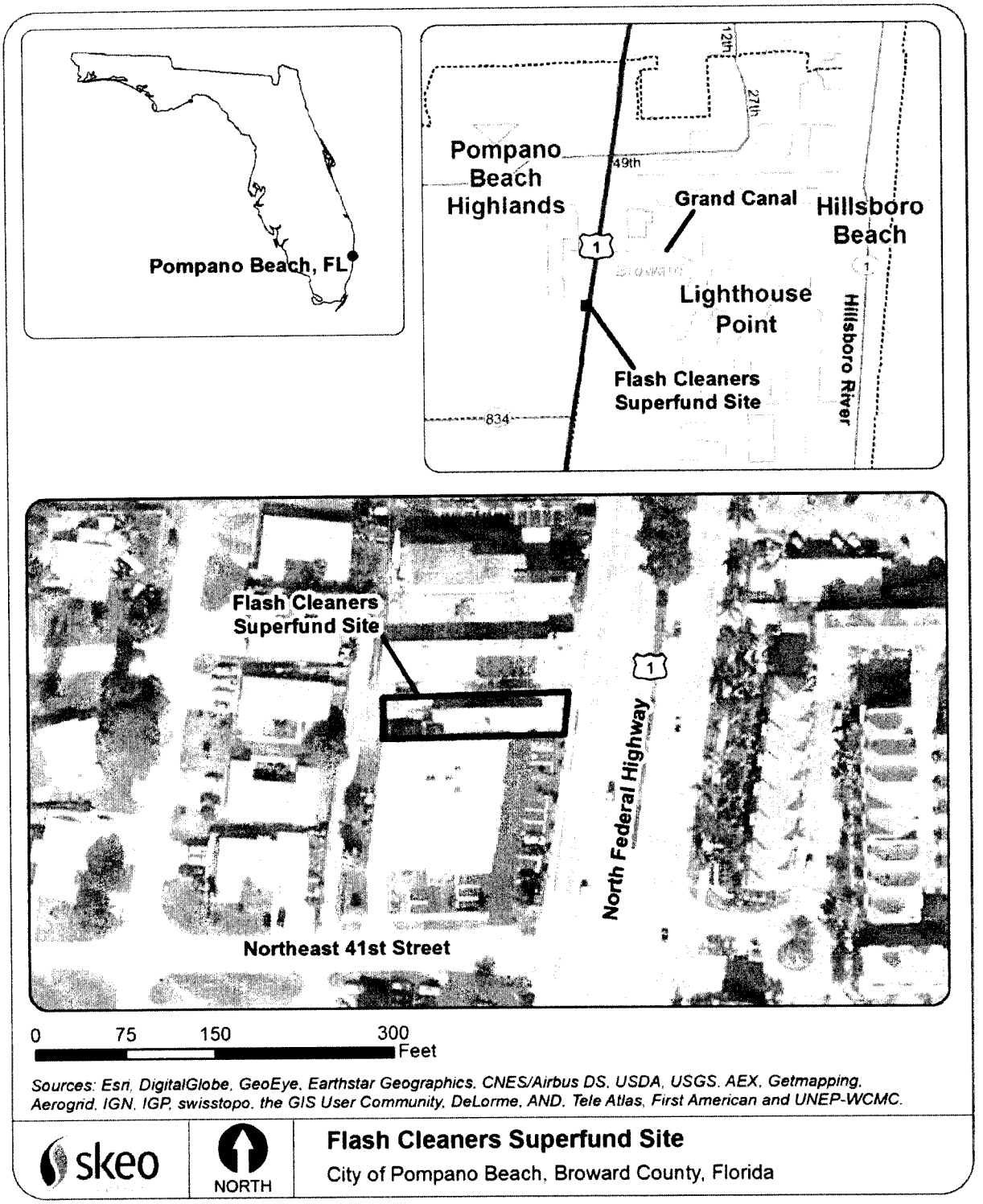
The groundwater investigation found the highest on-site concentrations of VOCs behind the building (16,000 micrograms per liter (µg/L) PCE, 3,700 µg/L TCE, 61,400 µg/L cis-1,2-DCE and 7,700 µg/L vinyl chloride). The RI found that groundwater was contaminated through onsite waste-handling activities and specifically, the use of the drycleaning solvent, PCE. The other Site contaminants of concern (COCs) are present due to natural degradation of PCE in the

groundwater environment. East and north of the Flash Cleaners building, a plume of contaminated groundwater extended some 1,875 feet, reaching to the nearest surface water body, Grand Canal. The plume underlies about 27 acres, with a maximum depth of about 100 feet.

During the latter part of the RI, two areas were identified downgradient (east and northeast) of the Site in which direct-push (DPT) groundwater samples from the 25-foot and 11-foot depth zones showed significant levels of COCs. One area was within an apartment complex across North Federal Highway to the east, while the second area was around the homes located to the north along Grand Canal. To investigate the potential for vapor intrusion, 29 soil vapor samples were collected from the two areas, as well as a group of samples from the Flash Cleaners building area. Mobile- and fixed-laboratory analysis of the soil vapor samples from the downgradient areas found no Site COCs detections, at levels below those which would indicate a vapor intrusion risk. By contrast, all sub-slab soil vapor samples collected at the Flash Cleaners building had elevated concentrations of PCE, TCE and cis-1,2-DCE. The results of the 2010 human health risk assessment indicated that the concentrations in indoor air resulted in cancer risks within the EPA's risk management range and a noncancer hazard index (HI) below the threshold of 1.0 under an unrestricted exposure scenario.

The risk assessment identified PCE, TCE, cis-1,2-DCE and vinyl chloride as soil COCs based on impacts to groundwater (e.g., exceedances of leachability-based state standards). The risk assessment concluded that cancer risks for residential and industrial direct exposures to soil at the Site were within the EPA's target risk range. The risk assessment identified PCE, TCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride as groundwater COCs based on exceedances of MCLs or groundwater cleanup target levels (GCTLs). The risk assessment determined that no response action was necessary for surface water.

Figure 1: Site Location Map



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

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP. The nine criteria are:

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility or Volume through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

4.1 Remedy Selection

The RAOs from the Site's September 2010 Record of Decision (ROD) are:

- Soil:
  - Prevent human exposure to soil with contaminants above levels that pose unacceptable risks based on an unrestricted land use scenario.
  - Prevent migration of contaminants in soil, with concentrations exceeding leachability-based state criteria, to groundwater.
- Groundwater:
  - Prevent human exposure to groundwater with contaminants above levels that pose unacceptable risk.
  - Restore groundwater to drinking water standards (federal and state).

According to the 2010 ROD, the major components of the selected remedy include:

- Excavation of on-site soils with COCs above the cleanup levels, with the exception of soils under the Flash Cleaners building.
- Transportation and disposal of the excavated soil to a permitted off-site waste disposal landfill.
- Installation of an SVE system to remove contaminants from the soil under the Flash Cleaners building. A vapor-phase carbon adsorption unit was included with the SVE system, to capture the volatilized off-gases.
- Soil institutional controls if, after treatment, contaminants in soil do not achieve cleanup levels.
- In-situ enhanced bioremediation of groundwater on the Flash Cleaners property and east northeast of the property using emulsified oil substrate (EOS) to stimulate the natural biodegradation of contaminants.

- Implementation of temporary institutional controls to prevent exposure to groundwater with contaminant concentrations above cleanup levels. The institutional controls will restrict use of groundwater as long as contaminant concentrations are above cleanup levels.
- Monitoring of groundwater, surface water and sediment porewater (in Grand Canal).

Table 2 presents the cleanup goals for groundwater and soil. Groundwater cleanup levels are based on the EPA MCL or the FDEP GCTL, whichever is more protective. Soil cleanup levels were determined based on Florida's enforceable soil cleanup target levels (SCTLs) for residential and industrial exposure scenarios and for leachability based on groundwater criteria, whichever is more protective.

Table 2: Groundwater and Soil COC Cleanup Goals

COC	Soil Cleanup Goal (mg/kg)	Groundwater Cleanup Goal (µg/L)
PCE	0.03	3
TCE	0.03	3
cis-1,2-DCE	0.4	70
trans-1,2-DCE	NA	100
Vinyl chloride	0.007	1
Notes: From the 2010 ROD. Table 21 mg/kg = milligram per kilogram µg/L = microgram per liter NA = not applicable		

4.2 Remedy Implementation

Soil

In November 2010, the EPA's contractor conducted remedial design field activities, including a pilot SVE system study and soil sampling to better define the area of excavation. In April and May 2011, workers excavated soil (173 tons) to the water table (9.5 feet below ground surface, bgs) in an 880 square-foot area on site and backfilled the area with clean soil. The excavation was offset at least 2 feet from the building to protect the foundation and structure. The EPA's contractor installed the SVE system and vapor-phase carbon adsorption unit and enclosed it with a security fence in May 2011. Air monitoring was conducted throughout the soil excavation, underground storage tank (UST) removal (two single-wall steel petroleum USTs were discovered in 2011 during site preparation activities), and SVE installation. There were no exceedances of VOC air action levels during these actions.

In June 2011, the SVE system went into operation. It was initially tested for three weeks to confirm it was operating properly. Based on low concentrations of hazardous air pollutants (HAPs) detected from the SVE wells between October 2012 and December 2014, the annual groundwater and soil vapor extraction monitoring reports in 2013 and 2014 concluded that the system might no longer be needed. A one-month shutdown was recommended to allow for measurement of contaminant rebound and to evaluate whether the SVE system should be discontinued. SVE operations were shut down from February 18, 2015, to March 27, 2015, and then restarted. The EPA's contractor conducted soil sampling to evaluate subsurface soil conditions and the potential for vapor intrusion in the absence of the SVE system. The data are included in section 6.4. A report presenting the data and interpretations

was completed in December 2015. After review, the EPA concluded that the SVE system had attained the cleanup goals for soil, and as a result SVE system operations were terminated in December 2015.

Groundwater

In May 2011, the EPA approved EOS and the microbial additive BAC-9 for the bioremediation injections. Bioremediation injections began in May 2011. The EOS injections also continued in the median of North Federal Highway and on the west side of the highway through early August 2011, eventually reaching a total of 80 injections. During the last injection, the driller struck utility cables. After repairs were made, to avoid the potential for this to reoccur, the EPA and their contractor decided to move the boring location for injection of BAC-9. On August 17, 2011, the contractors completed construction activities and demobilized from the Site. The groundwater remedy selected in the ROD called for reinjection of the EOS after collection of three years of monitoring data, to treat any remaining hot spots within the plume.

The groundwater remedy also called for monitoring of groundwater, surface water and sediment porewater (in Grand Canal). Following a six-month, post-injection groundwater sampling period, the groundwater remedy transitioned into the operations and maintenance phase with the EPA's approval of a Groundwater Operation and Maintenance (O&M) Plan in 2012. Another groundwater remedy component, institutional controls, is discussed in Section 6.3.

4.3 Operation and Maintenance (O&M)

Groundwater, porewater and surface water sampling conducted in accordance with the Groundwater O&M Work Plan began in 2012. Semiannual and Annual reports have been prepared by the EPA's contractor since 2013. An Addendum to the Groundwater O&M Work Plan was prepared in 2014. It included sampling to ensure that site groundwater discharging to the Grand Canal to the northeast of monitoring locations does not generate unacceptable levels of COCs in sediment porewater or canal surface water. Also in 2014, as described in section 6.4 below, the EPA expanded the groundwater sampling program to include sampling certain downgradient wells at all of the available depth intervals.

To guide implementation of the soil remedy after completion of the on-site soil excavation and removal action described above, a SVE O&M Work Plan was approved by the EPA in 2011. O&M activities for the SVE system began in June 2011 and continued through December 2015. Throughout this period, the EPA's contractor collected O&M data for the SVE system (e.g., SVE well flow rates, air monitoring of SVE wells, and influent, mid, and effluent air samples at the granular activated carbon (GAC) unit). Preventive maintenance of the SVE system also took place. O&M data collection started in early June 2011. SVE system installation occurred from May 3, 2011 through June 6, 2011 and the system startup began on June 7, 2011. System data were collected beginning at startup on June 7, 2011 and collected on daily basis for the first 2 weeks and then monthly beginning in September 2011. Troubleshooting and short-term shutdowns to accommodate system repairs and maintenance began in August 2011 and continued until the system was shut down in December 2015. Major O&M events have included change-out of the GAC unit in January 2013 when breakthrough was detected, and removal repair of the telemetry system in January 2014. In February 2014, the telemetry system was replaced. The system also required a service event in November 2014. In December 2014 and September 2015, flex tubing in the GAC was repaired.

In 2014, an Addendum to the 2011 SVE O&M Work Plan was prepared. The work plan Addendum outlined the additional sampling that would be performed to determine if SVE system operation was still necessary. The work performed and results are described further below in section 6.4. The SVE system was taken out of operation in December 2015.

Table 3 shows O&M costs over the past five years compared to costs anticipated in the ROD. Costs for 2015 are greater than previous years. This is likely the result of both the 2014 and 2015 annual reports being written during one fiscal year. This occurred because data was received earlier than in previous years. Also adding to the 2015 costs was the SVE effectiveness evaluation.

Table 3: Annual O&M Costs

Year	Reporting, Monitoring and O&M (rounded to the nearest $1,000)	ROD Anticipated (rounded to the nearest $1,000)
2011	$32,000	$206,000
2012	$137,000	$181,000
2013	$80,000	$121,000
2014	$156,000	$121,000
2015	$206,000	$105,000

5.0 Progress Since the Last Five-Year Review

This is the first FYR for the Site.

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in July 2015 and scheduled its completion for May 2016. EPA Remedial Project Manager (RPM) Ralph Howard led the EPA site review team, which also included EPA site attorney Susan Capel, EPA community involvement coordinator (CIC) L'Tonya Spencer and contractor support provided to the EPA by Skeo Solutions. In August 2015, the EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

6.2 Community Involvement

In September 2015, the EPA published a public notice in the *Sun Sentinel* newspaper announcing the commencement of the FYR process for the Site, providing contact information for the RPM and the

CIC, and inviting community participation. The press notice is available in Appendix B. No one contacted the EPA as a result of the advertisement.

The EPA will make the final FYR Report available to the public. Upon completion of the FYR, the EPA will place copies of the document in the designated site repository – Lighthouse Point Library, located at 2200 Northeast 38th Street in Lighthouse Point, Florida.

6.3 Document Review

This FYR included a review of relevant site-related documents, including the ROD, remedial action reports and recent monitoring data. Appendix A provides a complete list of the documents reviewed.

ARARs Review

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

- 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, remedial action, location or other circumstance found at a CERCLA site.

- Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards more stringent than federal requirements may be applicable or relevant and appropriate.

- To-Be-Considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, TBC criteria may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include MCLs under the federal Safe Drinking Water Act and ambient water quality criteria enumerated under the federal Clean Water Act, as well as Florida GCTLs and SCTLs.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated groundwater or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the chemical-specific ARARs identified in the ROD. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

Groundwater

The 2010 ROD identified groundwater ARAR COC cleanup levels as the lower of the EPA's MCLs, established under the federal Safe Drinking Water Act (40 CFR Part 141), and FDEP's GCTLs, promulgated under Florida's Administrative Code Chapter 62-777. Table 4 shows that the groundwater ARARs have not changed since the 2010 ROD.

Table 4: Summary of 2010 ARARs Compared to Current Groundwater ARARs

COC	2010 ROD ARARs (µg/L)[a]		Current ARARs (µg/L)		Change
	Federal MCL	State GCTL	Federal MCL[b]	State GCTL[c]	
PCE	5	3	5	3	None
TCE	5	3	5	3	None
cis-1,2-DCE	70	70	70	70	None
trans-1,2-DCE	100	100	100	100	None
Vinyl chloride	1	1	2	1	None

Notes:
a. From Table 20 of the 2010 ROD.
b. Federal MCLs were obtained from http://water.epa.gov/drink/contaminants/index.cfm (accessed 8/12/2015).
c. Florida GCTLs are available at http://www.dep.state.fl.us/legal/Rules/waste/62-777/62-777_TableI_GroundwaterCTLs.pdf (accessed 8/12/2015).
µg/L = microgram per liter

Soil

The EPA selected soil cleanup levels in the ROD based on the lower of Florida's enforceable SCTLs promulgated under Florida Administrative Code Chapter 62-777 for residential and industrial exposure scenarios and for leachability based on groundwater criteria. The EPA determined that the SCTL values are applicable as chemical-specific ARARs. A summary of the SCTLs are presented in Table 5. The SCTLs were developed in 2005 and have not been revised. Toxicity values have changed for TCE and PCE since the ROD was issued; the protectiveness of these values is further evaluated in Appendix I.

Table 5: Summary of 2010 Soil ARARs

COC	2010 ROD Soil ARARs (mg/kg)[a]	Current ARARs (mg/kg)	Change
PCE	0.03	0.03	None
TCE	0.03	0.03	None
cis-1,2-DCE	0.4	0.4	None

COC	2010 ROD Soil ARARs (mg/kg)[a]	Current ARARs (mg/kg)	Change
Vinyl Chloride	0.007	0.007	None

Notes:
a. From Table 21 of the 2010 ROD.
b. Florida SCTLs are available at:
http://www.dep.state.fl.us/waste/quick_topics/rules/documents/62-777/62-777_TableII_SoilCTLs.pdf (accessed 8/12/2015).
mg/kg = milligram per kilogram

Institutional Control Review

In November 2015, Skeo Solutions staff conducted research at the Broward County Public Records website. Table 6 lists the institutional control associated with the Site, which is the Memorandum of Agreement (MOA) between the EPA and South Florida Water Management District (SFWMD) (included in Appendix K). The MOA describes the establishment of an inner boundary (Zone A) and an outer boundary (Zone B) of the area of groundwater impacted or potentially impacted by a Superfund Area, by SFWMD. It also states that SFWMD will request that local agencies deny an application for a water well construction permit for activity in Zones A and B or a Superfund Area if use of the proposed well fails to meet the conditions for issuance.

Research conducted during the FYR indicates that EPA has not generated the map delineating the "Zone A/Zone B" areas in which well installations were to be restricted. Pursuant to the MOA, the map was to be used by Broward County Department of Health, to whom SFWMD delegates the responsibility to issue the permits and enforce the restrictions, for their use. The SFWMD places the maps used for well permitting on their public website, but no map was found to be posted there for the Flash Cleaners Site. In view of these search results, the EPA needs to work with FDEP and the SFWMD to produce the necessary map, in a form suitable for use by Broward County Department of Health in properly restricting well installations in the vicinity of the affected groundwater plume. In the course of sampling Site wells twice annually, the EPA's contractor drives throughout the offsite area underlain by the groundwater plume, and has not observed any newly-installed wells in the area.

Table 6: Institutional Control Summary Table

Media	ICs Needed	ICs Called for in Site Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
Groundwater	Yes, until cleanup levels are achieved.	Yes, until cleanup levels are achieved.	Not parcel-specific; refers to entire Site	Prevent unacceptable risks from exposure to contaminated groundwater through use restrictions. At a minimum, installation of potable water wells would be prevented until cleanup levels are achieved.	MOA between the EPA and SFWMD. However, the Site-specific map necessary for enforcing the restrictions needs to be generated by EPA.

Media	ICs Needed	ICs Called for in Site Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
Soil	No, because remedy achieved cleanup levels.	Yes, if after treatment, contaminants in soil do not achieve cleanup levels.	NA	Prevent human exposure to soil with contaminants above levels that pose unacceptable risks based on an unrestricted land use scenario.	None needed. Remedy has achieved soil cleanup levels.
Notes: NA = not applicable.					

6.4 Data Review

The data review focuses on monitoring results to evaluate the effectiveness of the remedy. The review evaluates the SVE system and groundwater and surface/porewater sampling results collected from September 2011 (O&M phase of the SVE system) to November 2015. Data was presented in the 2015 Annual Groundwater and Soil Vapor Extraction Monitoring Report.

SVE System

The EPA's contractor started operating the SVE system in June 2011. The contractor conducted monthly O&M events and collected air readings from the air streams for each SVE well and the GAC treatment system. The vapor readings were used to estimate the total concentration of HAPs to evaluate the effectiveness of the GAC treatment system.

As described briefly in section 4.2, the 2015 Annual Groundwater and Soil Vapor Extraction Monitoring Report documented that the total concentrations of HAPs detected in the SVE wells from October 2012 through November 2015 were below the permitting threshold limit for individual and total HAP concentrations that would require off-gas treatment. Further, no single SVE well showed any significant concentration of HAP removal compared with other SVE wells. Air concentrations for each SVE wellhead indicated that significant concentrations were not being removed from the subsurface from each well and the GAC treatment was not necessary to meet air permitting requirements.

In 2014, the EPA approved an Addendum to the SVE O&M Work Plan that directed the contractor to complete an evaluation of the need for the SVE system, including whether the cleanup goals for soil had been achieved. Activities included monitoring indoor air while the system was running and again one month after the SVE system was shut down, to evaluate the potential for vapor intrusion into the Flash Cleaners building in the absence of the system. This was included because, although vapor intrusion did not contribute significantly to overall risk as presented in the 2010 ROD, the soil remedy had required monitoring indoor air in the Flash Cleaners building during the remedial action. The contractor shut down the SVE system from February 18, 2015 to March 27, 2015. The EPA contractor then restarted the system to measure for contaminant rebound and to evaluate whether the SVE system should be discontinued.

For this evaluation, the contractor conducted soil sampling at boring locations previously sampled as part of the RI (FCB10, FCB11, FCB12 and FCB14) where soils had exceeded FDEP SCTLs. Soil samples were collected from 6 inches to 2 feet bgs, and from the subsurface, designated as below 2 feet

bgs to the water table. In addition, indoor air and sub-slab soil vapor samples were collected to evaluate the potential for vapor intrusion. These data are further evaluated in Section 7.1 and Appendix I.

The results of the vapor intrusion sampling indicate that no COCs were detected in indoor air above EPA regional screening levels (RSLs). The lack of COC detections in indoor ambient air suggests that groundwater contamination (via migration of vapors upward through soil) does not pose a threat of vapor intrusion at the Flash Cleaners property. Currently, the building is unused. The property was recently purchased and may be used in the near future.

Five contaminants which had not been identified in the RI as site COCs (referred to as "non-COCs") in the ROD, including 1,2-dichloroethane (DCA), benzene, chloroform, ethylbenzene and naphthalene, were detected in indoor air above RSLs in March 2015. A screening-level risk assessment (Appendix I) indicates that these non-COCs do not pose risks to onsite workers above the EPA's risk management criteria. The Site owner will be advised of this information. It should be noted that the indoor air samples were collected with the building completely closed and without benefit of any air circulation, fans or air conditioning. Any system of air handling, heating or cooling implemented for the building's use would be expected to reduce the levels of any air contaminants, regardless of source.

The March 2015 soil sampling event also indicated that the SVE system had reduced soil concentrations since implementation of the RI. The only VOC detected was PCE in the 4- to 6-foot samples in FCB10 (present at 0.025 mg/kg) and FCB11 (present at 0.006 mg/kg). However, these detections were below the soil cleanup goal, FDEP's SCTL for leachability to groundwater (Table 7). The EPA determined that the sampling had demonstrated that the SVE system was no longer necessary. After consultation with the FDEP, the system was shut down on December 14, 2015.

Table 7: Summary of March 2015 Contaminant Rebound Soil Data[a]

COC	Leachability SCTL (mg/kg)	FCB10: 4 to 6 ft bgs (mg/kg)	FCB11: 4 to 6 ft bgs (mg/kg)
PCE	0.03	0.025	0.006

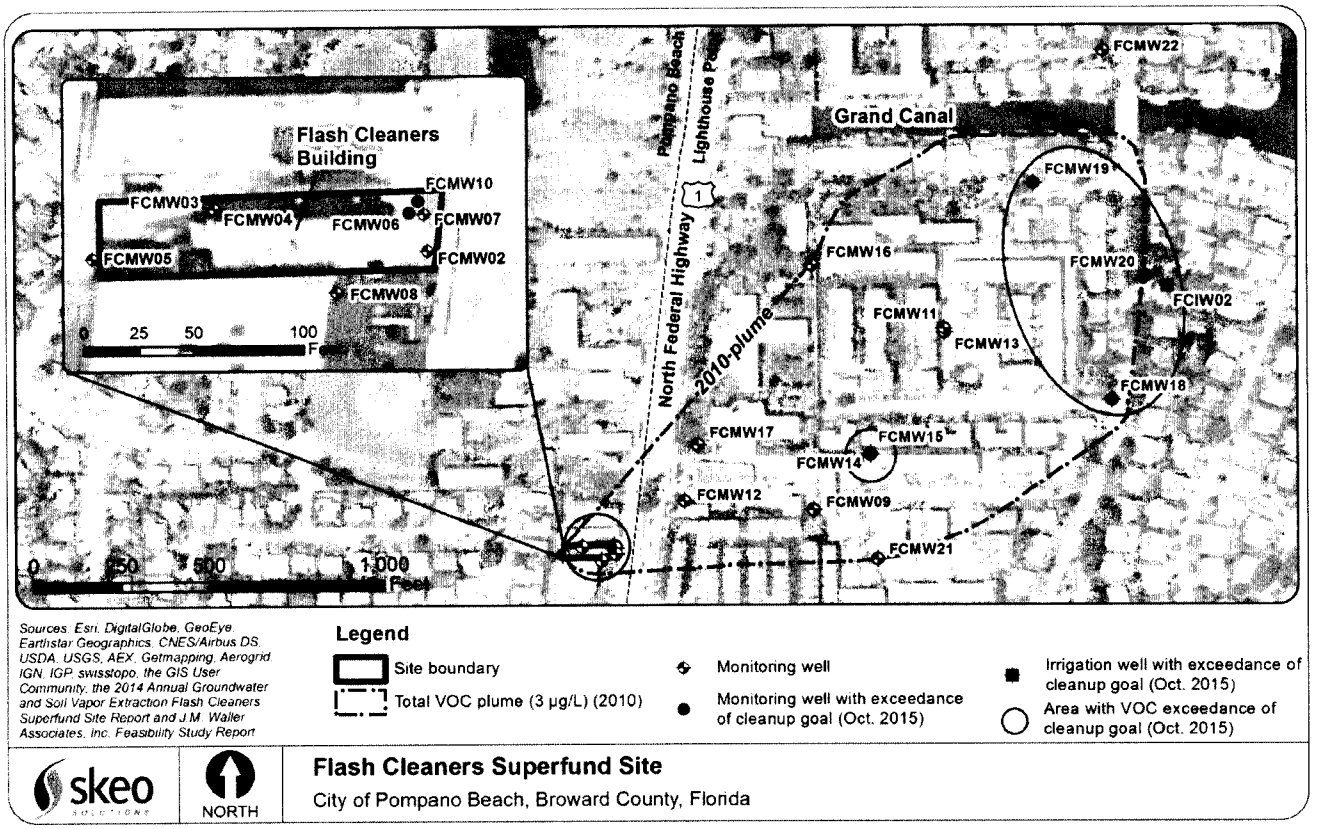
Notes:
a. From Table 2 of the Evaluation of the Soil Vapor Extraction System, Flash Cleaners Site, Pompano Beach, Florida. Prepared by J.M. Waller Associates, Inc. Dated August 2015.
mg/kg = milligram per kilogram

Groundwater

The groundwater plume extent in 2010 and the remaining locations of contamination in 2015 are shown in Figure 2. The circled wells are those with any one COC above the cleanup goal. These minimal remaining areas of contamination demonstrate that reductive dechlorination enhanced by active bio-treatment injections is still ongoing and actively transforming and removing the COCs. The wells with remaining COC concentrations above the cleanup goals are further discussed below.

The EPA initiated compliance groundwater sampling in September 2011 on select monitoring wells. The sampling frequency was quarterly for the first year, semiannually for years two through four, and annually thereafter, or until cleanup levels are reached. The groundwater data evaluated for this FYR include September 2011 through October 2015, the most recent data available (Appendix F).

Figure 2: Monitoring Well Locations



Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, the GIS User Community, the 2014 Annual Groundwater and Soil Vapor Extraction Flash Cleaners Superfund Site Report and J.M. Waller Associates, Inc. Feasibility Study Report

Legend

- Site boundary
- Total VOC plume (3 µg/L) (2010)
- Monitoring well
- Monitoring well with exceedance of cleanup goal (Oct. 2015)
- Irrigation well with exceedance of cleanup goal (Oct. 2015)
- Area with VOC exceedance of cleanup goal (Oct. 2015)

skeo SOLUTIONS

NORTH

Flash Cleaners Superfund Site

City of Pompano Beach, Broward County, Florida

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

The EPA monitors wells located upgradient of the Site (FCMW05) for background water quality, those located within the source area (FCMW03, FCMW06 and FCMW10), and located downgradient (FCMW09 and FCMW11 through FCMW22), as shown in Figure 2. FCMW20 is located on the eastern boundary of the plume. FCMW22 is located across the Grand Canal. Wells FCMW16 through FCMW22 (7 wells) are "multi-channel wells" which have multiple screened intervals available for sampling.

PCE was not detected in groundwater above the cleanup goal between August 2012 and October 2014. PCE concentrations in monitoring well FCMW06, which historically had the highest site PCE concentrations, have dropped five orders of magnitude since treatment began. PCE concentrations in this well were undetected in November 2014, but began being detected again starting in May 2015 at a concentration of 36 µg/L with a significant increase to 12,000 µg/L in October 2015 (Figure 3). Degradation products of PCE (e.g., TCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride) also exhibit downward trends in source area wells, with the exception of FCMW06. The well had rebounds of cis-1,2-DCE in November 2014 and in May and October 2015; TCE in May and October 2015; and of vinyl chloride from October 2013 to October 2015 (Figure 3).

During the March 2013 sampling, the EPA's contractor observed a slight rebound of vinyl chloride in downgradient well FCMW12. Concentrations returned to below cleanup levels from October 2013 to November 2014. Cis-1,2-DCE and vinyl chloride also persist, but they have a downward trend in downgradient monitoring wells FCMW09, FCMW13, FCMW15 and FCMW19. Since 2013, cis-1,2-DCE concentrations have been below the cleanup goal in these four downgradient wells. Vinyl chloride continues to decrease in these wells, but concentrations in FCMW15 and FCMW19 still exceed the cleanup goal of 1 µg/L. In October 2015, FCMW19 exceeded the vinyl chloride cleanup goal in the 25-foot interval (1.2 µg/L) and the 45-foot interval (2.8 µg/L), while the deeper 68-foot interval was below detection (Figure 4). FCMW22, across the Grand Canal, exhibited detections below cleanup goals of cis-1,2-DCE and PCE in the 25-foot and 45-foot intervals in November 2011. The 25-foot interval for FCMW22 has been below detection ever since 2011 for PCE, while low concentrations of cis-1,2-DCE (less than 0.5 µg/L, cleanup goal is 70 µg/L) have been detected. Given the potential for other non-Site sources as noted in the RI Report, the EPA does not believe these trace detections originate from the Flash Cleaners Site.

After review, the EPA concluded that these data support the finding that PCE is being degraded through the ongoing process of reductive dechlorination. All of the COCs noted in this discussion are expected to appear on occasion within the plume, because they are the expected degradation products resulting from reductive dechlorination.

Figure 3: Contaminant Trends in Source Area Well FCMW06

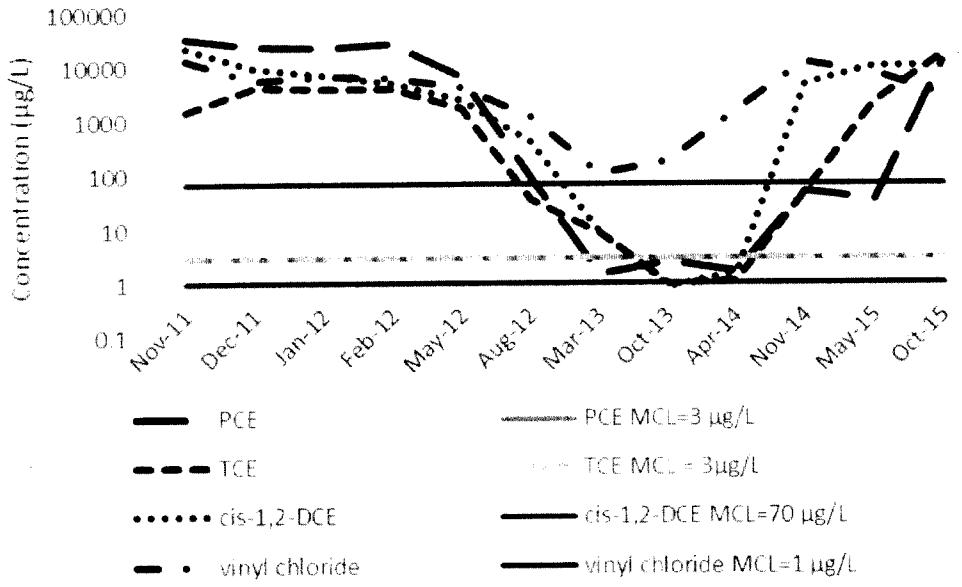
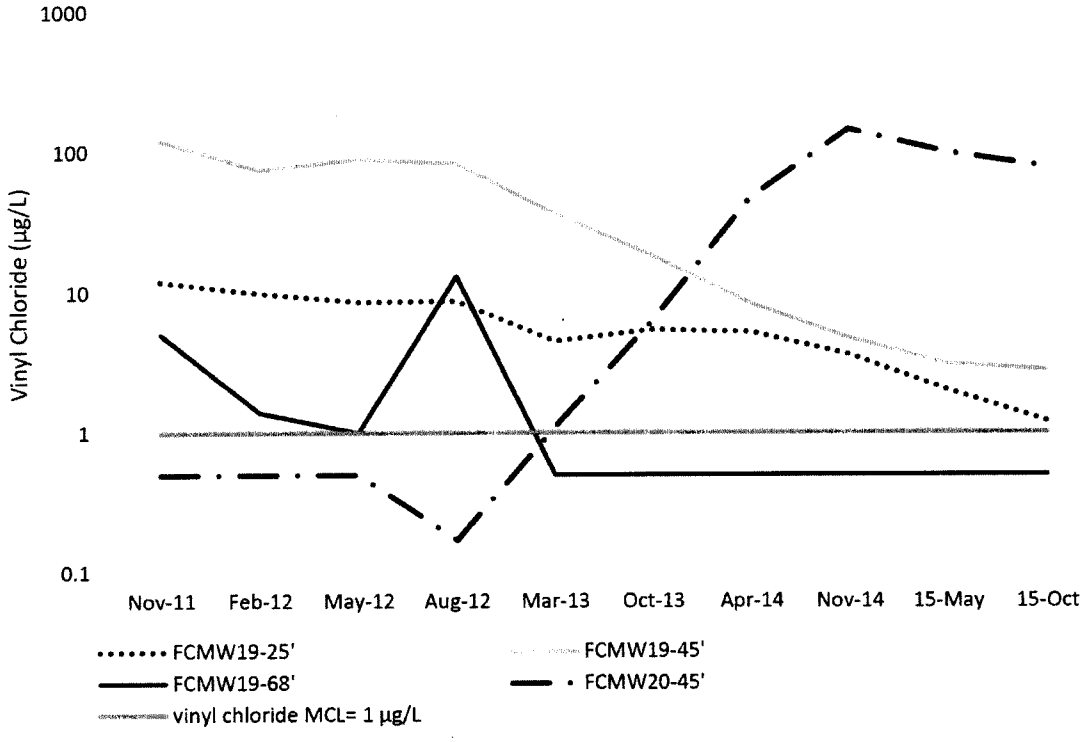


Figure 4: Vinyl Chloride Contaminant Trends in FCMW19 and FCMW20



Elevated levels of cis-1,2-DCE and vinyl chloride were also measured in the eastern boundary monitoring well FCMW20, located downgradient along the eastern edge of the plume. Concentrations of cis-1,2-DCE remained above the cleanup goal of 70 µg/L in April 2014 (400 µg/L) although they

decreased in November 2014 (260 µg L). However, vinyl chloride concentrations in FCMW20 have steadily increased above the cleanup goal of 1 µg L in the 45 foot-interval, starting in March 2013 (1.1 µg L) to 46 µg L in April 2014, 140 µg L in November 2014, 76 µg L in October 2015, and 96 µg L in May 2015 (Figure 3). Vinyl chloride was detected in FCMW20 in the 20 to 25-foot interval in 2015 with concentrations above the cleanup goal but not as high as observed in the 45-foot interval. Vinyl chloride was detected in the 68-foot interval at 13 µg L in May 2015 and below detection in October 2015 in this well (FCMW20). Historically, COCs have been detected in FCMW20, but at concentrations below cleanup goals. The EPA's contractor attributed these increases to continued degradation of PCE breakdown products and the eastward migration of the plume, possibly enhanced also by pumping from the irrigation well, FCIW02.

FCMW20 is located at the same residence as the irrigation well FCIW02, which is near the corner of the home and was sampled during the RI. The screening depth interval for the irrigation well FCIW02 is unknown, but the owner was told by the well driller that it has a total depth of 80 feet. Typical irrigation well construction would suggest the well is screened from the bottom upwards some distance, from 80 feet below land surface, with the pump positioned a few feet above the bottom. The well was installed for irrigation purposes, and the typical reason for a deeper depth such as 80 feet is to avoid the well going dry. This information strongly suggests that the water sampled from FCIW02 does not come from near the water table. This is significant because there is no potential to cause vapor intrusion unless the COC-bearing groundwater is located at the water table.

The EPA performed a vapor intrusion evaluation specifically targeted at the FCMW20-FCIW02 area, and concluded that a completed pathway does not exist there. The evaluation is presented in Appendix G.

In April 2014, irrigation well FCIW02 contained concentrations of cis-1,2-DCE (330 µg L) and vinyl chloride (5.3 µg L) above cleanup goals. November 2014 data showed that concentrations of cis-1,2-DCE and vinyl chloride had increased to 380 µg L and 91 µg L, respectively. October 2015 results for FCIW02 showed decreases, to 140 µg L cis-1,2-DCE and 66 µg L vinyl chloride. Based on these continuing detections, the EPA's contractor recommended that: 1) residential irrigation well FCIW02 continue to be a part of groundwater monitoring for 2016; 2) sampling of all depths of multi-chambered boundary wells FCMW18 and FCMW20 during the semiannual groundwater monitoring event to evaluate the vertical extent of the groundwater plume that may be migrating beyond the plume boundary identified during the RI; and 3) the EPA should consider whether an additional boundary well is be necessary to determine an eastern boundary for the groundwater plume.

The ROD groundwater remedy called for re-injection of the EOS after collection of three years of monitoring data. The second injection, and any additional injections, would treat remaining hot spots within the plume. The 2015 Annual Groundwater and Soil Vapor Extraction Monitoring Report identified a significant rebound of parent compounds in the source area at FCMW06, along with a coinciding drop in dehalococcoides populations (the microbes that biodegrade the COCs). These findings support the need for additional reinjection treatments in this area. Additional injections are planned this year (2016).

<u>Surface Water and Sediment Porewater</u>

The EPA established a long-term surface water compliance monitoring program to sample sediment porewater and surface water annually for at least three years to monitor VOC-contaminated groundwater

discharging to the Grand Canal. Sediment porewater and surface water samples were collected from 13 sampling locations (see Figure 1-4 in the 2015 Annual Monitoring Report (available in Appendix H)). Eight locations are based on the results of porewater (FCPW31 through FCPW37 and FCPW41) and surface water investigations (FCSW31 through FCSW37 and FCSW41) in April and November 2010: these locations represent groundwater inflow to Grand Canal. Five easterly locations (FCPW FCSW42 through FCPW FCSW46) along the canal were added as recommended by the 2014 Addendum to the Groundwater O&M Work Plan, based on the elevated COCs seen in boundary well FCMW20.

Results for surface water and sediment porewater compliance monitoring are provided in Appendix F. Sample locations FCPW42 through FCPW46 were added to the sampling program starting in November 2014 due to elevated COC concentrations in eastern boundary monitoring well FCMW20. However, COC detections were below screening criteria or below detection at these locations.

The only COCs detected in surface water or porewater were vinyl chloride, cis-1,2-DCE and trans-1,2-DCE. Only vinyl chloride was detected above the Ambient Water Quality Criteria in surface water sample FCSW36, with a concentration of 0.16 µg/L in 2014 (versus the criterion of 0.025 µg/L). The corresponding sediment porewater vinyl chloride concentration in FCPW36 of 24 µg/L also exceeded the surface water criterion. This is an increase from previous monitoring events at this location, but is below the concentration during the RI (230 µg/L), indicating a decreasing trend. Cis-1,2-DCE was also detected in surface water sample FCSW41 and associated porewater sample FCPW41. However, the concentrations were below criteria. Trans-1,2-DCE was not detected in surface water but was detected below criteria in two porewater samples, FCP41 and FCP42. The detections of vinyl chloride and cis-1,2-DCE in the two surface water samples in 2014 are the first detections of COCs in surface water since the RI. In 2015, there were no detections of COCs in surface water and no COCs measured above the FDEP surface water criterion. Ongoing sampling will continue in order to verify that porewater and surface water do not exceed acceptable criteria.

6.5 Site Inspection

The site inspection took place on October 13, 2015. Participants included Ralph Howard, EPA RPM; Donald Hardison, TetraTech (EPA contractor); Arnold Ostrofsky, JM Waller Versar Corp. (EPA contractor); and Johnny Zimmerman-Ward and Kelly MacDonald (Skeo Solutions). General conditions were noted and photographed (Appendix E). The inspection began on the former Flash Cleaners property. Participants looked at the area of former soil excavation in the backyard of the Site, which was well vegetated with grass. The SVE system appears to be in good condition. Participants went inside the building, which had leftover materials from the dry cleaning and drop-off operations. Participants also inspected wells on the site property, off-site wells across North Federal Highway, and wells in the residential Lighthouse Point area. All wells were in good condition. Results from the site inspection are in the Site Inspection Checklist in Appendix D.

On October 13, 2015, Skeo Solutions staff visited the designated site repository, Lighthouse Point Library, as part of the site inspection. Administrative records are present in hard copy and on compact disc at the library.

6.6 Interviews

The FYR process included interviews with parties affected by the Site, including regulatory agencies involved in site activities or aware of the Site. The purpose was to document the perceived status of the

Site and any perceived problems or successes with the phases of the remedy implemented to date. Interviews with local government officials and residents took place during the site inspection on October 13 and 14, 2015. All other interviews were conducted via email. The interviews are summarized below. Appendix C provides the complete interviews.

Residents: Seven residents were interviewed during the site inspection. Two residents who live near the canal were interviewed. One resident knew nothing about the Site and had few comments. The other resident knew about the Site because there is a well in front of his property that is sampled as part of the cleanup. This resident expressed negative opinions about the project, stating that is was a waste of money and that they wished they had not agreed to have the well in their yard because the people who sample it spill chemicals and damage the sod. He stated that he had had to replace some sod around the well because of this. Two residents who live near the Flash Cleaners building were interviewed. They both knew very little about the Site. One resident said that he had seen a man sleeping in a dump truck near the building. Three residents who live above the plume were interviewed. They knew very little about the Site.

Donald Hardison: Mr. Hardison of Tetra Tech stated that cleanup at the Site has gone well and that the remedy in place appears to be protective. He noted that the SVE system seems to have remediated the soil beneath the building to below SCTLs and that JM Waller Versar Corp. recommends shutting down the SVE system. Mr. Hardison also stated that there have been significant decreases in COC concentrations since groundwater treatment, and COCs have been detected in porewater samples at the Grand Canal only at low concentrations. He noted that one resident has a private irrigation well; JM Waller Versar Corp. monitored it and it does not appear to present unacceptable risk to the homeowner. He stated that there are monthly O&M events on the SVE system, and that there have been no significant changes in site O&M requirements or schedules, no unexpected O&M difficulties, and no SVE optimizations. In September 2015, there was one optimization for groundwater, in which JM Waller Versar Corp. (the EPA contractor) requested foregoing monitoring for FDEP underground injection control analytes, color and polysorbate 80, due to costs and lack of detections at the Site. Mr. Hardison pointed out that the property has been vacant for a couple years, but there is a new owner who appears to be interested in reuse of the property.

Charlotte Burrie: Ms. Burrie, Vice Mayor and District 2 Commissioner of Pompano Beach, stated that she was very familiar with the Site. She noted that the City does not receive many complaints about the Site anymore. She also stated that she was not aware of any trespassing, land use changes or changes to local regulations that would affect the Site. She suggested that email and phone would be the best ways for the EPA to communicate with the City.

Dennis Beach: Mr. Beach, Pompano Beach City Manager, was not very familiar with the Site. He said that the EPA has not communicated with the City and that email and mail are the best ways to keep in touch. He also stated that he was not aware of any trespassing, land use changes, resident complaints or changes to local regulations that would affect the Site. Mr. Beach also stated that the Site is part of the Broward County Service Area for water, and that if someone filed for a well permit through the City, it would go through the Pompano Beach Building Department.

7.0 Technical Assessment

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

The remedy appears to be functioning as intended by the 2010 ROD. This section presents a detailed technical assessment of remedy performance in support of this conclusion.

The selected soil remedy included excavation and off-site disposal of contaminated soils, SVE with vapor-phase carbon adsorption, and institutional controls. Soil excavation is complete. Monitoring and sample results in 2015 indicated that remedial goals for the SVE system have been met. In addition, site-related COCs were below detection in indoor ambient air. The SVE system was shut down permanently in December 2015.

As described in section 6.4, in March 2015, five contaminants (1,2- DCA, benzene, chloroform, ethylbenzene and naphthalene), which are non-COCs and were not detected in site groundwater at the Flash Cleaners property during the RI, were detected in indoor air above RSLs. A screening-level risk analysis (Appendix I) indicates that these non-COCs do not pose risks to onsite workers above the EPA's risk management criteria. The Site owner will be advised of this information, but the findings do not indicate a need for action. As long as some form of air circulation or cooling is used inside the former Flash Cleaners building, no health risks will be presented from these non-Site-originated chemicals.

The selected groundwater remedy was in-situ enhanced bioremediation with institutional controls and monitoring. As described in section 6.4 and shown on Figure 2, the groundwater injections conducted from June to August 2011 have had very favorable results: the great majority of the plume area has no detections of COCs in the latest data.

According to the 2010 ROD, source area groundwater was to be addressed by additional injection treatments if remaining PCE hot spots became evident from site data. Prior to May 2015, PCE had not been detected above cleanup goals in source area groundwater since August 2012; at that time however, PCE began to be detected above the cleanup goal in source area well FMCW06 with a significant increase in October 2015 (12,000 µg/L). Similarly, TCE had not been detected above the cleanup goals in site groundwater since March 2013; however, concentrations were detected above the cleanup goals in the same source area well (FCMW06) starting in May 2015, with a significant increase in October 2015 (16,000 µg/L). Concentrations of other daughter products have also rebounded, suggesting that reductive dechlorination is ongoing in the source area. The greatly-elevated COC levels suggest that a mass of contaminated groundwater formerly located beneath the Flash Cleaners building has migrated forward (eastward) into the vicinity of FCMW06. The 2015 Annual Groundwater and Soil Vapor Extraction Monitoring Report also identified a notable, coinciding drop in dehalococcoides populations (the microbes predominantly responsible for generating in-situ reductive dechlorination). The report concluded that based on the significant rebound of parent compounds (PCE) in the source area, and the drop in microbial populations, reinjection treatment in the area around FCMW06 appears to be necessary, as was planned for in the 2010 ROD. The EPA is currently in the planning phase for conducting an additional round of injections.

In addition, PCE degradation product detections above cleanup goals continue in downgradient wells, primarily in the northeast area of the plume. FCMW19 exceeded the vinyl chloride cleanup goal in the 25-foot (1.2 µg/L) and 45-foot intervals (2.8 µg/L) in October 2015. The 68-foot interval was below

detection in October 2015. Irrigation well FCIW02 was sampled in October 2015 and results showed 140 µg L cis-1.2-DCE and 66 µg L vinyl chloride in FCIW02. In addition, downgradient well FCMW20, which is adjacent to the irrigation well, also demonstrated an increase in vinyl chloride concentrations over time, with the highest observed in November 2014 (140 µg L) in the 45-foot interval and declined to 76 µg L in October 2015 but still remains above the cleanup goals. The 11-foot interval of well FCMW20 indicates below detection for all COCs. As noted above, these occurrences are the expected degradation products resulting from reductive dechlorination.

It was established in the RI that site groundwater ultimately discharges into the Grand Canal. The October 2015 data from sediment porewater shows that site COCs are not reaching pore or surface water at unacceptable levels, an indication that robust degradation of the COCs is ongoing in the downgradient area approaching the canal. The data also show only one detection of one COC (cis-1.2-DCE, 6 µg L) among the five stations east of station FCPW41, at the east side of the bridge over Grand Canal (see Figure 2), which does not indicate a significant eastward expansion of the groundwater plume. Nevertheless, the consistent detection of COCs in the northeast plume area indicates that the EPA should consider whether an additional well is necessary to monitor COC concentrations in this area.

As noted above, the concentrations of daughter products from ongoing reductive dechlorination have varied over time in downgradient wells, but remain above the cleanup goals. Residents and businesses in the area of site groundwater contamination are connected to a public water system for drinking water. Current groundwater data do not indicate that vapor intrusion is a concern for residential or commercial buildings overlying the groundwater plume.

The screen-depth interval for the irrigation well FCIW02 is unknown, but the well driller told the well owner at the time of installation that it has a total depth of 80 feet. This information suggests that the water sampled from FCIW02 likely does not come from near the water table. To screen this well (FCIW02) for the potential for vapor intrusion in the event the COCs were present at the water table, this FYR conducted a screening-level risk assessment, using the EPA's Vapor Intrusion Screening Level (VISL) calculator[1] and the FCIW02 data from October 2015. The screening-level VISL results indicate that cancer risks would exceed the EPA's upper-bound of the risk management range of 1×10^{-6} to 1×10^{-4} (4.5×10^{-4}), while the noncancer hazard quotient (HQ: 0.72) would be below the 1.0 benchmark. As noted however, the 11-foot interval of nearby well FCMW20 is below detection limits for all COCs, and the available information indicates the screened interval of well FCIW02 lies considerably below the water table.

In response to these results, in 2015 the EPA 1) directed that irrigation well FCIW02 would continue to be a part of groundwater monitoring program; 2) agreed that additional (all available) depth intervals of wells FCMW18 and FCMW20 would be added to future semiannual and annual groundwater sampling events; and 3) acknowledged the need to consider, in consultation with FDEP, whether an additional boundary well is necessary to determine an eastern boundary for the groundwater plume.

Concerning the potential for vapor intrusion at FCIW02, for purposes of this FYR the initial review of the October 2015 data conducted in in December 2015 was formalized into a technical review memorandum by the assigned EPA hydrogeologist (Appendix G). The review indicated that vapor intrusion is highly unlikely at the FCIW02 area, but recommends continued sampling of the shallowest

[1] Using the OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, June 2015.

available groundwater zones (11 feet). In addition however, verification by the EPA of the depth interval screened by irrigation well FCIW02 would provide complete certainty that vapor intrusion cannot be occurring at the home where well FCIW02 is located.

The groundwater remedy also included an institutional control. Research conducted for this FYR indicates that EPA will need to take action to ensure the effectiveness of the institutional control. The MOA between the EPA and SFWMD was intended to restrict drinking water well placement within and near the contaminant plume. Pursuant to the MOA, the EPA was to generate the necessary map delineating the "Zone A Zone B" areas on and near the Site from which drinking water well placement should be restricted. The map was to be used by Broward County Department of Health, to whom SFWMD delegates the responsibility to issue the permits, for their use in enforcing the restrictions. No map was found during this FYR. In view of this finding, the EPA will need to create the necessary map in a form suitable for use by Broward County Department of Health, so that well installations in the vicinity of the affected groundwater plume will not be allowed. In the course of driving the Site area twice annually and at other times, the EPA's contractor has maintained visual reconnaissance of the offsite residential areas underlain by the groundwater plume, and has not observed any newly-installed water wells in the area.

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

RAOs used at the time of the remedy selection are still valid. There have been some updates to the EPA Superfund default exposure parameters for residential and industrial worker receptors. There have also been updates to the IRIS toxicity assessments for TCE, PCE, cis-1,2-DCE, and trans-1,2-DCE. Considering these updates for exposure and toxicity, the cleanup goals for groundwater (based on drinking water standards) are all still protective (i.e., within the EPA risk management range). Likewise, the soil cleanup goals used for the Site are still protective based on the protection of groundwater pathway. Additionally, the soil cleanup goals are more stringent than would be cleanup goals for soil direct contact for either a resident or worker.

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

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

7.4 Technical Assessment Summary

The remedy appears to be functioning as intended by the 2010 ROD. Soil contaminant levels at the Site are below cleanup levels. Groundwater contamination has been greatly reduced through injection treatments, although there is some rebounding of PCE at source area well FCMW06, and daughter products currently exceed cleanup goals in downgradient wells FCMW19, FCMW20 and the nearby irrigation well, FCIW02. At FCMW06, an additional injection treatments are planned in accordance with the 2010 ROD, in order to ensure the continued effectiveness of the groundwater remedy.

Continued monitoring of the plume including particularly in the downgradient area, is necessary to ensure there are no unacceptable exposures to contaminated groundwater, and that no unacceptable COC levels appear in porewater and surface water samples in Grand Canal.

An MOA with SFWMD serves as an institutional control to restrict use of groundwater in the site groundwater plume area. However, the map described in the MOA for use in guiding permitting restrictions, was not located during the FYR. The EPA needs to create get the necessary map and provide it to the SFWMD, in order to properly restrict well installations in the vicinity of the affected groundwater plume.

The on-site building is not presently in use. If the building is returned to use, the ROD states that indoor monitoring will be necessary until Site groundwater contamination meets cleanup levels.

Soil and groundwater cleanup goals remain valid. Vapor intrusion analyses indicate no exposure to site-related COCs in buildings. Indoor air exceedances by non-COCs (1,2- DCA, benzene, chloroform, ethylbenzene and naphthalene) were observed in the Flash Cleaners building, but the findings do not indicate a need for action. These five non-COCs were not detected in site groundwater at the Flash Cleaners property during the RI. In downgradient areas, as detailed in Appendix G, current data do not indicate that a vapor intrusion pathway is completed in the vicinity of FCMW20 and FCIW02.

Remedial activities have met soil RAOs of preventing human exposure to soil contamination and preventing migration of contaminants in soil to groundwater. Once the groundwater remedy achieves groundwater cleanup goals, the last groundwater RAO of restoring groundwater to state and federal drinking water standards will be achieved.

8.0 Issues, Recommendations and Follow-up Actions

Table 8: Issues and Recommendations Identified in the Five-Year Review

OU(s): 1	Issue Category: Monitoring			
	Issue: COCs were measured in wells at the eastern boundary of the plume above cleanup goals.			
	Recommendation: Evaluate the need for an additional well to monitor the eastern plume boundary.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	EPA	EPA	9/19/2017

OU(s): 1	Issue Category: Monitoring			
	Issue: VOCs were measured in downgradient irrigation well FCIW02, sampled from an uncertain depth interval, at levels which, if present at the water table, could potentially cause vapor intrusion at the associated residence.			
	Recommendation: Verify/confirm the screened depth interval of well FCIW02, and confirm that vapor intrusion is not occurring at the residence associated with FCIW02.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date

No	Yes	EPA	EPA	9/19/2017

OU(s): 1	Issue Category: Remedy Performance			
	Issue: Elevated levels of PCE and related breakdown-product COCs are present in source area well FCMW06, as well as reduced microbial population levels (necessary to foster reductive dechlorination processes), indicating the need for additional groundwater injection treatments.			
	Recommendation: Conduct additional groundwater injection treatments at and around FCMW06, to support continued biodegradation of the groundwater plume in the source area and downgradient.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/19/2017

OU(s): 1	Issue Category: Institutional Controls			
	Issue: The map described in the institutional control document (MOA), which is necessary to guide well permitting restrictions, was not found during the FYR.			
	Recommendation: Ensure the map delineating the areas in which well installations are to be restricted is generated by the EPA, is available for use, and that appropriate water well restrictions (the institutional control) is being enforced.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/State	9/19/2017

The following additional item, though not expected to affect protectiveness, warrants additional follow up:

- Advise new property owner concerning the non-site COCs detected in 2015 indoor air samples that must be considered by both tenant and owner, with respect to the anticipated use of the building by tenants who intend to make commercial use of the building.

9.0 Protectiveness Statement

Table 9: Protectiveness Statement

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Site currently protects human health and the environment because there are no completed exposure pathways. For the remedy to be protective over the long term, the following actions need to be taken to ensure protectiveness: evaluate the need for an additional well to monitor the eastern plume boundary, verify/confirm that vapor intrusion is not occurring at the residence associated with FCIW02, conduct additional groundwater injection treatments at and around FCMW06, and ensure that the map delineating the areas in which well installations are to be restricted is generated by the EPA, is available for use, and that appropriate water well restrictions (the institutional control) are being enforced.

10.0 Next Review

The next FYR will be due within five years of the signature approval date of this FYR.

Appendix A: List of Documents Reviewed

2015 Annual Groundwater and Soil Vapor Extraction Monitoring Report. Flash Cleaners Site. Pompano Beach. Broward County. Florida. Prepared for U.S. Environmental Protection Agency Region 4 by J.M. Waller Associates. Inc. January 2016.

2014 Annual Groundwater and Soil Vapor Extraction Monitoring Report. Flash Cleaners Site. Pompano Beach. Broward County. Florida. Prepared for U.S. Environmental Protection Agency Region 4 by J.M. Waller Associates. Inc. April 2015.

Addendum to the Groundwater Operation Monitoring and Maintenance Work Plan for the Groundwater Monitoring of Flash Cleaners Site Pompano Beach. Florida dated October 2012. J.M. Waller Associates. Inc. May 2014.

Addendum to the Soil Vapor Extraction Operation Monitoring and Maintenance Work Plan for the Soil Vapor Extraction Monitoring of the Flash Cleaners Site. Pompano Beach. Florida dated August 2011. J.M. Waller Associates. Inc. May 2014.

Evaluation of the Soil Vapor Extraction System. Flash Cleaners Site. Pompano Beach. Florida. Prepared by J.M. Waller Associates. Inc. August 2015.

Final (100%) Groundwater Remedial Design. U.S. Environmental Protection Agency. June 2011.

Final (100%) Soil Remedial Design. U.S. Environmental Protection Agency. April 2011.

Groundwater Operation Monitoring and Maintenance Work Plan for the Groundwater Monitoring of Flash Cleaners Site Pompano Beach. Florida. J.M. Waller Associates. Inc. October 2012.

Memorandum of Agreement between the U.S. Environmental Protection Agency and the South Florida Water Management District (SFWMD). 11 March 2010.

Preliminary Close Out Report. Flash Cleaners Superfund Site. Prepared by Barbara Alfano. USEPA Region 4. September 2011.

Record of Decision Summary of Remedial Alternative Selection. Flash Cleaners Superfund Site. Pompano Beach and Lighthouse Point. Broward County. Florida. Prepared by the U.S. Environmental Protection Agency. Region 4. Atlanta. Georgia. September 30. 2010.

Remedial Investigation Report of Flash Cleaners Site. Pompano Beach. Florida. Final. Prepared by J.M. Waller Associates. Inc. for U.S. Environmental Protection Agency. September 2010.

Soil Vapor Extraction Operation Monitoring and Maintenance Work Plan. Prepared by J.M. Waller Associates. Inc. for U.S. Environmental Protection Agency. August 2011.

Source Removal Report. Flash Cleaners & Laundry. By REP Associates Inc. for Flash Cleaners & Laundry. April 30. 2001.

Appendix B: Press Notice

The U. S. Environmental Protection Agency, Region 4
Announces the First Five-Year Review
for the Flash Cleaners Superfund Site,
Pompano Beach, Broward County, Florida

Purpose/Objective: EPA is conducting a Five-Year Review of the remedy for Flash Cleaners Superfund Site (the Site) in Pompano Beach, Florida. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect human health and the environment.

Site Background: The half-acre Site is located in a commercial and residential area. From 1977 to about 2001, Flash Cleaners operated a dry cleaning facility on site. Workers reportedly discharged wastewater to an on-site septic tank, which resulted in soil and groundwater contamination. In 2008, EPA listed the Site on the Superfund program's National Priorities List. Contaminants of concern in the soil included tetrachloroethylene (also known as PCE or PERC), trichloroethylene (TCE), cis-1,2-dichloroethene (DCE) and vinyl chloride. Groundwater contaminants of concern included PCE, TCE, cis-1,2-DCE, trans-1,2-DCE and vinyl chloride.

Cleanup Actions: EPA selected the Site's long-term remedy in the Site's 2010 Record of Decision. It included excavation and disposal of contaminated soils, soil vapor extraction to remove soil contamination beneath the Flash Cleaners building, and injections of organic material into groundwater to speed up the natural breakdown of contaminants. The cleanup also required temporary institutional controls to prevent people from coming in contact with the groundwater during cleanup. EPA also periodically checks Site groundwater, surface (canal) water, and water located within sediment. Since 2011, the level of contamination in Site groundwater has been decreased by natural and enhanced attenuation of the contaminants.

Five-Year Review Schedule: The National Contingency Plan requires review, every five years, of Superfund remedial actions that result in any hazardous substances, pollutants or contaminants remaining at a Site above levels that allow for unlimited use and unrestricted exposure, to ensure the protection of human health and the environment. The cleanup action for the Site is ongoing and not yet completed. The first Five-Year Review for the Site will be completed by September 2016.

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

Ralph Howard, Jr., EPA Remedial Project Manager
Phone: 404-562-8829
(toll-free)
Email: howard.ralph@epa.gov

LaTonya Spencer, EPA Community Involvement Coordinator
Phone: (404) 562-8463 | (800) 564-7577
Email: spencer.latonya@epa.gov

Mailing Address: EPA Region 4, 61 Forsyth St. S.W., Atlanta, GA 30303-8960

Additional site information is also available at the Site's document repository, Lighthouse Point Library, located at 2200 Northeast 38th Street in Lighthouse Point, Florida, and online at *http://www.epa.gov/region4/superfund/sites/npl/florida/flashclfl.html*.

Appendix C: Interview Forms

Flash Cleaners Superfund Site **Five-Year Review Interview Form**

Site Name: **Flash Cleaners** **EPA ID No.:** **FLD083111005**
Interviewer Name: **NA** **Affiliation:**
Subject Name: **Donald Hardison** **Affiliation:** **Tetra Tech/JM Waller**
Subject Contact Information: **Phone: (904) 730-4669 ext. 227**
Donald.Hardison@tetratech.com
8640 Philips Highway, Suite 16 | Jacksonville, FL 32256
Time: **NA** **Date:** **NA**
Interview Location: **NA**

Interview Format (circle one): **In Person** **Phone** **Mail** **Other: Email**

Interview Category: **O&M Contractor**

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

   Cleanup at the Site to this point has gone really well. There have been significant decreases in concentrations site wide since groundwater treatment. Until a rebound this past year in one source area well FCMW06, PCE and TCE had been below groundwater cleanup goals since August 2012 and March 2013, respectively. Only breakdown products have been observed in downgradient wells, and aside from one boundary well, have consistently decreased in concentration. Maintenance of the SVE system has been routine and limited to small repairs such as hoses and gauges. The granulated activated carbon has been replaced once. The property has been vacant for a couple years, but there is a new owner who appears to be interested in reuse of the property.

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

   The remedy in place appears to be protective. A recent sampling event revealed that the SVE system appears to have remediated the soil beneath the building to below soil cleanup target levels. Also, as previously discussed, groundwater COC levels have decreased significantly at the Site since injections. Concentrations of breakdown products downgradient have consistently decreased with the exception of boundary well FCMW20. There is an irrigation well on the property with FCMW20. We have begun to monitor that irrigation well also. The irrigation well (FCIW02) has had elevated concentrations of breakdown products since monitoring began. The EPA evaluated these results and concluded that the homeowner is not at risk through the irrigation pathway, and the well may remain in use for irrigation purposes. In addition, while COCs have continued to be detected in porewater samples at the Grand Canal, concentrations have remained low.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

   Until a rebound this past year in one source area well (FCMW06), PCE and TCE had been below groundwater cleanup goals since August 2012 and March 2013, respectively. Only breakdown products have been observed in downgradient wells and, aside from one boundary well, have consistently decreased in concentration. This boundary well has seen an increase in the concentration of breakdown products and we have begun sampling more intervals in the well to better evaluate this

area. The boundary well is on a property with an irrigation well, and we have begun to monitor that irrigation well also. A recent sampling event showed that soil beneath the building was below soil cleanup target levels. During the last porewater sampling event, vinyl chloride was the only COC to be measured above the FDEP for Surface Water Cleanup Target Level, but concentrations were an order of magnitude less than those recorded during the RI. There were detections of COCs in surface water samples, but no exceedances of screening criteria.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

   There are monthly O&M events on the SVE system. These are one-day events, during which parameters evaluated include flow rates from each SVE well, effluent flow rate, FID readings from each SVE well, and the GAC influent, intermediate, and effluent air streams. Laboratory samples for influent, intermediate and effluent air streams are collected and sent to a laboratory. Adjustments are made to flow rates and vacuum as needed during these events, and any noted repairs are completed.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

   There have not been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up. There have been small changes in sampling such as adding additional porewater sample locations, additional intervals on boundary wells, and sampling an irrigation well when it was noted that the groundwater plume appears to be shifting to the northeast downgradient.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

   There have not been any unexpected O&M difficulties or costs at the Site since start-up.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

   There have not been any optimizations with the SVE other than evaluating the SVE system's performance this year. We did request forgoing monitoring for FDEP UIC analytes, color and polysorbate 80, due to costs and lack of detections at the Site. That was approved in September 2015 by FDEP and eliminated from annual sampling events.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

   An SVE evaluation submitted in August 2015 concluded that the RAOs established in the ROD have been met, the cleanup target levels have been reached for soil, and the SVE system may be discontinued. Based on this conclusion, we recommend shutting the SVE system down.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**Vice Mayor & District 2 Commissioner Charlotte Burrie and Utilities Director Randolph Brown**	**Affiliation:**	**Pompano Beach Government**

Subject Contact Information: **954-786-4625 or 945-545-7044**

Time: **10:30 a.m.** **Date:** **10/13/2015**

Interview Location: **Pompano Beach City Hall**

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **Local Government**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes, but I was a resident at the time so I had a resident's education rather than that of a city official.

2. Do you feel well informed regarding the Site's activities and remedial progress? If not, how might the EPA convey site-related information in the future?

   Yes. Email and phone are the best ways to keep in touch.

3. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

   No.

5. Are you aware of any changes in projected land use(s) at the Site?

   No.

6. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   It might be nice for the public to highlight how well the cleanup went with a public success story.

7. Do you have any comments, suggestions or recommendations regarding the project?

   We do not really get any resident complaints about the Site anymore. We used to around 2007, but since then that has only decreased.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**City Manager Dennis Beach and Utilities Director Randolph Brown**	**Affiliation:**	**Pompano Beach Government**

Subject Contact Information: **954-786-4625 or 945-545-7044**
Time: **10:00 a.m.** **Date:** **10/13/2015**
Interview Location: **Pompano Beach City Hall**

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **Local Government**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   I am only slightly familiar with the Site. We annexed that area to the city in 2005.

2. Do you feel well informed regarding the Site's activities and remedial progress? If not, how might the EPA convey site-related information in the future?

   The EPA has not really communicated with us. Email and mail are the best ways to keep in touch.

3. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

   No.

5. Are you aware of any changes in projected land use(s) at the Site?

   No.

6. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   We have not heard anything from citizens about the Site.

7. Do you have any comments, suggestions or recommendations regarding the project?

   No. In terms of water and well installation, the Site is in is part of the Broward County Service Area. If someone filed for a well permit through the City, it would go through the building department.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**Resident near canal**	**Affiliation:**	
Subject Contact Information:			
Time:	**8:00 p.m.**	**Date:**	**10/13/2015**
Interview Location:	**Resident's home**		

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   No, and we have lived here for about 12 years. We have never seen the porewater sampling occur on the canal in the back.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   N/A.

3. What have been the effects of the Site on the surrounding community, if any?

   None.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   We did not receive any flyers and have not heard anything about the Site.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   No.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   No.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**Resident behind Flash Cleaners building**	**Affiliation:**	
Subject Contact Information:			
Time:	**7:00 p.m.**	**Date:**	**10/13/2015**
Interview Location:	**Resident's home**		

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   No. I work during the day though so I would not really see much of what goes on at the Site. I am also in the military and was deployed for some of the time that the cleanup took place.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   N/A.

3. What have been the effects of the Site on the surrounding community, if any?

   None.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   I have seen guys standing back there and working.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   I have not really been informed about site-related activities.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   No.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   No.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**Resident behind Flash Cleaners building**	**Affiliation:**	
Subject Contact Information:			
Time:	**6:50 p.m.**	**Date:**	**10/13/2015**
Interview Location:	**Resident's home**		

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   No. I have lived here for about two years and have not heard anything. This is a very quiet area.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   N/A.

3. What have been the effects of the Site on the surrounding community, if any?

   None.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   I saw a dump truck back there with a guy sleeping in it once.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   I have not really been informed about site-related activities.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   No.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   No.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**Resident who lives above plume**	**Affiliation:**	
Subject Contact Information:			
Time:	**6:00 p.m.**	**Date:**	**10/13/2015**
Interview Location:	**Resident's home**		

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **Residents**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   I have lived here for one year and am not familiar with the Site at all.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   N/A.

3. What have been the effects of the Site on the surrounding community, if any?

   N/A.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   N/A.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   N/A.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   N/A.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   N/A.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**Resident who lives above plume**	**Affiliation:**	
Subject Contact Information:			
Time:	**6:20 p.m.**	**Date:**	**10/13/2015**
Interview Location:	**Resident's home**		

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

Resident did not speak English and was not able to answer questions.

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   N/A.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   N/A.

3. What have been the effects of the Site on the surrounding community, if any?

   N/A.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   N/A.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   N/A.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   N/A.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   N/A.

Site Name:	**Flash Cleaners**	**EPA ID No.:**	**FLD083111005**
Interviewer Name:	**Ralph Howard**	**Affiliation:**	**EPA**
Subject Name:	**Resident near canal**	**Affiliation:**	
Subject Contact Information:			
Time:	**6:30 p.m.**	**Date:**	**10/13/2015**
Interview Location:	**Resident's home**		

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   I think that the project is a waste of money and that they contamination is not even being reached.

3. What have been the effects of the Site on the surrounding community, if any?

   None.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   Yes.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   No.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   I wish I said no to have the well on my yard. The people who sample it spill chemicals and damage the sod. I have had to replace the sod.

Site Name: **Flash Cleaners** **EPA ID No.:** **FLD083111005**
Interviewer Name: **Ralph Howard** **Affiliation:** **EPA**
Subject Name: **Resident who lives above plume** **Affiliation:**
Subject Contact Information:
Time: **6:10 p.m.** **Date:** **10/13/2015**
Interview Location: **Resident's home**

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **Residents**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes. There are always people picking stuff up in my yard.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   I have seen people working on the well over there but I do not know who it is.

3. What have been the effects of the Site on the surrounding community, if any?

   None.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

   No.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   No.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   No.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST	
I. SITE INFORMATION	
Site Name: Flash Cleaners	**Date of Inspection: 10/13/2015**
Location and Region: Pompano Beach, FL/Region 4	**EPA ID: FLD083111005**
Agency, Office or Company Leading the Five-Year Review: EPA Region 4	**Weather/Temperature: Sunny, 80s**
Remedy Includes: (Check all that apply) ☐ Landfill cover containment ☐ Access controls ☒ Institutional controls ☐ Groundwater pump and treatment ☐ Surface water collection and treatment ☒ Other: Soil excavation and disposal, soil vapor extraction and injection of organic material into groundwater ☐ Monitored natural attenuation ☐ Groundwater containment ☐ Vertical barrier walls	
Attachments: ☐ Inspection team roster attached ☐ Site map attached	
II. INTERVIEWS (check all that apply)	
1. **O&M Site Manager** ____ Name ____ Title mm dd yyyy Date Interviewed ☐ at site ☐ at office ☐ by phone Phone: ____ Problems, suggestions ☐ Report attached: ____	
2. **O&M Staff** ____ Name ____ Title mm dd yyyy Date Interviewed ☐ at site ☐ at office ☐ by phone Phone: ____ Problems suggestions ☐ Report attached: ____	

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

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

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

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

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

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

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

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

1. **O&M Documents**

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

Remarks: _____

2. **Site-Specific Health and Safety Plan**	☐ Readily available	☐ Up to date	☐ N A
☐ Contingency plan emergency response plan	☐ Readily available	☐ Up to date	☐ N A

Remarks: _____

3. **O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☐ N A

Remarks: _____

4. **Permits and Service Agreements**			
☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N A
Remarks: _____			
5. **Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N A
Remarks: _____			
6. **Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N A
Remarks: _____			
7. **Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N A
Remarks: _____			
8. **Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N A
Remarks: _____			
9. **Discharge Compliance Records**			
☐ Air	☐ Readily available	☐ Up to date	☒ N A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N A
Remarks: _____			
10. **Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N A
Remarks: _____			

IV. O&M COSTS

1. **O&M Organization**	
☐ State in-house	☐ Contractor for state
☐ PRP in-house	☐ Contractor for PRP
☐ Federal facility in-house	☐ Contractor for Federal facility
☒ Contractor for the EPA	

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☐ Funding mechanism agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: 01 01 2011 Date	To: 12 31 2011 Date	$32,000 Total cost	☐ Breakdown attached
From: 01 01 2012 Date	To: 12 31 2012 Date	$8,000 Total cost	☐ Breakdown attached
From: 01 01 2013 Date	To: 12 31 2013 Date	$80,000 Total cost	☐ Breakdown attached
From: 01 01 2014 Date	To: 12 31 2014 Date	$156,000 Total cost	☐ Breakdown attached
From: 01 01 2015 Date	To: 12 31 2015 Date	$206,000 Total cost	☐ Breakdown attached

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N A

A. Fencing

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

Remarks: _____

B. Other Access Restrictions

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

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

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

Frequency: _____

Responsible party agency: _____

Contact _____ _____ mm dd yyyy _____

Name Title Date Phone no.

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

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

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

Violations have been reported ☐ Yes ☐ No ☒ N A

Other problems or suggestions: ☐ Report attached

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

Remarks: _____

D. General

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

Remarks: _____

2. **Land Use Changes On Site** ☐ N A

Remarks: The building owner would like to reuse the property, possibly as a rental for an unknown tenant, or possibly tear down the building and use the land as a parking lot.

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

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N A

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

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N A

A. Landfill Surface

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

Arial extent: _____ Depth: _____

Remarks: _____

2. **Cracks**	☐ Location shown on site map	☐ Cracking not evident
Lengths: _____	Widths: _____	Depths: _____
Remarks: _____		
3. **Erosion**	☐ Location shown on site map	☐ Erosion not evident
Arial extent: _____		Depth: _____
Remarks: _____		
4. **Holes**	☐ Location shown on site map	☐ Holes not evident
Arial extent: _____		Depth: _____
Remarks: _____		
5. **Vegetative Cover**	☐ Grass	☐ Cover properly established
☐ No signs of stress	☐ Trees shrubs (indicate size and locations on a diagram)	
Remarks: _____		
6. **Alternative Cover** (e.g., armored rock, concrete)		☐ N A
Remarks: _____		
7. **Bulges**	☐ Location shown on site map	☐ Bulges not evident
Arial extent: _____		Height: _____
Remarks: _____		
8. **Wet Areas/Water Damage**	☐ Wet areas water damage not evident	
☐ Wet areas	☐ Location shown on site map	Arial extent: _____
☐ Ponding	☐ Location shown on site map	Arial extent: _____
☐ Seeps	☐ Location shown on site map	Arial extent: _____
☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
Remarks: _____		
9. **Slope Instability**	☐ Slides	☐ Location shown on site map
☐ No evidence of slope instability		
Arial extent: _____		
Remarks: _____		
B. Benches	☐ Applicable	☐ N A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1. **Flows Bypass Bench**	☐ Location shown on site map	☐ N A or okay
Remarks: _____		
2. **Bench Breached**	☐ Location shown on site map	☐ N A or okay
Remarks: _____		
3. **Bench Overtopped**	☐ Location shown on site map	☐ N A or okay
Remarks: _____		

C. Letdown Channels ☐ Applicable ☐ N A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement

Arial extent: _____ Depth: _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type:_____ Arial extent: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Arial extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Arial extent: _____ Depth: _____

Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions

☐ Location shown on site map Arial extent: _____

Size: _____

Remarks: _____

6. **Excessive Vegetative Growth** Type: _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Arial extent: _____

Remarks: _____

D. Cover Penetrations ☐ Applicable ☐ N A

1. **Gas Vents** ☐ Active ☐ Passive

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

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

Remarks: _____

2. **Gas Monitoring Probes**

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

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

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

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

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

Remarks: _____

4. **Extraction Wells Leachate**

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

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

Remarks: _____

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

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☐ N A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance ☐ N A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N A

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

Remarks: _____

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

Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N A

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

☐ Siltation not evident

Remarks: _____

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

☐ Erosion not evident

Remarks: _____

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

Remarks: _____

4. **Dam** ☐ Functioning ☐ N A

Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N A

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

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

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

Remarks: _____

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

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

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

Area extent: _____ Depth: _____

Remarks: _____

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

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N A

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

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

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

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

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

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

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

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

C. Treatment System ☒ Applicable ☐ N A

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

☐ Metals removal ☐ Oil water separation ☒ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

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

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

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

☒ N A ☐ Good condition ☐ Needs maintenance

Remarks: _____

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

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

Remarks: _____

4. **Discharge Structure and Appurtenances**

☒ N A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemicals and equipment properly stored

Remarks: _____

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

☒ Properly secured locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

☐ All required wells located ☐ Needs maintenance ☒ N A

Remarks: _____

X. OTHER REMEDIES

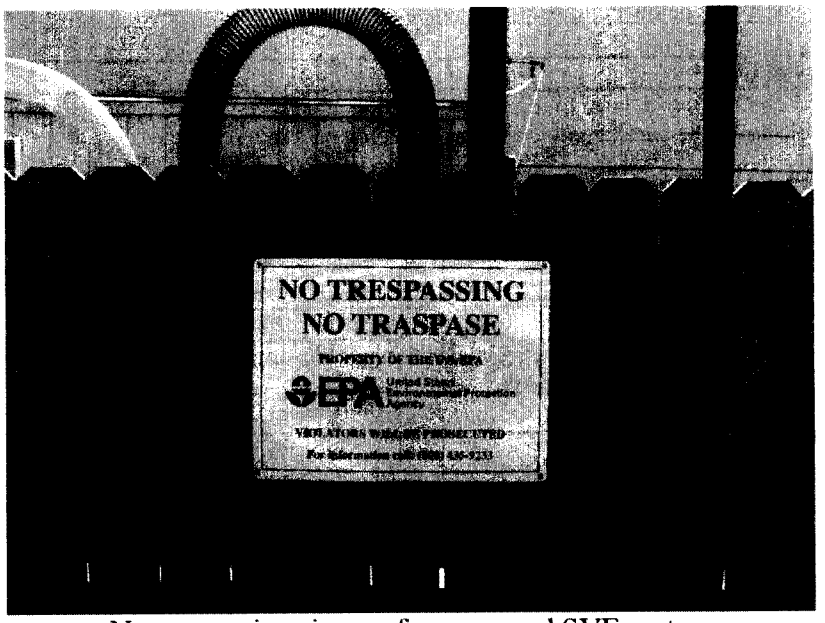
If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

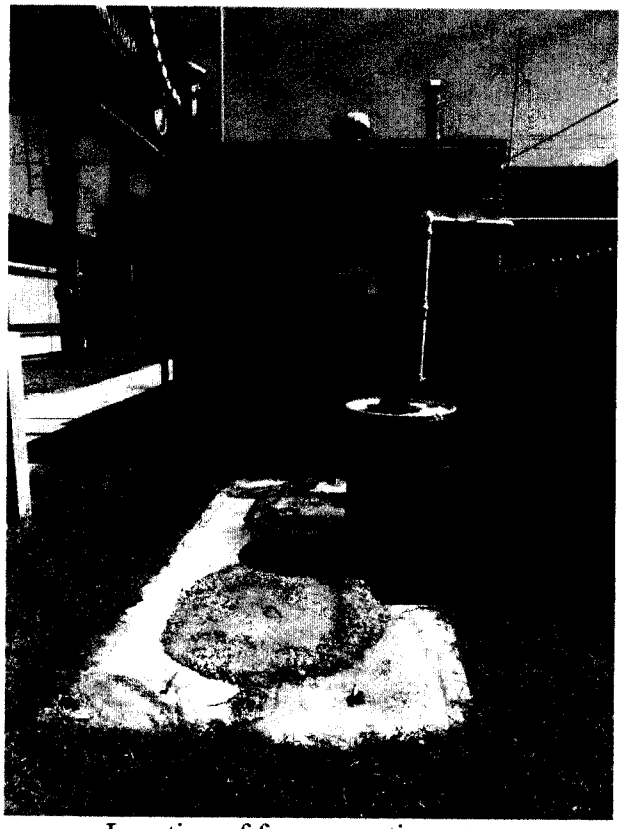
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). SVE system has treated soils below building. Injections into groundwater are breaking down contaminants in plume beyond site.
B. Adequacy of O&M
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. O&M is adequate.
C. Early Indicators of Potential Remedy Problems
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. Extension of daughter products beyond original plume area may be a concern.
D. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None.

Appendix E: Photographs from Site Inspection Visit



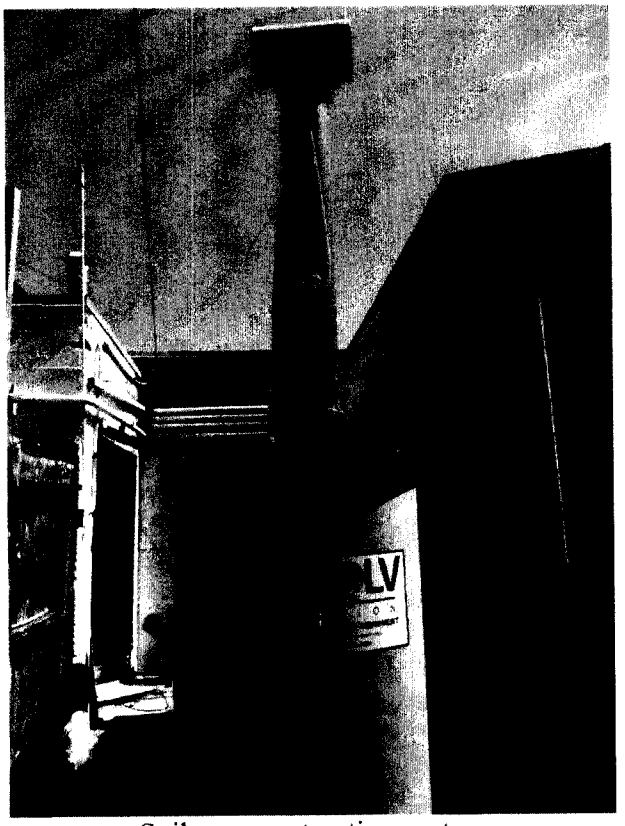
No trespassing sign on fence around SVE system

No trespassing sign and fence around SVE system

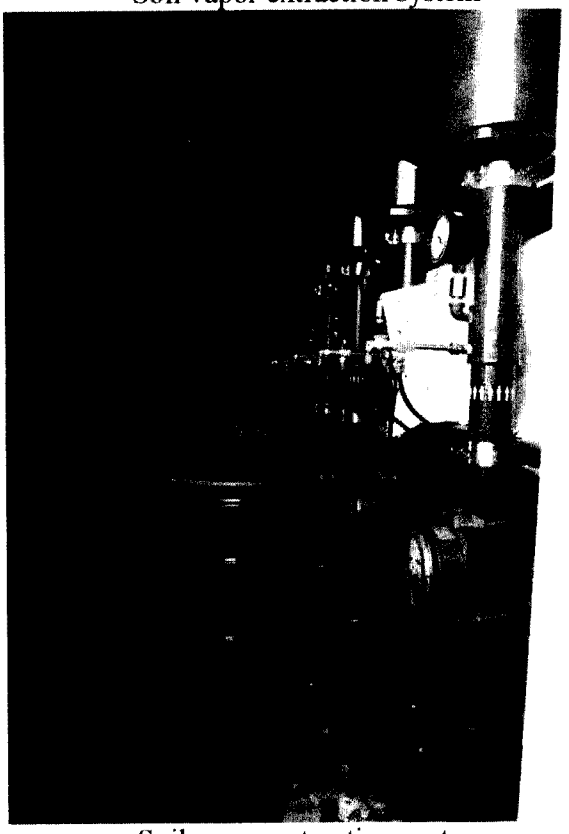


Location of former septic system

Area of former soil excavation in back of the Site

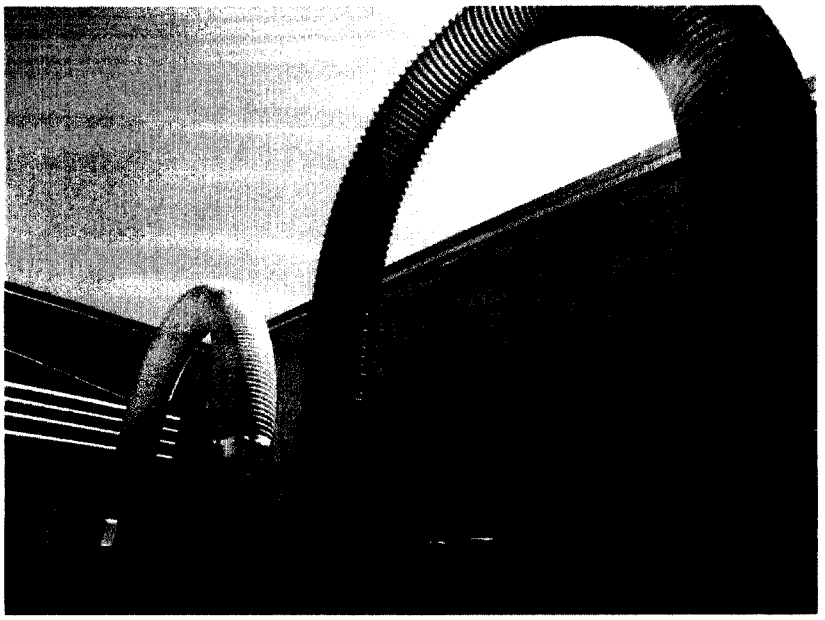


Soil vapor extraction system

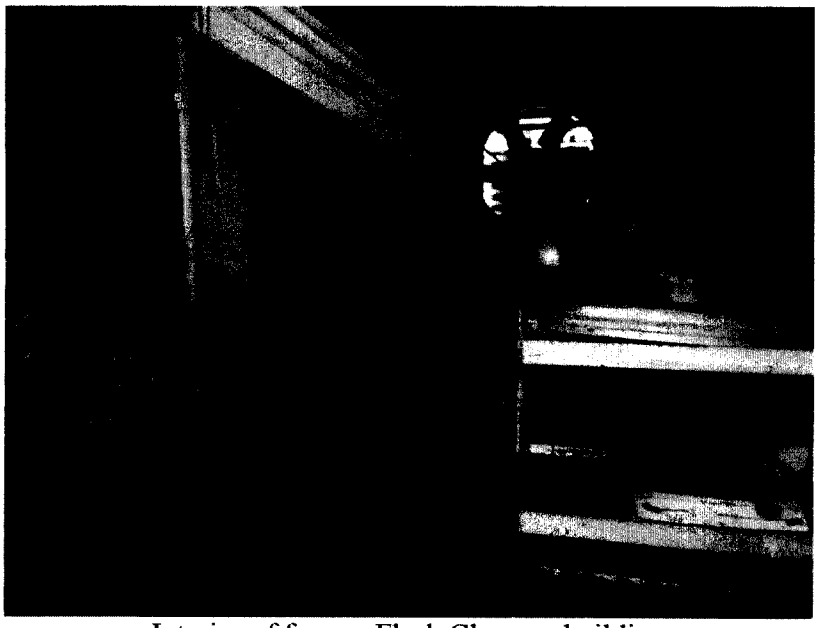


Soil vapor extraction system

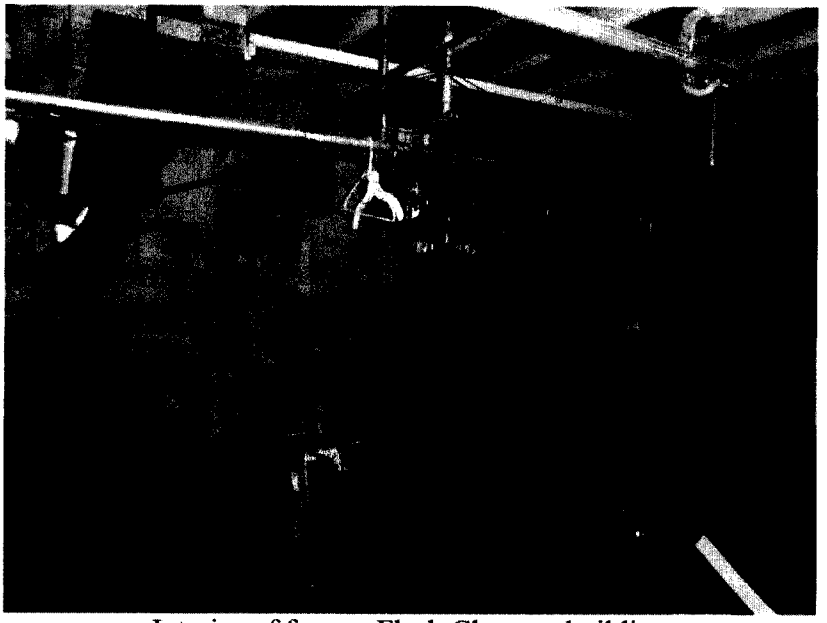
Soil vapor extraction system


Soil vapor extraction system

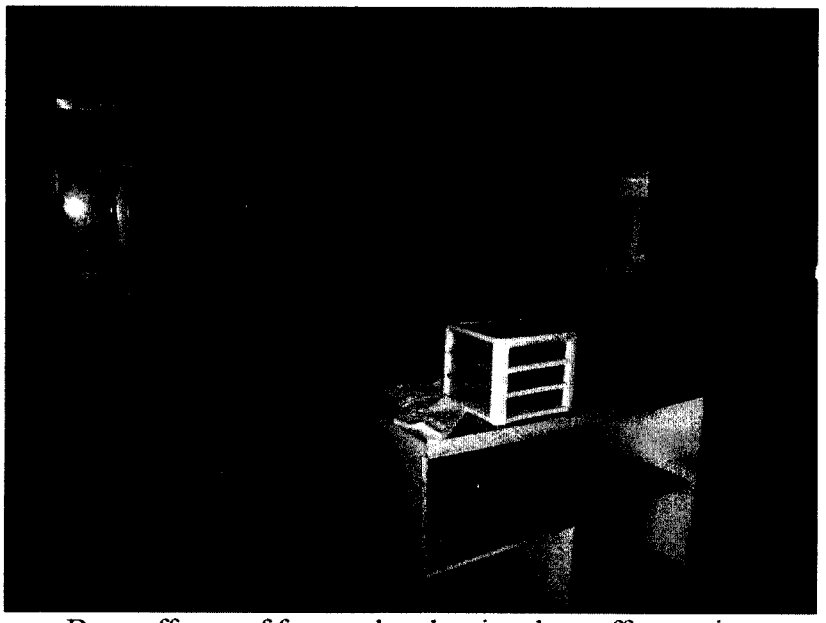
Former soil sample areas



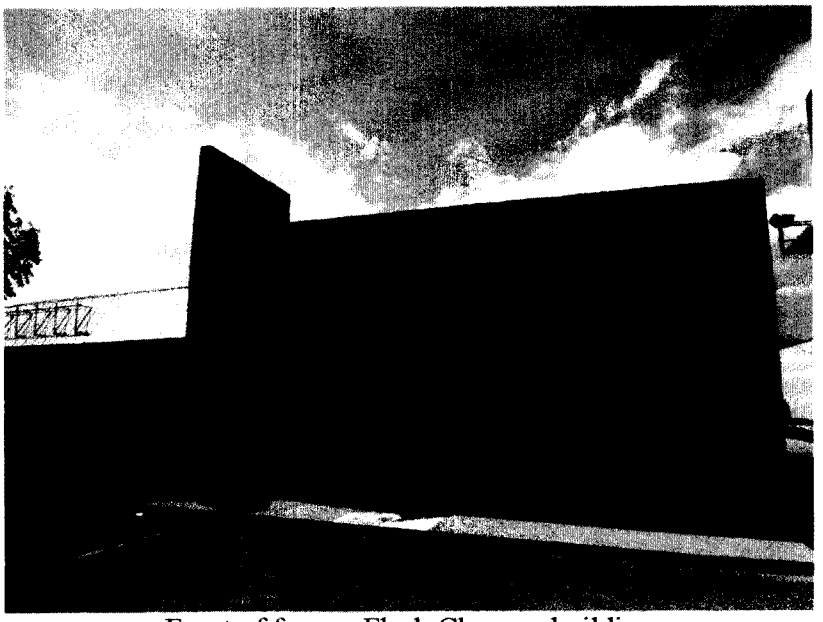
Interior of former Flash Cleaners building



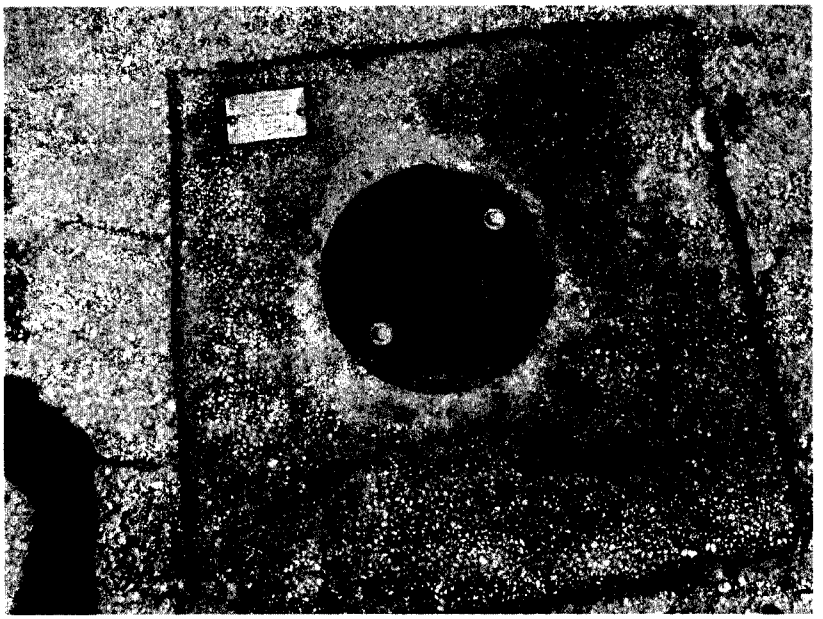
Interior of former Flash Cleaners building



Drop-off area of former dry cleaning drop-off operation

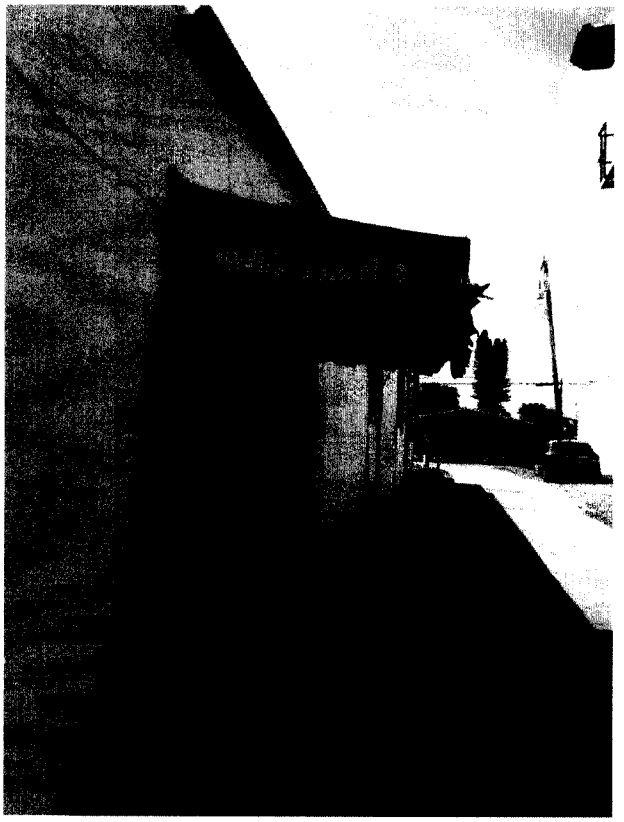


Front of former Flash Cleaners building

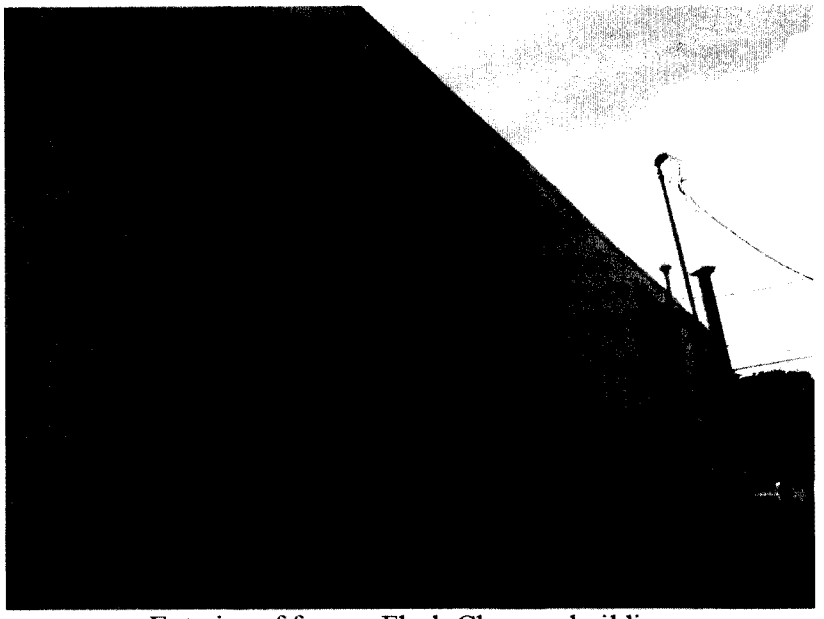


MW06

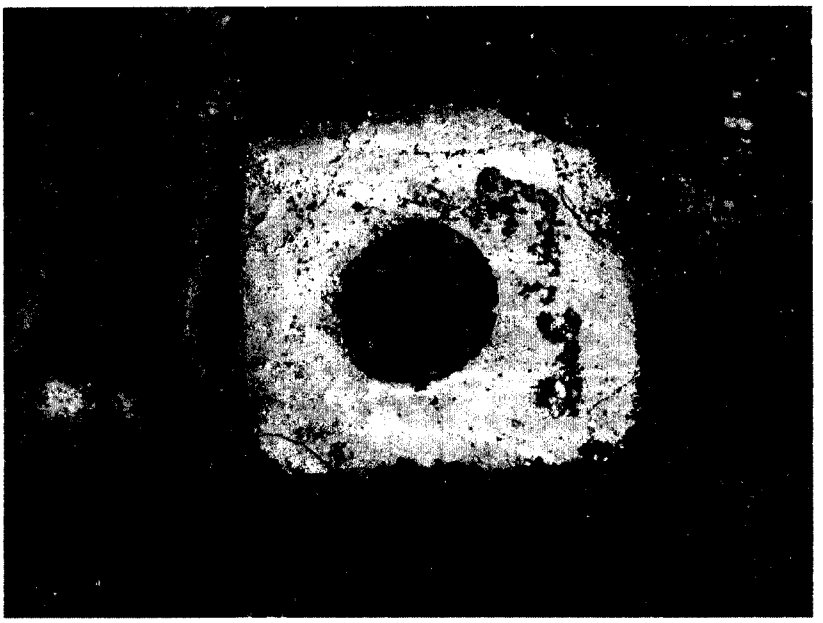
MW02



Former dry-cleaning drop-off area



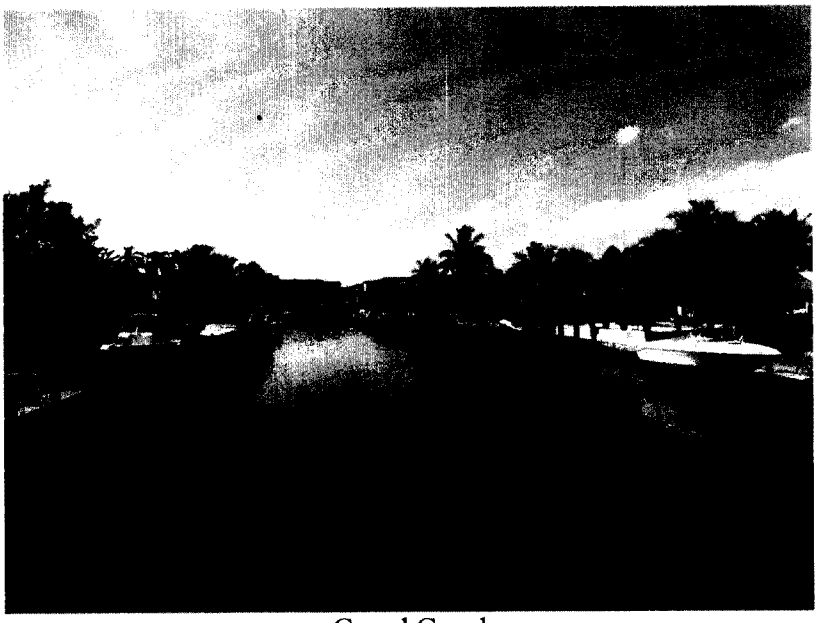
Exterior of former Flash Cleaners building



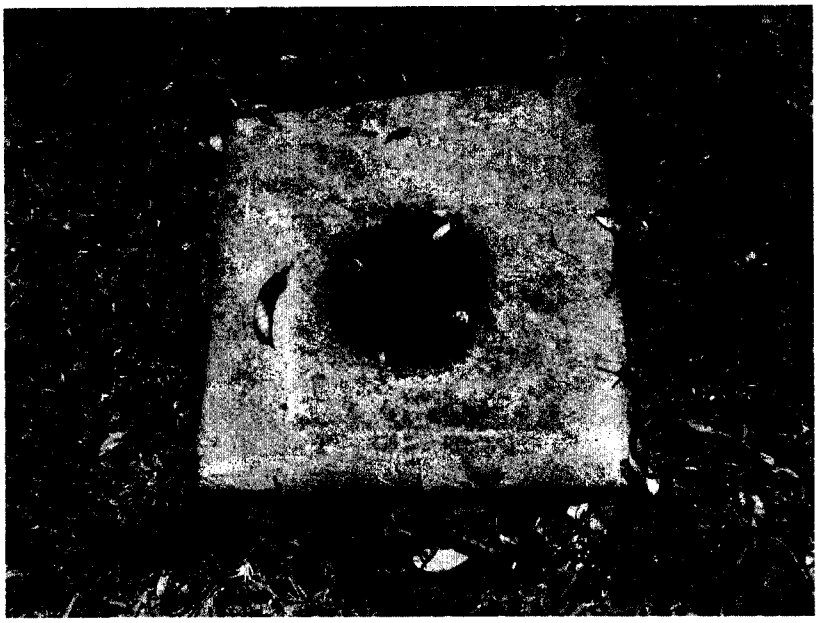
MW12

Former Flash Cleaners building and neighboring properties from across North Federal Highway

Sampling MW19



Grand Canal



MW20

Appendix F: Historical Groundwater, Sediment Porewater and Surface Water Data, 2009 to 2015

TABLE 3-5
SUMMARY OF SURFACE WATER AND SEDIMENT PORE WATER
ANALYTICAL RESULTS
FLASH CLEANERS
POMPANO BEACH, FLORIDA

PAGE 1 OF 2

LOCATION_ID SAMPLE ID SAMPLE DATE	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCPW31 FC-PW-31_20120807 08/07/2012	FCPW31 FC-PW-31_20131029 10/29/2013	FCPW32 FC-PW-32_20120807 08/07/2012	FCPW32 FC-PW-32_20131029 10/29/2013	FCPW33 FC-PW-33_20120808 08/08/2012	FCPW33 FC-PW-33_20131029 10/29/2013	FCPW34 FC-PW-34_20120807 08/07/2012
VOLATILES (UG/L)									
CIS-1,2-DCE	11000	11000	**0.45 J**	**0.21 J**	**0.17 J**	0.5 U	**1.4**	**0.16 J**	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	**0.94**	**0.39 J**	**1.4**	**0.22 J**	2.8	**0.78**	**0.84**

LOCATION_ID SAMPLE ID SAMPLE DATE	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCPW34 FC-PW-34_20131029 10/29/2013	FCPW35 FC-PW-35_20120807 08/07/2012	FCPW35 FC-PW-35_20120807-D 08/07/2012	FCPW35 FC-PW-35_20131029 10/29/2013	FCPW36 FC-PW-36_20120807 08/07/2012	FCPW36 FC-PW-36_20131029 10/29/2013	FCPW36 FC-PW-36_20131029-D 10/29/2013
VOLATILES (UG/L)									
CIS-1,2-DCE	11000	11000	0.5 U	0.33 J	0.35 J	0.5 U	0.14 J	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	0.5 U	10	9.9	**0.24 J**	9.5	0.5 U	0.5 U

LOCATION_ID SAMPLE ID SAMPLE DATE	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCPW37 FC-PW-37_20120807 08/07/2012	FCPW37 FC-PW-37_20131030 10/30/2013	FCPW38 FC-PW-38_20120808 08/08/2012	FCPW38 FC-PW-38_20131029 10/29/2013	FCPW39 FC-PW-39_20120808 08/08/2012	FCPW39 FC-PW-39_20131029 10/29/2013	FCPW40 FC-PW-40_20120808 08/08/2012
VOLATILES (UG/L)									
CIS-1,2-DCE	11000	11000	**0.21 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	**1.5**	8.9	0.5 U	0.5 U	**0.83**	0.5 U	0.5 U

LOCATION_ID SAMPLE ID SAMPLE DATE	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCPW40 FC-PW-40_20131029 10/29/2013	FCPW41 FC-PW-41_20120808 08/08/2012	FCPW41 FC-PW-41_20131030 10/30/2013
VOLATILES (UG/L)					
CIS-1,2-DCE	11000	11000	0.5 U	**0.3 J**	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	**0.35 J**	**1.3**
VINYL CHLORIDE	2.4	2.4	0.5 U	0.5 U	0.5 U

Footnotes:

Shaded concentrations exceed at least one of the criteria compared.

Bolded concentrations were detected

* = Criteria corresponds to trans-1,2-DCE

NA = The chemical was not analyzed or no value was available.

Data Qualifiers:

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TABLE 3-5
SUMMARY OF SURFACE WATER AND SEDIMENT PORE WATER
ANALYTICAL RESULTS
FLASH CLEANERS
POMPANO BEACH, FLORIDA

PAGE 2 OF 2

LOCATION_ID SAMPLE ID SAMPLE DATE	Ambient Water Quality Criteria (Water & Organisms)	Ambient Water Quality Criteria (Organisms Only)	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCSW31 FC-SW-31_20120807 08/07/2012	FCSW31 FC-SW-31_20131029 10/29/2013	FCSW32 FC-SW-32_20120807 08/07/2012	FCSW32 FC-SW-32_20131029 10/29/2013	FCSW33 FC-SW-33_20120808 08/08/2012	FCSW33 FC-SW-33_20131029 10/29/2013
VOLATILES (UG/L)										
CIS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.025	2.4	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION_ID SAMPLE ID SAMPLE DATE	Ambient Water Quality Criteria (Water & Organisms)	Ambient Water Quality Criteria (Organisms Only)	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCSW34 FC-SW-34_20120807 08/07/2012	FCSW34 FC-SW-34_20131029 10/29/2013	FCSW35 FC-SW-35_20120807 08/07/2012	FCSW35 FC-SW-35_20131029 10/29/2013	FCSW36 FC-SW-36_20120807 08/07/2012	FCSW36 FC-SW-36_20131029 10/29/2013
VOLATILES (UG/L)										
CIS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.025	2.4	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION_ID SAMPLE ID SAMPLE DATE	Ambient Water Quality Criteria (Water & Organisms)	Ambient Water Quality Criteria (Organisms Only)	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCSW37 FC-SW-37_20120807 08/07/2012	FCSW37 FC-SW-37_20131030 10/30/2013	FCSW38 FC-SW-38_20120808 08/08/2012	FCSW38 FC-SW-38_20131029 10/29/2013	FCSW39 FC-SW-39_20120808 08/08/2012	FCSW39 FC-SW-39_20131029 10/29/2013
VOLATILES (UG/L)										
CIS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.025	2.4	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION_ID SAMPLE ID SAMPLE DATE	Ambient Water Quality Criteria (Water & Organisms)	Ambient Water Quality Criteria (Organisms Only)	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCSW40 FC-SW-40_20120808 08/08/2012	FCSW40 FC-SW-40_20131029 10/29/2013	FCSW41 FC-SW-41_20120808 08/08/2012	FCSW41 FC-SW-41_20131030 10/30/2013
VOLATILES (UG/L)								
CIS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.025	2.4	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U

Footnotes:

Shaded concentrations exceed at least one of the criteria compared.

Bolded concentrations were detected

* = Criteria corresponds to trans-1,2-DCE

NA = The chemical was not analyzed or no value was available.

Data Qualifiers:

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R = The chemical was rejected.

TABLE 3-5

SUMMARY OF SURFACE WATER AND SEDIMENT PORE WATER ANALYTICAL RESULTS
ANNUAL MONITORING REPORT
FLASH CLEANERS
POMPANO BEACH, FLORIDA
PAGE 1 OF 2

LOCATION SAMPLE ID SAMPLE DATE	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCPW31 FC-PW-31_20141104 11/04/2014	FCPW32 FC-PW-32X_20141104 11/04/2014	FCPW33 FC-PW-33_20141104 11/04/2014	FCPW34 FC-PW-34_20141104 11/04/2014	FCPW35 FC-PW-35_20141104 11/04/2014	FCPW35 FC-PW-35_20141104-AVG 11/04/2014
VOLATILES (UG/L)								
CIS-1,2-DCE	11000	11000	**0.22 J**	**0.64 J**	**0.41 J**	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	**0.64**	**1.4**	**0.75**	**0.18 J**	**0.23 J**	**0.235**

LOCATION SAMPLE ID SAMPLE DATE	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCPW35 FC-PW-35_20141104-D 11/04/2014	FCPW36 FC-PW-36_20141104 11/04/2014	FCPW36 FC-PW-36_20141104-AVG 11/04/2014	FCPW36 FC-PW-36_20141104-D 11/04/2014	FCPW37 FC-PW-37_20141104 11/04/2014	FCPW41 FC-PW-41_20141105 11/05/2014
VOLATILES (UG/L)								
CIS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**61**
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**6.5**
VINYL CHLORIDE	2.4	2.4	**0.24 J**	24	24	24	0.5 U	**0.22 J**

LOCATION SAMPLE ID SAMPLE DATE	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	FCPW42 FC-PW-42_20141105 11/05/2014	FCPW43 FC-PW-43_20141105 11/05/2014	FCPW44 FC-PW-44_20141105 11/05/2014	FCPW45 FC-PW-45_20141104 11/04/2014	FCPW46 FC-PW-46_20141104 11/04/2014
VOLATILES (UG/L)							
CIS-1,2-DCE	11000	11000	**1.8**	**3.6**	**2.6**	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	**0.1 J**	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	**0.13 J**	**0.13 J**	0.5 U	0.5 U	0.5 U

Footnotes:

Shaded concentrations exceed at least one of the criteria compared.

Bolded concentrations were detected

* = Criteria corresponds to trans-1,2-DCE

NA = The chemical was not analyzed or no value was available.

Data Qualifiers:

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TABLE 3-5

SUMMARY OF SURFACE WATER AND SEDIMENT PORE WATER ANALYTICAL RESULTS
ANNUAL MONITORING REPORT
FLASH CLEANERS
POMPANO BEACH, FLORIDA
PAGE 2 OF 2

LOCATION_ID SAMPLE ID SAMPLE DATE	Ambient Water Quality Criteria (Water & Organisms)	Ambient Water Quality Criteria (Organisms Only)	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	**FCSW31** **FC-SW-31_20141104** **11/04/2014**	**FCSW32** **FC-SW-32_20141104** **11/04/2014**	**FCSW33** **FC-SW-33_20141104** **11/04/2014**	**FCSW34** **FC-SW-34_20141104** **11/04/2014**	**FCSW35** **FC-SW-35_20141104** **11/04/2014**
VOLATILES (UG/L)									
CIS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.025	2.4	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION_ID SAMPLE ID SAMPLE DATE	Ambient Water Quality Criteria (Water & Organisms)	Ambient Water Quality Criteria (Organisms Only)	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	**FCSW36** **FC-SW-36_20141104** **11/04/2014**	**FCSW37** **FC-SW-37_20141104** **11/04/2014**	**FCSW41** **FC-SW-41_20141105** **11/05/2014**	**FCSW42** **FC-SW-42_20141105** **11/05/2014**	**FCSW43** **FC-SW-43_20141105** **11/05/2014**
VOLATILES (UG/L)									
CIS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	**0.24 J**	0.5 U	0.5 U
TRANS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.025	2.4	2.4	2.4	0.16 J	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION_ID SAMPLE ID SAMPLE DATE	Ambient Water Quality Criteria (Water & Organisms)	Ambient Water Quality Criteria (Organisms Only)	FDEP SW Criteria - Fresh	FDEP SW Criteria - Marine	**FCSW44** **FC-SW-44_20141104** **11/04/2014**	**FCSW45** **FC-SW-45_20141104** **11/04/2014**	**FCSW46** **FC-SW-46_20141104** **11/04/2014**
VOLATILES (UG/L)							
CIS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	140	10000	11000	11000	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.025	2.4	2.4	2.4	0.5 U	0.5 U	0.5 U

Footnotes:

Shaded concentrations exceed at least one of the criteria compared.

Bolded concentrations were detected

* = Criteria corresponds to trans-1,2-DCE

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TABLE 3-5
SUMMARY OF SURFACE WATER AND SEDIMENT PORE WATER ANALYTICAL RESULTS
ANNUAL MONITORING REPORT
FLASH CLEANERS
POMPANO BEACH, FLORIDA
PAGE 1 OF 2

LOCATION SAMPLE ID SAMPLE DATE	**FDEP SW Criteria -Fresh**	**FDEP SW Criteria -Marine**	**FCSW31 FCSW31 10/13/2015**	**FCSW32 FCSW32 10/13/2015**	**FCSW33 FCSW33 10/13/2015**	**FCSW34 FCSW34 10/13/2015**	**FCSW35 FCSW35 10/13/2015**	**FCSW36 FCSW36 10/14/2015**
VOLATILES (UG/L)								
CIS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION SAMPLE ID SAMPLE DATE	**FDEP SW Criteria -Fresh**	**FDEP SW Criteria -Marine**	**FCSW37 FCSW37 10/14/2015**	**FCSW41 FCSW41 10/14/2015**	**FCSW42 FCSW42 10/13/2015**	**FCSW43 FCSW43 10/13/2015**	**FCSW44 FCSW44 10/13/2015**	**FCSW45 FCSW45 10/14/2015**
VOLATILES (UG/L)								
CIS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION SAMPLE ID SAMPLE DATE	**FDEP SW Criteria -Fresh**	**FDEP SW Criteria -Marine**	**FCSW46 FCSW46 10/13/2015**
VOLATILES (UG/L)			
CIS-1,2-DCE	11000	11000	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U
VINYL CHLORIDE	2.4	2.4	0.5 U

Footnotes:
Shaded concentrations e
Bolded concentrations were detected
* = Criteria corresponds to trans-1,2-DCE
NA = The chemical was not analyzed or no value was available.

Data Qualifiers:
Blank (i.e., no qualifier) = the chemical was detected.
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ANNUAL MONITORING REPORT
FLASH CLEANERS
POMPANO BEACH, FLORIDA
PAGE 2 OF 2

LOCATION SAMPLE ID SAMPLE DATE	**FDEP SW Criteria -Fresh**	**FDEP SW Criteria -Marine**	**FCPW31 FCPW31 10/13/2015**	**FCPW32 FCPW32 10/13/2015**	**FCPW33 FCPW33 10/13/2015**	**FCPW34 FCPW34 10/13/2015**	**FCPW35 FCPW35 10/13/2015**	**FCPW36 FCPW36 10/14/2015**
VOLATILES (UG/L)								
CIS-1,2-DCE	11000	11000	0.5 U	**0.41 J**	**0.15 J**	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	**0.38 J**	**0.95**	**0.8**	0.5 U	**0.42 J**	**1.5**

LOCATION SAMPLE ID SAMPLE DATE	**FDEP SW Criteria -Fresh**	**FDEP SW Criteria -Marine**	**FCPW36 FCPW36X 10/14/2015**	**FCPW37 FCPW37 10/14/2015**	**FCPW37 FCPW37X 10/14/2015**	**FCPW41 FCPW41 10/14/2015**	**FCPW42 FCPW42 10/13/2015**	**FCPW42 FCPW42X 10/13/2015**
VOLATILES (UG/L)								
CIS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	**1.4**	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	**1.6**	**0.56**	**0.63**	0.5 U	0.5 U	0.5 U

LOCATION SAMPLE ID SAMPLE DATE	**FDEP SW Criteria -Fresh**	**FDEP SW Criteria -Marine**	**FCPW43 FCPW43 10/13/2015**	**FCPW44 FCPW44 10/13/2015**	**FCPW45 FCPW45 10/14/2015**	**FCPW46 FCPW46 10/13/2015**
VOLATILES (UG/L)						
CIS-1,2-DCE	11000	11000	0.5 U	**6**	0.5 U	0.5 U
TRANS-1,2-DCE	11000	11000	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2.4	2.4	0.5 U	0.5 U	0.5 U	0.5 U

Footnotes:
Shaded concentrations e
Bolded concentrations were detected
* = Criteria corresponds to trans-1,2-DCE
NA = The chemical was not analyzed or no value was available.

Data Qualifiers:
Blank (i.e., no qualifier) = the chemical was detected.
J = The chemical was detected but the concentration reported is an estimated value.
U = The chemical was not detected.
R = The chemical was rejected.

TABLE 3-3
VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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FLASH DRY CLEANERS
POMPANO BEACH, FLORIDA
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PARAMETER	UNIT	GCG*	FCMW03 (15 ft)										FCMW04 (34.5 ft)	
			Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	May-12	Aug-12	Mar-13	Oct-13	Aug-12	Oct-13
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	µg/L	70	1	2	140 J	220 J	15	3.4 J	10	51	30	4.4	0.5	0.1 J
TETRACHLOROETHENE	µg/L	3	0.69	0.82	0.85 J	5 U	5 U	5 U	0.23 J	10 U	5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.24 J	2.8 J	3.8 J	5.6	10	6.5	13	5.9	19	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.17 J	0.15 J	5 U	5 UJ	5 U	5 U	0.5 U	10 U	5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	5.2	39 J	400 J	420	410	880	470	1100	620	630	0.38 J	0.5 U
Volatile Gasses														
ETHANE	µg/L	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 UJ	109	NA	NA
ETHENE	µg/L	--	2.6 U	2.6 U	5.1	7	7.3	19	31	59	61 J	0.48 U	NA	NA
METHANE	µg/L	--	170	650	4800	5400	8700	7500	3300	3600 J	10000 J	4610	NA	NA
Metals														
IRON	µg/L	--	1700	3100	14000	31000 J	22000	17000	5200	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	15 U	7.2	59	110	56	49	23	NA	NA	NA	NA	NA
Filtered Metals														
IRON	µg/L	--	100 U	2100	14000	100 UR	20000	17000	5200	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	15 U	6.7	62	15 UJ	54	50	23	NA	NA	NA	NA	NA
Other NA Parameters														
ALKALINITY	mg/L	--	46.7	82.4	222	223	216	179	105	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	46.7	82.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	22.3	24.6	28.6	32.9	262	53.7	30.1	31.1	28.5	43.6	NA	NA
HYDROXIDE ALKALINITY	mg/L	--	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	0.75	0.52	0.05 U	0.05 U	0.25 U	0.097 I	1.3	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	0.15 I	0.12 I	0.05 U	0.05 U	0.25 U	0.05 U	0.05 U	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	17.1	19.3	1.4 I	1 U	82.4	28.6	26.1	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	2 U	2 U	0.6 I	0.3 U	0.71 I	0.3 U	0.81 I	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	371	293	319	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	4.3	9.3	47.8	47.9	18	16.8	10	NA	19.4	59.2	NA	NA
DISSOLVED OXYGEN	mg/L	--	1.08	0.47	0.51	0.39	0.27	1.24	2.24	0.45	0.31	0.28	1.43	0.51
[illegible]	mV	--	-25.5	-174.9	-107.1	-54.8	-97.6	-47.2	-11	-99	-29.8	-77.3	4.8	-90.3
[illegible]	S U	--	5.8	6.63	6.4	5.81	6.35	6.25	6.06	5.78	6.1	5.89	7.14	6.63
[illegible]	mS/cm	--	0.227	0.324	0.508	0.59	0.62	0.067	0.491	0.538	0.486	0.538	0.044	0.83
[illegible]	C	--	28.97	28.72	27.67	27.26	26.19	25.43	26.65	29.75	25.67	28.2	27.51	27
[illegible]	NTU	--	18.02	1.31	1.39	1.89	0.69	3.54	12.7	5.73	2.16	5.63	18.5	7.88
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	79.8	NA	394	NA	1260	NA	NA	NA	308	NA	NA

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NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
mS/cm - milliSiemens per centimeter
S U - Standard Unit
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Shaded - MRI indicate concentrations greater than GCG
Bold values indicate a detection

TABLE 3-3
VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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PARAMETER	UNIT	GCG*	FCMW05 (14 ft)						FCMW06 (25 ft)					
			Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13	Sep-11	Sep-11 AVG	Sep-11 DUP	Oct-11	Oct-11 AVG	Oct-11 DUP
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	µg/L	70	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	24000	23000	22000	14000	14000	14000
TETRACHLOROETHENE	µg/L	3	**2.7 J**	**2**	**2.3**	**2.2**	**0.98**	**0.87**	29000	28000	27000	42000	43500	45000
TRANS-1,2-DICHLOROETHENE	µg/L	100	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	200 U	200 U	200 U	100 U	100 U	100 U
TRICHLOROETHENE	µg/L	3	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5800	5500	5200	8000	7950	7900
VINYL CHLORIDE	µg/L	1	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5700	5800	5900	6400	6350	6300
Volatile Gasses														
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	**110**	**105**	**100**	**190**	**195**	**200**
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	**4200**	**4050**	**3900**	**5200**	**5650**	**6100**
Metals														
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	**12000**	**11500**	**11000**	**12000**	**12000**	**12000**
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	15 U	15 U	15 U	**8.1**	**8.25**	**8.4**
Filtered Metals														
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	**11000**	**11000**	**11000**	**12000**	**12000**	**12000**
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	15 U	15 U	15 U	**7.7**	**7.9**	**8.1**
Other NA Parameters														
ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	**242**	**242.5**	**243**	**260**	**264**	**268**
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	**242**	**242.5**	**243**	**260**	**264**	**268**
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U
CHLORIDE	mg/L	--	NA	NA	NA	**24**	NA	**11.9**	**48**	**48.1**	**48.2**	**42.5**	**42.85**	**43.2**
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U
NITRATE-N	mg/L	--	NA	NA	NA	NA	NA	NA	0.2 U	**0.16 I**	**0.16 I**	**0.18 I**	**0.175**	**0.17 I**
NITRITE-N	mg/L	--	NA	NA	NA	NA	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U
POLYSORBATE 80	mg/L	--	NA	NA	NA	1 U	NA	0.125 U	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	NA	NA	NA	**1.05**	**1.03**	**1.01**	**1.16**	**1.15**	**1.14**
SULFIDE	mg/L	--	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	2 U	2 U
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	**500**	NA	**318**	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	**47.9**	**48.7**	**49.5**	**71.8**	**72.4**	**73**
DISSOLVED OXYGEN	mg/L	--	**1.47**	**N/A**	**1.21**	**1.25**	**0.54**	**0.58**	**0.16**	NA	NA	**0.11**	NA	NA
[illegible]	mV	--	**-64.4**	**70.9**	**37.8**	**9.4**	**143.5**	**105**	**-92.8**	NA	NA	**-187.3**	NA	NA
[illegible]	S.U.	--	**6.39**	**6.8**	**6.79**	**6.65**	**6.83**	**6.18**	**6.07**	NA	NA	**6.69**	NA	NA
[illegible]	mS/cm	--	**0.51**	**0.455**	**0.568**	**0.824**	**0.667**	**0.822**	**0.874**	NA	NA	**0.71**	NA	NA
[illegible]	C	--	**27.19**	**25.02**	**26.42**	**29.27**	**24.39**	**28.8**	**29.08**	NA	NA	**29.15**	NA	NA
[illegible]	NTU	--	**0.64**	**2.79**	**1.53**	**2.78**	**0.78**	**0.78**	**1.49**	NA	NA	**0.89**	NA	NA
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	**824**	NA	NA

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NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
mS/cm - milliSiemens per centimeter
S.U. - Standard Unit
C - degrees Celsius
I - Value is between the laboratory method detection limit and the laboratory practical quantitation limit
U = concentration less than laboratory method detection limit
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Shaded cells indicate concentrations greater than GCG*
Bold values indicate a detection

TABLE 3-3
VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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PARAMETER	UNIT	GCG*	FCMW06 (25 ft) con't											
			Nov-11	Dec-11	Dec-11 AVG	Dec-11 DUP	Jan-12	Jan-12 AVG	Jan-12 DUP	Feb-12	May-12	Aug-12	Aug-12 DUP	Mar-13
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	ug/L	70	22000 J	8100 J	8600	9100 J	6500	6700	6900	4800	2400	420	390	**9.4**
TETRACHLOROETHENE	ug/L	3	34000	22000	23000	24000	23000	23000	23000	26000	6600	69	89	**1.5**
TRANS-1,2-DICHLOROETHENE	ug/L	100	120	**14 J**	**14 J**	400 U	200 U	200 U	200 U	200 U	50 U	10 U	12 U	**1.2**
TRICHLOROETHENE	ug/L	3	1500	3300 J	3650	4000 J	3500	3650	3800	3900	1700	28	35	8.9
VINYL CHLORIDE	ug/L	1	13000 J	5100	5300	5500	6300	6500	6700	6000	4000	1200	1000	110
Volatile Gasses														
ETHANE	ug/L	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 UJ
ETHENE	ug/L	--	**320**	**670**	**800**	**730**	**510**	**525**	**540**	**350**	**300**	**230**	**130**	**260 J**
METHANE	ug/L	--	**3900**	**5700**	**5600**	**5500**	**5100**	**4950**	**4800**	**5700**	**2000**	**3800 J**	**3300 J**	**12000 J**
Metals														
IRON	ug/L	--	**14000**	**17000 J**	**17000**	**17000 J**	**15000**	**15000**	**15000**	**14000**	**13000**	NA	NA	NA
MANGANESE	ug/L	--	15 U	**8.8 J**	**8.75**	**8.7 J**	**7.1**	**7.1**	**7.1**	**7.2**	**5.3**	NA	NA	NA
Filtered Metals														
IRON	ug/L	--	**14000**	**17000 J**	**16500**	**16000 J**	**15000**	**14500**	**14000**	**14000**	**14000**	NA	NA	NA
MANGANESE	ug/L	--	15 U	**8.1 J**	**10.05**	**12 J**	**7.5**	**7.5**	**7.5**	**6.7**	**5.5**	NA	NA	NA
Other RA Parameters														
ALKALINITY	mg/L	--	**257**	**247**	**247**	NA	**281**	**283**	**275**	**245**	**266**	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	**42.8**	**41.6**	**41.6**	NA	**7.3**	**23.5**	**39.7**	**32.9**	**27.9**	**11.2**	**10.9**	**51.6**
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	**0.052 I**	0.05 U	0.05 U	NA	0.05 U	0.15 U	0.25 U	0.05 U	**0.074 I**	NA	NA	NA
NITRITE-N	mg/L	--	0.05 U	0.05 U	0.05 U	NA	0.05 U	0.15 U	0.25 U	0.05 U	0.05 U	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA
SULFATE	mg/L	--	1 U	**4**	**4**	NA	1 U	3 U	5 U	**7.6**	1 U	NA	NA	NA
SULFIDE	mg/L	--	**0.42 I**	**1.1**	**1.1**	NA	0.3 U	0.3 U	0.3 U	**2.5**	**0.6 I**	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	**234**	**242**	**445**
TOTAL ORGANIC CARBON	mg/L	--	**57.1**	**49.5**	**49.5**	NA	**37**	**37.2**	**37.4**	**32.4**	**28.1**	NA	NA	**18.2**
DISSOLVED OXYGEN	mg/L	--	**0.17**	**0.15**	NA	NA	**0.19**	NA	NA	**0.53**	**0.79**	**0.53**	NA	**0.2**
[illegible]	mV	--	**-81**	**-35.8**	NA	NA	**-70.3**	NA	NA	**-59.4**	**-78.2**	**-57.4**	NA	**-55.5**
[illegible]	S.U	--	**6.41**	**4.95**	NA	NA	**6.54**	NA	NA	**5.92**	**6.62**	**6.7**	NA	**6.48**
[illegible]	mS/cm	--	**0.742**	**0.707**	NA	NA	**0.709**	NA	NA	**0.691**	**0.044**	**0.37**	NA	**0.754**
[illegible]	C	--	**29.45**	**28.87**	NA	NA	**28.64**	NA	NA	**27.64**	**28.35**	**29.93**	NA	**28.13**
[illegible]	NTU	--	**1.3**	**1.18**	NA	NA	**0.27**	NA	NA	**1.73**	**2.32**	**3.58**	NA	**1.96**
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	**6920**	NA	NA	NA	NA	NA	**24400**	NA	NA	NA	NA

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µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
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TABLE 3-3
VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
ANNUAL MONITORING REPORT
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PARAMETER	UNIT	GCG*	FCMW06 (25 ft) con't		FCMW07 (100 ft)				FCMW08 (45 ft)		FCMW09 (45 ft)		
			Oct-13	Oct-13 DUP	Aug-12	Aug-12 DUP	Oct-13	Oct-13 DUP	Aug-12	Oct-13	Nov-11	Feb-12	May-12
Volatile Organic Compounds													
CIS-1,2-DICHLOROETHENE	µg/L	70	**0.89**	**0.65**	**0.42 J**	**0.38 J**	**0.9**	**0.2 J**	0.5 U	0.5 U	**730**	**57**	**24**
TETRACHLOROETHENE	µg/L	3	**2.6**	**0.23 J**	0.5 U	0.5 UJ	**0.21 J**	0.5 U	**0.6**	0.5 U	5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	**2.6**	**2.7**	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	**2.5 J**	**1.8**	**0.89**
TRICHLOROETHENE	µg/L	3	**1**	**0.21 J**	0.5 U	0.5 UJ	**0.28 J**	0.5 U	**0.17 J**	0.5 U	5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	**100**	**180**	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	**6.8**	**3.2**	**1.2**
Volatile Gasses													
ETHANE	µg/L	--	0.32 U	NA	NA	NA	NA	NA	NA	NA	2.6 U	2.6 U	2.6 U
ETHENE	µg/L	--	**88.1**	NA	NA	NA	NA	NA	NA	NA	2.6 U	2.6 U	2.6 U
METHANE	µg/L	--	**8440**	NA	NA	NA	NA	NA	NA	NA	**40**	**59**	**41**
Metals													
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	**1400**	**1500**	**1500**
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	15 U	5 U	5 U
Filtered Metals													
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	**1400**	**1500**	**1400**
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	15 U	5 U	5 U
Other NA Parameters													
ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	**205**	**238**	**209**
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	**42.9**	NA	NA	NA	NA	NA	NA	NA	**29.1**	**34.6**	**34.5**
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	**0.05 I**	0.05 U	**0.089 I**
NITRITE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	0.05 U	0.05 U	0.05 U
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	0.125 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	**26.6**	**24.6**	**25.7**
SULFIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	**0.41 I**	0.3 U	0.2 U
TOTAL DISSOLVED SOLIDS	mg/L	--	**451**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	**40.8**	NA	NA	NA	NA	NA	NA	NA	**8.6**	**8.1**	**8**
DISSOLVED OXYGEN	mg/L	--	**0.16**	NA	**0.62**	NA	**0.42**	NA	**2.89**	**0.43**	**3.42**	**0.19**	**0.18**
[illegible]	mV	--	**-70**	NA	**-75.6**	NA	**-83.6**	NA	**-14.7**	**-78.2**	**-88.2**	**-54.6**	**-77.7**
[illegible]	S.U.	--	**6.41**	NA	**7.14**	NA	**6.93**	NA	**7.26**	**6.97**	7.13	**6.3**	**7.07**
[illegible]	mS/cm	--	**0.827**	NA	**0.844**	NA	**0.826**	NA	**0.533**	**0.539**	**0.532**	**0.606**	**0.558**
[illegible]	C	--	**29.8**	NA	**28.47**	NA	**28.13**	NA	**28.8**	**27.96**	**26.94**	**26.31**	**26.52**
[illegible]	NTU	--	**2.73**	NA	**8.83**	NA	**1.58**	NA	**8.17**	**207**	**5.27**	**8.76**	**8.38**
Microbiological													
DEHALOCOCCOIDES	CELLS	--	**3060**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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mV - millivolt
NTU - Nephelometric turbidity unit
mS/cm - milliSiemens per centimeter
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PARAMETER	UNIT	GCG*	FCMW09 (45 ft) con't			FCMW10 (68 ft)									
			Aug-12	Mar-13	Oct-13	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	May-12	Aug-12	Mar-13	Oct-13
Volatile Organic Compounds															
CIS-1,2-DICHLOROETHENE	µg/L	70	**17**	**6.7**	**6.8**	**10**	**0.09 J**	120 J	260 J	310	260	81	**8.6**	**2**	**3.4**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.62 J**	5 U	2 U	2 U	0.5 U	0.5 U	**0.30 J**	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	**0.48 J**	0.5 U	**0.24 J**	**0.21 J**	0.5 U	**1.9 J**	**3.7 J**	**6.4**	**5.7**	**3.3**	**0.24 J**	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	**1.8**	**0.12 J**	70	52 J	160	39	0.5 U	**0.13 J**	**0.62**	0.5 U
VINYL CHLORIDE	µg/L	1	**0.97**	**1.1**	**0.51**	**7**	0.5 U	68 J	67	56	120	110	7.5	**3.9**	**2**
Volatile Gasses															
ETHANE	µg/L	--	2.6 U	2.6 UJ	0.32 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 UJ	0.32 U
ETHENE	µg/L	--	2.6 U	2.6 UJ	0.43 U	2.6 U	2.6 U	**3**	2.6 U	2.6 U	2.6 U	**6.8**	2.6 U	2.6 UJ	0.42 U
METHANE	µg/L	--	**51**	**89 J**	**38.8**	**140**	**2.1**	**240**	**310**	**340**	**420**	**320**	**110**	**62 J**	**31.7**
Metals															
IRON	µg/L	--	NA	NA	NA	**1700**	**580**	**2100**	**1900 J**	**1900**	**1700**	**1300**	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	15 U	**6.8**	15 U	**12 J**	**13**	**12**	**11**	NA	NA	NA
Filtered Metals															
IRON	µg/L	--	NA	NA	NA	**1300**	100 U	**2100**	**1900 J**	**1500**	**1400**	**380**	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	15 U	5 U	15 U	**13 J**	**13**	**12**	**9**	NA	NA	NA
Other NA Parameters															
ALKALINITY	mg/L	--	NA	NA	NA	**183**	**24.4**	**215**	**194**	**203**	**210**	**210**	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	**183**	**24.4**	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	**31.5**	**38**	**34.5**	**38.9**	**1.4**	**41.9**	**41.1**	**40.9**	**37.9**	**37.7**	**37.2**	**37.6**	**34.8**
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	**0.16 I**	**0.18 I**	0.05 U	0.05 U	**0.075 I**	0.05 U	**0.075 I**	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	0.2 U	0.2 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	**26.4**	**0.81**	**23.2**	**19.6**	**18**	**14.6**	**11.9**	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	2 U	2 U	**0.5 I**	0.3 U	0.3 U	**1.3**	**2.1**	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	**351**	**341**	**350**	NA	NA	NA	NA	NA	NA	NA	**372**	**320**	**293**
TOTAL ORGANIC CARBON	mg/L	--	NA	**7.6**	**8.4**	**9.1**	**2.4**	**19.8**	**8.3**	**8.6**	**9.8**	**9.9**	NA	**8.5**	**9.9**
DISSOLVED OXYGEN	mg/L	--	**0.31**	**0.18**	**0.19**	**0.41**	**0.34**	**0.12**	**0.43**	**0.2**	**0.24**	**0.82**	**0.98**	**0.68**	**0.16**
[illegible]	mV	--	**-62**	**-82.4**	**-79.2**	**-70.2**	**-148.1**	**-159.3**	**-95**	**-112.2**	**-133.4**	**-255.7**	**-119.9**	**-103.6**	**-146.1**
[illegible]	S.U.	--	**6.89**	**7.06**	**6.79**	**7.26**	**7.34**	**7.27**	**7.29**	**7.3**	**6.84**	**7.53**	**6.98**	**7.25**	**6.95**
[illegible]	mS/cm	--	**0.607**	**0.691**	**0.606**	**0.48**	**0.61**	**0.611**	**0.69**	**0.616**	**0.691**	**0.599**	**0.54**	**0.635**	**0.544**
[illegible]	C	--	**28.17**	**26.62**	**27.3**	**27.56**	**27.95**	**28.45**	**27.72**	**27.64**	**27.34**	**27.74**	**28.99**	**27.6**	**29.8**
[illegible]	NTU	--	**11.7**	**1.57**	**6.45**	**4.93**	**1.94**	**1.51**	**2.17**	**0.32**	**0.12**	**3.86**	**7.99**	**3.92**	**1.8**
Microbiological															
CEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	**26.4 J**	NA	**218**	NA	**1830**	NA	NA	NA	**25 <**

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PARAMETER	UNIT	GCG*	FCMW11 (100 ft)			FCMW12 (45 ft)									
			Nov-11	Aug-12	Oct-13	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	May-12	Aug-12	Aug-12 DUP	Mar-13
Volatile Organic Compounds															
CIS-1,2-DICHLOROETHENE	ug/L	70	**16 J**	**4.1**	**4.3**	**30**	**25**	**17 J**	**8.7 J**	**17 J**	**26**	**19**	**4 J**	**3.6 J**	200
TETRACHLOROETHENE	ug/L	3	5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.65 J**	5 U	0.5 U	0.5 U	0.5 U	0.5 UD	0.5 UJ	1 U
TRANS-1,2-DICHLOROETHENE	ug/L	100	5 U	0.5 U	0.5 U	**0.22 J**	0.5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 UD	0.5 UJ	**0.92 J**
TRICHLOROETHENE	ug/L	3	5 U	0.5 U	0.5 U	**0.17 J**	**0.3 J**	5 U	5 U	0.5 U	0.5 U	0.5 U	**0.19 J**	**0.16 J**	**0.32 J**
VINYL CHLORIDE	ug/L	1	5 U	0.5 U	0.5 U	**8.5**	**28**	**26 D**	5 U	**18**	**2.4**	**1.4**	**0.4 J**	**0.34 J**	**13**
Volatile Gases															
ETHANE	ug/L	--	NA	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 UJ
ETHENE	ug/L	--	NA	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 UJ
METHANE	ug/L	--	NA	NA	NA	**8.4**	**6.9**	**9.8 J**	**8.4 J**	**9.7**	**8.9**	**6.8**	**2.6**	**2.6**	**70 J**
Metals															
IRON	ug/L	--	NA	NA	NA	**560**	**560**	580 U	**570 J**	**520**	**490**	**510**	NA	NA	NA
MANGANESE	ug/L	--	NA	NA	NA	15 U	5 U	15 U	**2.5 J**	5 U	5 U	5 U	NA	NA	NA
Filtered Metals															
IRON	ug/L	--	NA	NA	NA	**480**	**650**	560 U	**580 J**	**510**	**460**	**460**	NA	NA	NA
MANGANESE	ug/L	--	NA	NA	NA	15 U	5 U	15 U	**2.4 J**	5 U	5 U	5 U	NA	NA	NA
Other NA Parameters															
ALKALINITY	mg/L	--	NA	NA	NA	**212**	**211**	**201**	**237**	**223**	**202**	**221**	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	**212**	**211**	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	NA	NA	NA	**22**	**18.9**	**19.8**	**19.4**	**20.8**	**20.4**	**19.2**	**21.6**	NA	**24.9**
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	**0.18 I**	0.2 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.092 I**	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	0.2 U	0.2 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	**51.3**	**47.7**	**47.9**	**46.2**	**47.5**	**44.6**	**44**	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	2 U	2 U	0.2 U	0.3 U	0.3 U	0.3 U	0.3 U	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**320**	NA	**296**
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	**6.8**	**5**	**6.8**	**4.4**	**4.6**	**4.9**	**4.6**	NA	NA	**4.7**
DISSOLVED OXYGEN	mg/L	--	**1.27**	**0.19**	**0.31**	**0.65**	**0.13**	**0.27**	**0.13**	**0.11**	**0.6**	**0.14**	**0.29**	NA	**0.17**
[illegible]	mV	--	**-142.8**	**-71.6**	**-110.9**	**-88.2**	**-332.7**	**-182.9**	**-189.9**	**-222**	**-119.7**	**-106.9**	**-57.1**	NA	**-80.2**
pH	S.U.	--	**7.36**	**6.62**	**7.24**	**6.32**	**7.44**	**7.15**	**7.06**	**7.16**	**7.13**	**7.18**	**6.99**	NA	**7.2**
[illegible]	mS/cm	--	**0.546**	**0.477**	**0.513**	**0.525**	**0.581**	**0.559**	**0.644**	**0.61**	**0.645**	**0.54**	**0.605**	NA	**0.618**
[illegible]	C	--	**27.25**	**29.73**	**28.12**	**31.2**	**28.13**	**28.28**	**27.99**	**27.97**	**27.12**	**27.7**	**30.21**	NA	**27.68**
[illegible]	NTU	--	**11.4**	**17.2**	**18.3**	**1.89**	**2.79**	**0.51**	**5.55**	**0.37**	**3.57**	**0.73**	**5.4**	NA	**0.43**
Microbiological															
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	**25 <**	NA	**25 <**	NA	25 U	NA	NA	NA	NA

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PARAMETER	UNIT	GCG*	PCMW12 (45 ft) con't		PCMW13 (45 ft)									
			Oct-13	Oct-13 DUP	Nov-11	Nov-11 AVG	Nov-11 DUP	Feb-12	Feb-12 AVG	Feb-12 DUP	May-12	Aug-12	Mar-13	Oct-13
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	µg/L	70	**3.4**	**1.2**	300 J	305	310 J	240	245	250	160	140	**52**	**19**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	11	6.25	**1.5 J**	2 U	2 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	**12**	**12**	**12**	**8**	**8.3**	**8.6**	**6.2**	**6.1**	**1.2**	**0.47 J**
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	3.7 J	**2.235**	**0.77 J**	2 U	2 U	2 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	18	17.5	17	9.4	9.45	9.5	8.1	2	2	**0.95**
Volatile Gasses														
ETHANE	µg/L	--	0.32 U	NA	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 UJ	0.32 U
ETHENE	µg/L	--	0.43 U	NA	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 UJ	0.43 U
METHANE	µg/L	--	**0.24 I**	NA	**48**	**48.5**	**49**	**53**	**52**	**51**	**48**	**4.1 J**	**52 J**	**54.4**
Metals														
IRON	µg/L	--	NA	NA	**2000**	**2000**	**2000**	**1600**	**1650**	**1700**	**1600**	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	15 U	15 U	15 U	**5**	**5.05**	**5.1**	5 U	NA	NA	NA
Filtered Metals														
IRON	µg/L	--	NA	NA	**1800**	**1800**	**1800**	**1600**	**1650**	**1600**	**1500**	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	15 U	15 U	15 U	**5**	**5**	**5**	5 U	NA	NA	NA
Other RA Parameters														
ALKALINITY	mg/L	--	NA	NA	**207**	**198**	**189**	**185**	**193.5**	**202**	**195**	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	**33.1**	NA	**27.2**	**27.1**	**27**	**27**	**26.9**	**26.8**	**26.2**	**21.3**	**22.7**	**23.6**
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	**0.052 I**	**0.06**	**0.068 I**	0.05 U	0.05 U	0.05 U	**0.074 I**	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	**23.4**	**23.35**	**23.3**	**25.3**	**24.4**	**23.5**	**20.5**	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	**0.07 I**	**0.595**	**0.34 I**	**0.61 I**	**0.38**	0.3 U	0.3 U	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	**307**	NA	NA	NA	NA	NA	NA	NA	NA	**255**	**324**	**306**
TOTAL ORGANIC CARBON	mg/L	--	**4.3**	NA	**10.2**	**10.2**	**10.2**	**10.1**	**10.2**	**10.3**	**9.8**	NA	**10.3**	**12.7**
DISSOLVED OXYGEN	mg/L	--	**0.18**	NA	**0.75**	NA	NA	**0.29**	NA	NA	**0.22**	**1.14**	**0.16**	**0.41**
[illegible]	mV	--	**-58.2**	NA		NA	NA	**-95.1**	NA	NA	**-94.7**	**-25.7**	**-90.3**	**-97.6**
[illegible]	S.U.	--	**6.9**	NA	**7.08**	NA	NA	**7.1**	NA	NA	**7.14**	**7.04**	**7.11**	**6.77**
[illegible]	mS/cm	--	**0.817**	NA	**0.528**	NA	NA	**0.582**	NA	NA	**0.506**	**0.39**	**0.626**	**0.581**
[illegible]	C	--	**28.9**	NA	**27.67**	NA	NA	**27.3**	NA	NA	**27.25**	**29.11**	**27.01**	**28.2**
[illegible]	NTU	--	**0.67**	NA	**3.29**	NA	NA	**1.14**	NA	NA	**1.84**	**13.5**	**2.21**	**111.1**
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**25 <**

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NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
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TABLE 3-3
VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
ANNUAL MONITORING REPORT
FLASH DRY CLEANERS
POMPANO BEACH, FLORIDA
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PARAMETER	UNIT	GCG*	FCMW14 (150 ft)			FCMW15 (68 ft)								
			Nov-11	Aug-12	Oct-13	Nov-11	Feb-12	May-12	May-12 DUP	Aug-12	Mar-13	Mar-13 DUP	Oct-13	Oct-13 DUP
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	µg/L	70	5 U	0.5 U	0.5 U	1500 J	2200	1300	1400	910	210	210	**51**	**50**
TETRACHLOROETHENE	µg/L	3	5 U	0.5 U	0.5 U	5.3	20 U	2.5 U	2.5 U	10 U	1 U	1 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	5 U	0.5 U	0.5 U	320	330	210	250	**19**	**5.8**	**6**	**2**	**2**
TRICHLOROETHENE	µg/L	3	5 U	0.5 U	0.5 U	**2.4 J**	20 U	2.5 U	2.5 U	10 U	1 U	1 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	5 U	0.5 U	0.5 U	6.5	20 U	3.6	3.8	130	61	57	7.6	7.1
Volatile Gasses														
ETHANE	µg/L	--	NA	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	NA	0.32 U	NA
ETHENE	µg/L	--	NA	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U	**11**	**11 J**	NA	0.43 U	NA
METHANE	µg/L	--	NA	NA	NA	**90**	**110**	**87**	**84**	**23**	**42 J**	NA	**21.7**	NA
Metals														
IRON	µg/L	--	NA	NA	NA	**2600**	**2500**	**2500**	**2800**	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	15 U	**9.2**	**8.4**	**8.4**	NA	NA	NA	NA	NA
Filtered Metals														
IRON	µg/L	--	NA	NA	NA	**2600**	**2500**	**2500**	**2500**	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	15 U	**9.3**	**9**	**8.8**	NA	NA	NA	NA	NA
Other NA Parameters														
ALKALINITY	mg/L	--	NA	NA	NA	**253**	**235**	**257**	**248**	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	NA	NA	NA	**29.4**	**28.9**	**29**	**29.1**	**29.7**	**29.5**	NA	**31.6**	NA
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	0.05 U	0.05 U	**0.079 I**	**0.07 I**	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	**28.8**	**31.6**	**27.6**	**27.6**	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	**0.69 I**	**1.1**	0.3 U	0.3 U	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	**356**	**322**	NA	**310**	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	**5.6**	**5.5**	**5.5**	**6**	NA	**5.4**	NA	**6.4**	NA
DISSOLVED OXYGEN	mg/L	--	**0.51**	**0.29**	**0.54**	**0.5**	**0.44**	**0.2**	NA	**1.5**	**0.63**	NA	**0.66**	NA
[illegible]	mV	--	**-151.4**	**-70.3**	**-92.4**	**-162.9**	**-86.2**	**-87.2**	NA	**-29**	**-77**	NA	**-47**	NA
[illegible]	S.U.	--	**4.96**	**6.92**	**7.01**	**6.97**	**6.97**	**7**	NA	**6.92**	**6.98**	NA	**6.55**	NA
[illegible]	mS/cm	--	**9.252**	**0.001**	**10.5**	**0.622**	**0.705**	**0.622**	NA	**0.69**	**0.64**	NA	**0.56**	NA
[illegible]	C	--	**27.95**	**28.71**	**28.39**	**28.11**	**27.26**	**27.21**	NA	**31.6**	**27.8**	NA	**28.4**	NA
[illegible]	NTU	--	**9.77**	**9.6**	**99.3**	**4.07**	**3.49**	**4.77**	NA	**9.48**	**1.86**	NA	**8.66**	NA
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**37.6 J**	NA

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TABLE 3-3
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ANNUAL MONITORING REPORT
FLASH DRY CLEANERS
PONPANO BEACH, FLORIDA

PARAMETER	UNIT	GCG*	PCMW16 (45 ft)						PCMW17 (45 ft)					
			Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13	Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	µg/L	70	**2 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**14 J**	**2**	**1.3**	**0.25 J**	**0.23 J**	**0.37 J**
TETRACHLOROETHENE	µg/L	3	**0.7 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.66 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.02 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**[illegible]**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gases														
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Filtered Metals														
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other NA Parameters														
ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	**0.69**	**0.46**	**0.23**	**0.21**	**0.5**	**0.36**	**0.56**	**0.66**	**0.24**	**0.21**	**0.48**	**0.35**
[illegible]	mV	--	**-116.7**	**-79.3**	**-64.8**	**-59.5**	**-110.3**	**-73.8**	**-119**	**-104**	**-115**	**-79.9**	**-95.1**	**-58.7**
[illegible]	S.U.	--	**7.13**	**7.12**	**7.17**	**7.17**	**7.05**	**7.05**	**7.2**	**7.09**	**7.26**	**7.29**	**7.17**	**7.08**
[illegible]	mS/cm	--	**0.645**	**0.727**	**0.605**	**0.755**	**0.644**	**0.651**	**0.542**	**0.549**	**0.523**	**0.645**	**0.486**	**0.489**
[illegible]	C	--	**29.34**	**28.7**	**28.92**	**30.29**	**27.01**	**29.21**	**28.52**	**28.02**	**28.44**	**31.33**	**25.29**	**28.39**
[illegible]	NTU	--	**0.23**	**0.43**	**0.3**	**4.02**	**0.27**	**0.24**	**0.29**	**1**	**1.89**	**10.8**	**1.88**	**3.24**
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
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ANNUAL MONITORING REPORT
FLASH DRY CLEANERS
POMPANO BEACH, FLORIDA

PARAMETER	UNIT	GCG*	FCMW19 (45 ft)						FCMW19A (25 ft)							
			Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13	Nov-11	Feb-12	Feb-12 AVG	Feb-12 DUP	May-12	Aug-12	Mar-13	Oct-13
Volatile Organic Compounds																
CIS-1,2-DICHLOROETHENE	µg/L	70	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**3.3 J**	**2.3**	**2.35**	**2.4**	**2.1**	**2.3**	**0.69**	**0.83**
TETRACHLOROETHENE	µg/L	3	**0.5 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**12.9**	**9.9**	**9.9**	**9.9**	**8.8**	**8.7**	**4.5**	**5.4**
Volatile Gases																
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Filtered Metals																
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other NA Parameters																
ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	**0.76**	**0.49**	**0.14**	**0.21**	**0.38**	**0.38**	**4.93**	**0.36**	NA	NA	**0.8**	**0.29**	**0.24**	**0.3**
[illegible]	mV	--	**-132**	**-124**	**-158**	**-104**	**-118**	**-117.7**	**-98.6**	**-53.6**	NA	NA	**-80.2**	**-63.8**	**-102.9**	**-65.3**
[illegible]	S.U.	--	**7.24**	**6.75**	**7.33**	**7.26**	**7.18**	**7.12**	**7.07**	**6.42**	NA	NA	**7.01**	**7.13**	**6.87**	**6.61**
[illegible]	mS/cm	--	**0.517**	**0.527**	**0.47**	**0.542**	**0.492**	**0.506**	**0.58**	**0.594**	NA	NA	**0.692**	**0.63**	**0.541**	**0.523**
[illegible]	C	--	**27.89**	**27.47**	**27.16**	**29.89**	**26.13**	**27.72**	**27.7**	**27.01**	NA	NA	**27.31**	**27.61**	**25.22**	**27.32**
[illegible]	NTU	--	**1.83**	**1.5**	**14.1**	**1.17**	**0.89**	**1.27**	**3.64**	**0.98**	NA	NA	**1.48**	**2.87**	**1.69**	**7.38**
Microbiological																
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
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ANNUAL MONITORING REPORT
FLASH DRY CLEANERS
POMPANO BEACH, FLORIDA

PARAMETER	UNIT	GCG*	FCMW19B (45 ft)			FCMW19B (45 ft) con't						FCMW19C (68 ft)				
			Nov-11	Feb-12	May-12	May-12 DUP	Aug-12	Mar-13	Mar-13 AVG	Mar-13 DUP	Oct-13	Nov-11	Nov-11 AVG	Nov-11 DUP	Feb-12	May
Volatile Organic Compounds																
CIS-1,2-DICHLOROETHENE	µg/L	70	290 J	200	130	130	93	21	20	19	5.6	2.2 J	6.1	10 J	1.4	0.69
TETRACHLOROETHENE	µg/L	3	3.3 J	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.71 J	1.405	2.1 J	0.5 U	0.5
TRANS-1,2-DICHLOROETHENE	µg/L	100	1.8 J	2 U	0.5 U	0.5 U	0.23 J	0.5 U	0.5 U	0.5 U	0.5 U	5 U	5 U	5 U	0.5 U	0.5
TRICHLOROETHENE	µg/L	3	1.7 J	2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.9 J	0.9 J	0.5 U	0.5
VINYL CHLORIDE	µg/L	1	120	74	78	88	82	36	35	34	18	0.61 J	2.855	5.1	1.4	1
Volatile Gasses																
ETHANE	µg/L	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	NA	NA	NA	0.32 U	NA	NA	NA	NA	NA
ETHENE	µg/L	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	NA	NA	NA	0.43 U	NA	NA	NA	NA	NA
METHANE	µg/L	--	110	110	100	120	84	NA	NA	NA	48.8	NA	NA	NA	NA	NA
Metals																
IRON	µg/L	--	2200	2100	2000	2000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	15 U	12	11	9.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Filtered Metals																
IRON	µg/L	--	2100	2000	2000	2000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	15 U	11	11	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other NA Parameters																
ALKALINITY	mg/L	--	232	216	214	216	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	195	230	237	241	153	192	202.5	213	192	NA	NA	NA	NA	NA
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	0.25 U	0.25 U	0.39 I	0.37 I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	0.25 U	0.25 U	0.25 U	0.25 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	1 U	NA	NA	NA	0.125 U	NA	NA	NA	NA	NA
SULFATE	mg/L	--	22.9	25.6	18	18.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	0.55 I	0.69 I	0.3 U	0.37 I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	528	604	621	638	631	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	4.5	4.6	4.5	4.4	NA	4.5	4.5	4.5	5.4	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	4.52	0.19	0.61	NA	0.25	0.39	NA	NA	0.32	4.1	NA	NA	0.62	0.15
[illegible]	mV	--	-104.8	-84.2	-91.7	NA	-79.6	-105.1	NA	NA	-84.4	-123.8	NA	NA	-103.5	-112.8
[illegible]	S U	--	7.12	6.71	7.05	NA	7.07	6.83	NA	NA	7.04	7.11	NA	NA	6.84	7.15
[illegible]	mS/cm	--	1.124	1.247	1.265	NA	0.994	1.111	NA	NA	1.049	43.96	NA	NA	45.22	43.12
[illegible]	C	--	27.50	26.53	26.81	NA	27.88	23.68	NA	NA	27.04	27.13	NA	NA	27.20	26.94
[illegible]	NTU	--	4.99	6.82	0.43	NA	1.99	0.68	NA	NA	1.06	1.41	NA	NA	1.99	0.63
Microbiological																
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
mS/cm - milliSiemens per centimeter
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FLASH DRY CLEANERS
POMPANO BEACH, FLORIDA

PARAMETER	UNIT	GCG*	-12
Volatile Organic Compounds			
CIS-1,2-DICHLOROETHENE	µg/L	70	
TETRACHLOROETHENE	µg/L	3	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	U
TRICHLOROETHENE	µg/L	3	U
VINYL CHLORIDE	µg/L	1	
Volatile Gases			
ETHANE	µg/L	--	
ETHENE	µg/L	--	
METHANE	µg/L	--	
Metals			
IRON	µg/L	--	
MANGANESE	µg/L	--	
Filtered Metals			
IRON	µg/L	--	
MANGANESE	µg/L	--	
Other NA Parameters			
ALKALINITY	mg/L	--	
BICARBONATE ALKALINITY	mg/L	--	
CARBONATE ALKALINITY	mg/L	--	
CHLORIDE	mg/L	--	
HYDROXIDE ALKALINITY	mg/L	--	
NITRATE-N	mg/L	--	
NITRITE-N	mg/L	--	
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	
POLYSORBATE 80	mg/L	--	
SULFATE	mg/L	--	
SULFIDE	mg/L	--	
TOTAL DISSOLVED SOLIDS	mg/L	--	
TOTAL ORGANIC CARBON	mg/L	--	
DISSOLVED OXYGEN	mg/L	--	
[illegible]	mV	--	
[illegible]	S.U	--	
[illegible]	mS/cm	--	
[illegible]	C	--	
[illegible]	NTU	--	
Microbiological			
DEHALOCOCCOIDES	CELLS/	--	

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POMPANO BEACH, FLORIDA

PARAMETER	UNIT	GCG*	FCMW19C (88 ft) con't			FCMW20 (45 ft)					
			Aug-12	Mar-13	Oct-13	Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13
Volatile Organic Compounds											
CIS-1,2-DICHLOROETHENE	µg/L	70	**9.6 J**	**0.22 J**	**0.13 J**	**43 J**	**38**	**37**	**51**	170	520
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	5 U	**0.46 J**	**0.55**	**1.8**	**13**	**43**
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	**13.3**	0.5 U	0.5 U	5 U	0.5 U	0.5 U	**0.17 J**	1.1	6.3
Volatile Gasses											
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals											
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Filtered Metals											
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other NA Parameters											
ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	**0.32**	**0.41**	**0.25**	**0.61**	**0.4**	**0.25**	**0.37**	**0.5**	**0.49**
[illegible]	mV	--	**-98.6**	**-135.7**	**-89.7**	**-139.8**	**-94.3**	**-49.6**	**-106.6**	**-102.8**	**-71.6**
[illegible]	S.U.	--	**7.19**	**6.92**	**6.97**	**6.96**	**7.05**	**7.09**	**7.2**	**7**	**6.85**
[illegible]	mS/cm	--	**39.29**	**43.47**	**42.94**	**1.436**	**1.459**	**1.144**	**0.985**	**1.084**	**0.795**
[illegible]	C	--	**27.69**	**24.81**	**27.1**	**26.82**	**26.88**	**26.52**	**28.03**	**26.12**	**26.79**
[illegible]	NTU	--	**7.93**	**0.48**	**0.59**	**8.14**	**2.1**	**4.02**	**11.1**	**0.48**	**1.54**
Microbiological											
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA

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POMPANO BEACH, FLORIDA
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PARAMETER	UNIT	GCG*	FCMW21A (11 ft)						FCMW21B (45 ft)					
			Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13	Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	µg/L	70	**1.4 J**	0.5 U	0.5 U	0.5 U	**0.41 J**	0.5 U	**20 J**	**18**	**13**	**11**	**7.8**	**9.6**
TETRACHLOROETHENE	µg/L	3	**0.59 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses														
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Filtered Metals														
IRON	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other NA Parameters														
ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	**0.43**	**0.41**	**0.31**	**0.16**	**0.2**	**0.33**	**1.55**	**0.58**	**0.18**	**0.19**	**0.27**	**0.45**
[illegible]	mV	--	**-131**	**-83.7**	**-97.9**	**-164**	**-120**	**-43.2**	**-99.3**	**-97.9**	**-89.6**	**-111**	**-69**	**-68.7**
[illegible]	S.U.	--	**7.75**	**7.76**	**7.84**	**7.57**	**7.53**	**7.9**	**6.97**	**6.94**	**7.04**	**6.73**	**6.88**	**6.87**
[illegible]	mS/cm	--	**0.185**	**0.2**	**0.188**	**0.107**	**0.191**	**0.18**	**0.665**	**0.71**	**0.62**	**0.59**	**0.552**	**0.581**
[illegible]	C	--	**29.63**	**28.07**	**28.96**	**31.32**	**27.2**	**30.83**	**28.41**	**28.07**	**28.26**	**28.68**	**27.41**	**28.22**
[illegible]	NTU	--	**0.74**	**1.71**	**0.4**	**0.94**	**0.7**	**0.31**	**1.73**	**1.04**	**1.09**	**0.68**	**0.9**	**1.12**
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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µg/L - micrograms per liter
mV - millivolt
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PARAMETER	UNIT	GCG*	FCMW22A (25 ft)						FCMW22B (45 ft)					
			Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13	Nov-11	Feb-12	May-12	Aug-12	Mar-13	Oct-13
Volatile Organic Compounds														
CIS-1,2-DICHLOROETHENE	ug/L	70	**1.3 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**1.5 J**	0.5 U	0.5 U	**0.19 J**	**0.22 J**	**0.18 J**
TETRACHLOROETHENE	ug/L	3	**0.57 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.51 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	ug/L	100	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	ug/L	3	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	ug/L	1	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses														
ETHANE	ug/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	ug/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	ug/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
IRON	ug/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	ug/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Filtered Metals														
IRON	ug/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MANGANESE	ug/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other NA Parameters														
ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BICARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBONATE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HYDROXIDE ALKALINITY	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRITE-N	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHENOLPHTHALEIN ALKALINITY AS CACO3	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYSORBATE 80	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	**0.85**	**0.63**	**0.52**	**0.08**	**0.27**	**0.52**	**1.02**	**0.14**	**0.69**	**0.81**	**0.52**	**0.45**
[illegible]	mV	--	**-137.5**	**-63.1**	**-88.6**	**-59.9**	**-78.9**	**-57.3**	**-256**	**-188**	**-165**	**-81.8**	**-97.8**	**-73.3**
[illegible]	S.U.	--	**6.47**	**6**	**6.92**	**6.83**	**6.79**	**6.79**	**7.24**	**6.88**	**7.2**	**7.04**	**6.96**	**6.97**
[illegible]	mS/cm	--	**0.912**	**0.906**	**0.933**	**0.618**	**0.851**	**0.99**	**46.5**	**46.6**	**48.2**	**1.95**	**2.056**	**2.218**
[illegible]	C	--	**26.73**	**26.19**	**26.79**	**28.18**	**25.71**	**26.35**	**26.8**	**26.7**	**26.7**	**28.9**	**26.35**	**26.34**
[illegible]	NTU	--	**1.22**	**2.8**	**1.85**	**18.6**	**1.77**	**4**	**8.65**	**6.84**	**5.85**	**4.71**	**3.72**	**3.58**
Microbiological														
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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ug/L - micrograms per liter
mV - millivolt
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LOCATION			FCIW02				FCMW03 (15 ft)				
SAMPLE ID	UNIT	GCG*	FCIW02_20140423	FCIW03_20141105	FCIW02_20150520	FCIW02_20151015	FCMW03_20140424	FCMW03_20141106	FCMW03_20141205	FCMW03_20150518	FCMW03
SAMPLE DATE			Apr-14	Nov-14	May-15	Oct-15	Apr-14	Nov-14	Dec-14	May-15	Oct-15
Volatile Organic Compounds											
CIS-1,2-DICHLOROETHENE	µg/L	70	130	380	170	140	1.3	5 U	NA	1	0.2 J
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	1 U	0.5 U	0.5 U	5 U	NA	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	32	7.5	0.4 J,O	0.25 J	10	4.8 J	NA	8.7	4.1
TRICHLOROETHENE	µg/L	3	0.5 U	0.12 J	1 U	0.5 U	0.5 U	5 U	NA	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	5.3	91	34	66	140	78	NA	47	6.2
Volatile Gasses											
ETHANE	µg/L	--	NA	NA	NA	NA	2.6 U	2.6 U	NA	2.6 U	2.6 U
ETHENE	µg/L	--	NA	NA	NA	NA	130	35	NA	120	120
METHANE	µg/L	--	NA	NA	NA	NA	7600	10000	NA	8700	3000
MISCELLANEOUS PARAMETERS (MG/L)											
CHLORIDE	mg/L	--	NA	NA	NA	NA	16	NA	NA	13	8.1
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	250	NA	NA	290 J,O	220
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	18	NA	NA	45 J,O	NA
DISSOLVED OXYGEN	mg/L	--	NA	NA	NA	NA	NA	0.9	NA	NA	0.95
OXIDATION REDUCTION POTENTIAL	mV	--	NA	NA	NA	NA	NA	-34.9	NA	NA	-73.2
PH	S.U.	--	NA	NA	NA	NA	NA	5.62	NA	NA	6.22
SPECIFIC CONDUCTANCE	µS/cm	--	NA	NA	NA	NA	NA	414	NA	NA	2.79
TEMPERATURE	°C	--	NA	NA	NA	NA	NA	27.88	NA	NA	28.64
TURBIDITY	NTU	--	NA	NA	NA	NA	NA	2.93	NA	NA	34.1
Microbiological											
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	950	NA	1090 [Nov-15]
FILTERED MISCELLANEOUS											
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	10

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mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
µS/cm - microSiemens per centimeter
S.U. - Standard Unit
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TABLE 3-3

VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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LOCATION			FCMW04 (34.5 ft)		FCMW05 (14 ft)			
SAMPLE ID	UNIT	GCG*	FCMW04_20141104	FCMW04	FCMW05_20140423	FCMW05_20141106	FCMW05_20150518	FCMW05
SAMPLE DATE			Nov-14	Oct-15	Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds								
CIS-1,2-DICHLOROETHENE	µg/L	70	0.1 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	**1**	**1.3**	**1.7**	**2**
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses								
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)								
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	**2.03**	**0.12**	NA	**3.42**	NA	**20.2**
OXIDATION REDUCTION POTENTIAL	mV	--	**-59.3**	**-102**	NA	**57.4**	NA	**55.6**
PH	S.U.	--	**8.68**	**6.95**	NA	**6.72**	NA	**5.94**
SPECIFIC CONDUCTANCE	uS/cm	--	**865**	**0.776**	NA	**605**	NA	**0.534**
TEMPERATURE	°C	--	**27.77**	**27.88**	NA	**28.55**	NA	**29.921**
TURBIDITY	NTU	--	**8.81**	**3.66**	NA	**1.03**	NA	**1.08**
Microbiological								
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS								
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA

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LOCATION			FCMW06 (25 ft)					FCMW07 (100 ft)	
SAMPLE ID	UNIT	GCG*	FCMW06_20140424	FCMW06_20141106	FCMW06_20141205	FCMW06_20150518	FCMW06	FCMW07_20141104	FCMW07
SAMPLE DATE			Apr-14	Nov-14	Dec-14	May-15	Oct-15	Nov-14	Oct-15
Volatile Organic Compounds									
CIS-1,2-DICHLOROETHENE	µg/L	70	**1.6**	**3600**	NA	**10000**	**10000**	**0.16 J**	**8.4**
TETRACHLOROETHENE	µg/L	3	**1.7**	50 U	NA	**36**	**12000**	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	**4.1**	50 U	NA	**95**	**30**	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	**1.1**	50 U	NA	**2100**	**16000**	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	**1500**	**12000**	NA	**7300**	**2900**	0.5 U	0.5 U
Volatile Gasses									
ETHANE	µg/L	--	2.6 UJ	2.6 U	NA	2.6 U	2.6 U	NA	NA
ETHENE	µg/L	--	**460 J**	**650**	NA	**380**	**150**	NA	NA
METHANE	µg/L	--	**11000 J**	**13000**	NA	**11000**	**9900**	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)									
CHLORIDE	mg/L	--	**26**	NA	NA	**29**	**28**	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	**470**	NA	NA	**430 J,O**	**320**	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	**60**	NA	NA	**56**	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**0.1**	NA	NA	**0.04**	**2.41**	**0.28**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-84**	NA	NA	**-100.7**	**-91.9**	**-91.8**
PH	S.U.	--	NA	**6.36**	NA	NA	**6.47**	**9.09**	**7.1**
SPECIFIC CONDUCTANCE	uS/cm	--	NA	**0.72**	NA	NA	**5.39**	**548**	**0.616**
TEMPERATURE	°C	--	NA	**29.53**	NA	NA	**30.12**	**28.47**	**27.81**
TURBIDITY	NTU	--	NA	**6.56**	NA	NA	**6.22**	**1.97**	**7.84**
Microbiological									
DEHALOCOCCOIDES	CELLS	--	NA	NA	**421000**	NA	**14600 [Nov-15]**	NA	NA
FILTERED MISCELLANEOUS									
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	**20**	NA	NA

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uS/cm - microSiemens per centimeter
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LOCATION			FCMW08 (45 ft)		FCMW09 (45 ft)			
SAMPLE ID	UNIT	GCG*	FCMW08_20141105	FCMW08	FCMW09_20140423	FCMW09_20141105	FCMW09_20150519	FCMW09
SAMPLE DATE			Nov-14	Oct-15	Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds								
CIS-1,2-DICHLOROETHENE	µg/L	70	0.5 U	0.5 U	**3.7**	**4.7**	**2.3**	**3.6**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	**0.17 J**	0.5 U	**0.43 J**
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	**0.21 J**	**0.39 J**	0.5 U	0.5 U
Volatile Gasses								
ETHANE	µg/L	--	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U
ETHENE	µg/L	--	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U
METHANE	µg/L	--	NA	NA	**43 J**	**38**	**21**	**30**
MISCELLANEOUS PARAMETERS (MG/L)								
CHLORIDE	mg/L	--	NA	NA	**41**	NA	**36**	**36**
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	**380**	NA	**380**	**440**
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	**7.4**	NA	**12**	NA
DISSOLVED OXYGEN	mg/L	--	**2.91**	**0.26**	NA	NA	NA	**0.08**
OXIDATION REDUCTION POTENTIAL	mV	--	**-78.2**	**-85.8**	NA	NA	NA	**-91**
PH	SU	--	**8.91**	**7.11**	NA	NA	NA	**6.98**
SPECIFIC CONDUCTANCE	uS/cm	--	**479**	**0.607**	NA	NA	NA	**0.649**
TEMPERATURE	°C	--	**28.07**	**28.84**	NA	NA	NA	**27.27**
TURBIDITY	NTU	--	**11.2**	**3.66**	NA	NA	NA	**160**
Microbiological								
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS								
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	**4.4**

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mV - millivolt
NTU - Nephelometric turbidity unit
uS/cm - microSiemens per centimeter
S.U. - Standard Unit
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LOCATION	UNIT	GCG*	FCMW10 (68 ft)					FCMW11 (100 ft)	
SAMPLE ID			FCMW10_20140424	FCMW10_20141106	FCMW10_20141205	FCMW10_20150518	FCMW10_20151015	FCMW11_20141104	FCMW11_20151015
SAMPLE DATE			Apr-14	Nov-14	Dec-14	May-15	Oct-15	Nov-14	Oct-15
Volatile Organic Compounds									
CIS-1,2-DICHLOROETHENE	µg/L	70	**0.47 J**	**2.4**	NA	**8.2**	**3.8**	**2.8**	**0.97**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2 DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	NA	**0.26 J,O**	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	**0.56**	**1.9**	NA	**3.6**	**1.7**	0.5 U	0.5 U
Volatile Gasses									
ETHANE	µg/L	--	2.6 U	2.6 U	NA	2.6 U	2.6 U	NA	NA
ETHENE	µg/L	--	2.6 U	2.6 U	NA	2.6 U	2.6 U	NA	NA
METHANE	µg/L	--	**50**	**110**	NA	**110**	**77**	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)									
CHLORIDE	mg/L	--	**39**	NA	NA	**29**	**30**	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	**340**	NA	NA	**340 J,O**	**360**	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	**9.5**	NA	NA	**15**	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**0.16**	NA	NA	**0.26**	**1.15**	**0.11**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-116.2**	NA	NA	**-88**	**-88.1**	**-120**
PH	S.U.	--	NA	**7.16**	NA	NA	**7.13**	**8.76**	**7.12**
SPECIFIC CONDUCTANCE	uS/cm	--	NA	**0.603**	NA	NA	**0.591**	**512**	**2.237**
TEMPERATURE	°C	--	NA	**28.03**	NA	NA	**28.72**	**27.76**	**27.42**
TURBIDITY	NTU	--	NA	**4.13**	NA	NA	**2.16**	**5.82**	**6.05**
Microbiological									
DEHALOCOCCOIDES	CELLS	--	NA	NA	**2770**	NA	**244 [Nov-15]**	NA	NA
FILTERED MISCELLANEOUS									
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	**12**	NA	NA

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µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
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LOCATION			FCMW12 (45 ft)				FCMW13 (45 ft)				
SAMPLE ID	UNIT	GCG*	FCMW12_20140424	FCMW12_20141105	FCMW12_20150519	FCMW12_20151013	FCMW13_20140424	FCMW13_20141105	FCMW13_20141205	FCMW13_20150520	FCMW13_20151015
SAMPLE DATE			Apr-14	Nov-14	May-15	Oct-15	Apr-14	Nov-14	Dec-14	May-15	Oct-15
Volatile Organic Compounds											
CIS-1,2-DICHLOROETHENE	µg/L	70	**0.47 J**	**0.43 J**	**0.52**	**0.18 J**	**12**	**7.3**	NA	**6**	**4.9**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U	**0.36 J**	**0.24 J**	NA	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	0.5 U	0.5 U	**0.64**	**0.37 J**	NA	0.5 U	0.5 U
Volatile Gases											
ETHANE	µg/L	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	NA	2.6 U	2.6 U
ETHENE	µg/L	--	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	NA	2.6 U	2.6 U
METHANE	µg/L	--	**1.5**	**24**	**25**	**9.5**	**66**	**72**	NA	**33**	**39**
MISCELLANEOUS PARAMETERS (MG/L)											
CHLORIDE	mg/L	--	**30**	NA	**32**	**37**	**21**	NA	NA	**22**	**34**
TOTAL DISSOLVED SOLIDS	mg/L	--	**350**	NA	**340**	**360**	**330**	NA	NA	**330**	**350**
TOTAL ORGANIC CARBON	mg/L	--	**6.4**	NA	**8.1**	NA	**7.5**	NA	NA	**11**	NA
DISSOLVED OXYGEN	mg/L	--	NA	**0.42**	NA	**0.12**	NA	**0.39**	NA	NA	**0.11**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-74.2**	NA	**-86.3**	NA	**-79.2**	NA	NA	**-123**
PH	S.U.	--	NA	**7.2**	NA	**7.08**	NA	**7**	NA	NA	**7.08**
SPECIFIC CONDUCTANCE	µS/cm	--	NA	**0.604**	NA	**0.575**	NA	**0.575**	NA	NA	**0.541**
TEMPERATURE	°C	--	NA	**28.36**	NA	**28.19**	NA	**27.19**	NA	NA	**12.78**
TURBIDITY	NTU	--	NA	**5.46**	NA	**1.76**	NA	**3.26**	NA	NA	**1.99**
Microbiological											
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	**25 <**	NA	**17.8 J [Nov-15]**
FILTERED MISCELLANEOUS											
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	1 U	NA	NA	NA	NA	**6.8**

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LOCATION			FCMW14 (150 ft)		FCMW15 (68 ft)			
SAMPLE ID	UNIT	GCG*	FCMW14_20141104	FCMW14_20151015	FCMW15_20140423	FCMW15_20140423-AVG	FCMW15_20140423-D	FCMW15_20141103
SAMPLE DATE			Nov-14	Oct-15	Apr-14	Apr-14	Apr-14	Nov-14
Volatile Organic Compounds								
CIS-1,2-DICHLOROETHENE	µg/L	70	0.5 U	0.5 U	**21**	**20.5**	**20**	**11**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	**1**	**1**	**1**	5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	**[illegible]**	**5.85**	**[illegible]**	**2.1 J**
Volatile Gases								
ETHANE	µg/L	--	NA	NA	2.6 UJ	2.6 U	2.6 UJ	2.6 U
ETHENE	µg/L	--	NA	NA	2.6 UJ	2.6 U	2.6 UJ	2.6 U
METHANE	µg/L	--	NA	NA	**35 J**	**36.5**	**38 J**	**39**
MISCELLANEOUS PARAMETERS (MG/L)								
CHLORIDE	mg/L	--	NA	NA	**37**	**37**	**37**	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	**350**	**350**	**350**	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	**1.9**	**3.05**	**4.2**	NA
DISSOLVED OXYGEN	mg/L	--	**1.24**	**0.15**	NA	NA	NA	**0.3**
OXIDATION REDUCTION POTENTIAL	mV	--	**-81**	**-142.4**	NA	NA	NA	**-103.1**
PH	S.U.	--	**7.87**	**6.63**	NA	NA	NA	**7.05**
SPECIFIC CONDUCTANCE	uS/cm	--	**10920**	**18.17**	NA	NA	NA	**0.621**
TEMPERATURE	°C	--	**28.08**	**29.15**	NA	NA	NA	**27.25**
TURBIDITY	NTU	--	**8.82**	**8.91**	NA	NA	NA	**3.62**
Microbiological								
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS								
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA

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LOCATION			FCMW15 (68 ft)						
SAMPLE ID	UNIT	GCG*	FCMW15_20141103-D	FCMW15_20141205	FCMW15_20141205-AVG	FCMW15_20150520	FCMW15_20150520-D	FCMW15_20151015	FCMW15X
SAMPLE DATE			Nov-14	Dec-14	Dec-14	May-15	May-15	Oct-15	Oct-15
Volatile Organic Compounds									
CIS-1,2-DICHLOROETHENE	µg/L	70	**11**	NA	NA	**9.2**	**8.8**	**8.6**	**8.6**
TETRACHLOROETHENE	µg/L	3	5 U	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	5 U	NA	NA	**0.6**	**0.48 J,O**	**0.65**	**0.54**
TRICHLOROETHENE	µg/L	3	5 U	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	**2.1 J**	NA	NA	**1.2**	**1**	**0.97**	**1.4**
Volatile Gasses									
ETHANE	µg/L	--	2.6 U	NA	NA	2.6 U	NA	2.6 U	2.6 U
ETHENE	µg/L	--	2.6 U	NA	NA	2.6 U	NA	2.6 U	2.6 U
METHANE	µg/L	--	**43**	NA	NA	**42**	NA	**41**	**46**
MISCELLANEOUS PARAMETERS (MG/L)									
CHLORIDE	mg/L	--	NA	NA	NA	**39**	NA	**39**	**39**
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	**370**	NA	**370**	**380**
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	**9.8**	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	NA	NA	NA	NA	**0.08**	NA
OXIDATION REDUCTION POTENTIAL	mV	--	NA	NA	NA	NA	NA	**-207.7**	NA
PH	S.U.	--	NA	NA	NA	NA	NA	**6.95**	NA
SPECIFIC CONDUCTANCE	uS/cm	--	NA	NA	NA	NA	NA	**0.627**	NA
TEMPERATURE	°C	--	NA	NA	NA	NA	NA	**28.71**	NA
TURBIDITY	NTU	--	NA	NA	NA	NA	NA	**3.28**	NA
Microbiological									
DEHALOCOCCOIDES	CELLS	--	NA	**2780**	**2780**	NA	NA	NA	**276 [Nov-15]**
FILTERED MISCELLANEOUS									
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	1 U	**1.9**

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mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
µS/cm - microSiemens per centimeter
S.U. - Standard Unit
°C - degrees Celsius
J = Value is between the laboratory method detection limit and the laboratory practical quantitation limit.
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TABLE 3-3

VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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LOCATION			FCMW16 (45 ft)				FCMW17 (45 ft)			
SAMPLE ID	UNIT	GCG*	FCMW16-45_20140422	FCMW16-45_20141105	FCMW16-45_20150519	FCMW16-45	FCMW17-45_20140422	FCMW17-45_20141104	FCMW17-45_20150519	FCMW17-45
SAMPLE DATE			Apr-14	Nov-14	May-15	Oct-15	Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds										
CIS-1,2-DICHLOROETHENE	µg/L	70	0.5 U	0.5 U	0.5 U	0.5 U	**0.34 J**	**0.17 J**	**0.25 J,O**	**0.41 J**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U,J,O	0.5 U
Volatile Gasses										
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)										
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**10.16**	NA	**1.7**	NA	**2.55**	NA	**0.14**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-73.9**	NA	**-163**	NA	**-67.2**	NA	**-173.1**
PH	S.U.	--	NA	**8.16**	NA	**7.01**	NA	**9.47**	NA	**7.11**
SPECIFIC CONDUCTANCE	µS/cm	--	NA	**551**	NA	**0.531**	NA	**411**	NA	**0.518**
TEMPERATURE	°C	--	NA	**29.7**	NA	**23.94**	NA	**28.8**	NA	**28.91**
TURBIDITY	NTU	--	NA	**0.83**	NA	**0.25**	NA	**0.64**	NA	**0.34**
Microbiological										
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS										
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA

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µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
µS/cm - microSiemens per centimeter
S.U. - Standard Unit
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LOCATION			FCMW18 (11 ft)		FCMW18 (25 ft)		FCMW18 (45 ft)				
SAMPLE ID	UNIT	GCG*	FCMW18-11_20150519	FCMW18-11	FCMW18-25_20150519	FCMW18-25	FCMW18-45_20140423	FCMW18-45_20141103	FCMW18-45_20150519	FCMW18-45	FCMW18-45X
SAMPLE DATE			May-15	Oct-15	May-15	Oct-15	Apr-14	Nov-14	May-15	Oct-15	Oct-15
Volatile Organic Compounds											
CIS-1,2-DICHLOROETHENE	µg/L	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses											
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)											
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**0.16**	NA	**0.05**	NA	**0.13**	NA	**0.1**	NA
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-64**	NA	**-90**	NA	**-139.4**	NA	**-120.2**	NA
PH	SU	--	NA	**6.94**	NA	**7.07**	NA	**7.28**	NA	**7.12**	NA
SPECIFIC CONDUCTANCE	uS/cm	--	NA	**0.308**	NA	**0.501**	NA	**0.7**	NA	**0.582**	NA
TEMPERATURE	°C	--	NA	**30.32**	NA	**29.24**	NA	**27.35**	NA	**29.65**	NA
TURBIDITY	NTU	--	NA	**0.98**	NA	**0.87**	NA	**6.7**	NA	**0.91**	NA
Microbiological											
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS											
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
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µg/L - micrograms per liter
mV - millivolt
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S.U. - Standard Unit
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TABLE 3-3

VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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LOCATION			FCMW18 (68 ft)		FCMW18 (100 ft)		FCMW19 (25 ft)			
SAMPLE ID	UNIT	GCG*	FCMW18-68_20150519	FCMW18-68	FCMW18-100_20150519	FCMW18-100	FCMW19A-25_20140423	FCMW19A-25_20141105	FCMW19A-25_20150518	FCMW19A-25
SAMPLE DATE			May-15	Oct-15	May-15	Oct-15	Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds										
CIS-1,2-DICHLOROETHENE	µg/L	70	170	86	0.24 J,O	0.34 J	0.92	0.43 J	0.86	0.5 U
TETRACHLOROETHENE	µg/L	3	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	4.2	0.37 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.48 J,O	0.5 U
VINYL CHLORIDE	µg/L	1	8	40	0.5 U	0.5 U	5.2	5.6	2	1.2
Volatile Gasses										
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)										
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	0.1	NA	0.12	NA	9.51	NA	0.16
OXIDATION REDUCTION POTENTIAL	mV	--	NA	-112	NA	-97	NA	-74.7	NA	-95
pH	SU	--	NA	7.09	NA	6.78	NA	9.07	NA	7
SPECIFIC CONDUCTANCE	uS/cm	--	NA	1.12	NA	41.35	NA	521	NA	0.556
TEMPERATURE	°C	--	NA	28.05	NA	28.41	NA	28.92	NA	27.96
TURBIDITY	NTU	--	NA	4.51	NA	1.2	NA	3.09	NA	6.88
Microbiological										
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS										
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA

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mV - millivolt
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LOCATION	UNIT	GCG*	FCMW19 (45 ft)					
SAMPLE ID			FCMW19B-45_20140423	FCMW19B-45_20140423-AVG	FCMW19B-45_20140423-D	FCMW19B-45_20141105-D	FCMW19B-45_20141106	FCMW19B-45_20141106-AVG
SAMPLE DATE			Apr-14	Apr-14	Apr-14	Nov-14	Nov-14	Nov-14
Volatile Organic Compounds								
CIS-1,2-DICHLOROETHENE	µg/L	70	**2.1**	**2.1**	**2.1**	**1.5**	**1.5**	**1.5**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.1	0.15	0	1.7	1.7	1.7
Volatile Gasses								
ETHANE	µg/L	--	2.6 U	2.6 U	NA	NA	2.6 U	2.6 U
ETHENE	µg/L	--	2.6 U	2.6 U	NA	NA	2.6 U	2.6 U
METHANE	µg/L	--	**87**	**87**	NA	NA	**67**	**67**
MISCELLANEOUS PARAMETERS (MG/L)								
CHLORIDE	mg/L	--	**190**	**190**	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	**620**	**620**	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	**8.2**	**8.2**	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	NA	NA	NA	**0.13**	**0.13**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	NA	NA	NA	**-107.7**	**-107.7**
PH	S.U.	--	NA	NA	NA	NA	**7.01**	**7.01**
SPECIFIC CONDUCTANCE	dS/cm	--	NA	NA	NA	NA	**0.957**	**0.957**
TEMPERATURE	°C	--	NA	NA	NA	NA	**27.8**	**27.8**
TURBIDITY	NTU	--	NA	NA	NA	NA	**3.4**	**3.4**
Microbiological								
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS								
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA

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µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
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S.U. - Standard Unit
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LOCATION			FCMW19 (45 ft)					FCMW19 (68 ft)			
SAMPLE ID	UNIT	GCG*	FCMW19B-45_20150518	FCMW19B-45_20150518-D	FCMW19B-45	FCMW19B-45RS	FCMW19B-45X	FCMW19C-68_20140423	FCMW19C-68_20141105	FCMW19C-68_20150518	FCMW19C-68
SAMPLE DATE			May-15	May-15	Oct-15	Oct-15	Oct-15	Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds											
CIS-1,2-DICHLOROETHENE	µg/L	70	**1.2**	**1.1**	**1.2**	NA	**1.3**	**0.13 J**	**0.14 J**	0.5 U	**0.64**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	**1.1**	**2.6**	**2.8**	NA	**2.8**	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses											
ETHANE	µg/L	--	2.6 U	2.6 U	2.6 U	NA	2.6 U	NA	NA	NA	NA
ETHENE	µg/L	--	2.6 U	2.6 U	2.6 U	NA	2.6 U	NA	NA	NA	NA
METHANE	µg/L	--	**51**	**64**	**84**	NA	**76**	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)											
CHLORIDE	mg/L	--	**170**	**170**	**28**	**180**	**180**	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	**610 J,O**	**600 J,O**	**320**	**620**	**630**	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	**9.1**	**7.8**	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	NA	**0.12**	NA	NA	NA	**3.51**	NA	**0.07**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	NA	**-103.6**	NA	NA	NA	**-113.6**	NA	**-116.9**
PH	S.U.	--	NA	NA	**6.95**	NA	NA	NA	**8.78**	NA	**6.99**
SPECIFIC CONDUCTANCE	uS/cm	--	NA	NA	**1.05**	NA	NA	NA	**38427**	NA	**45.29**
TEMPERATURE	°C	--	NA	NA	**28.64**	NA	NA	NA	**28.32**	NA	**27.53**
TURBIDITY	NTU	--	NA	NA	**3.45**	NA	NA	NA	**3.23**	NA	**0.67**
Microbiological											
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS											
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	**1.5**	**20**	1 U	NA	NA	NA	NA

Notes:
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µg/L - micrograms per liter
mV - millivolt
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LOCATION			FCMW20 (11 ft)		FCMW20 (25 ft)		FCMW20 (45 ft)			
SAMPLE ID	UNIT	GCG*	FCMW20-11_20150519	FCMW20-11	FCMW20-25_20150519	FCMW20-25	FCMW20-45_20140423	FCMW20-45_20141104	FCMW20-45_20150519	FCMW20-45
SAMPLE DATE			May-15	Oct-15	May-15	Oct-15	Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds										
CIS-1,2-DICHLOROETHENE	µg/L	70	**0.42 J,O**	0.5 U	**59**	**14**	**400**	**200**	**110**	**59**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	1 U	0.5 U	0.5 U	5 U	1 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	1 U	0.5 U	**5.6**	5 U	1 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	1 U	0.5 U	0.5 U	5 U	1 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	**92**	**17**	**15**	**130**	**96**	**75**
Volatile Gasses										
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)										
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**0.1**	NA	**0.06**	NA	**2.18**	NA	**0.1**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-35**	NA	**-86**	NA	**-79**	NA	**-97.9**
PH	S.U.	--	NA	**6.75**	NA	**7.09**	NA	**8.79**	NA	**6.95**
SPECIFIC CONDUCTANCE	uS/cm	--	NA	**0.521**	NA	**0.54**	NA	**670**	NA	**1.08**
TEMPERATURE	°C	--	NA	**28.18**	NA	**27.59**	NA	**27.13**	NA	**27.18**
TURBIDITY	NTU	--	NA	**1.48**	NA	**1.86**	NA	**4.49**	NA	**0.43**
Microbiological										
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS										
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
* - Groundwater Cleanup Goals. Record of Decision, Flash Cleaners Superfund Site. September 2010.
-- = no value for this parameter.
NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
uS/cm - microSiemens per centimeter
S.U. - Standard Unit
°C - degrees Celsius
J - Value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U = concentration less than laboratory method detection limit
J = concentration estimated
Shaded cells indicate concentrations greater than GCG*
Bold values indicate a detection

TABLE 3-3

VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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LOCATION			FCMW20 (68 ft)		FCMW20 (100 ft)		FCMW21 (11 ft)				
SAMPLE ID	UNIT	GCG*	FCMW20-68_20150519	FCMW20-68	FCMW20-100_20150519	FCMW20-100	FCMW21A-11_20140422	FCMW21A-11_20141103	FCMW21A-11_20150520	FCMW21A-11_20150520-D	FCMW21A-11
SAMPLE DATE			May-15	Oct-15	May-15	Oct-15	Apr-14	Nov-14	May-15	May-15	Oct-15
Volatile Organic Compounds											
CIS-1,2-DICHLOROETHENE	µg/L	70	**15**	**0.75**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	**1.1**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses											
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)											
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**0.09**	NA	**0.18**	NA	**0.85**	NA	NA	**0.13**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-105**	NA	**-96.7**	NA	**-88.6**	NA	NA	**-126.3**
PH	S.U.	--	NA	**6.83**	NA	**6.85**	NA	**11.39**	NA	NA	**7.6**
SPECIFIC CONDUCTANCE	uS/cm	--	NA	**38.05**	NA	**45.79**	NA	**185**	NA	NA	**0.167**
TEMPERATURE	°C	--	NA	**27.17**	NA	**27.3**	NA	**31.43**	NA	NA	**32.81**
TURBIDITY	NTU	--	NA	**1.03**	NA	**2.3**	NA	**0.49**	NA	NA	**-99**
Microbiological											
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS											
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
* - Groundwater Cleanup Goals. Record of Decision, Flash Cleaners Superfund Site. September 2010.
-- = no value for this parameter.
NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
µS/cm - microSiemens per centimeter
S.U. - Standard Unit
°C - degrees Celsius
J - Value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U = concentration less than laboratory method detection limit
J = concentration estimated
Shaded cells indicate concentrations greater than GCG*
Bold values indicate a detection

TABLE 3-3

VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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LOCATION	UNIT	GCG*	FCMW21 (45 ft)			
SAMPLE ID			FCMW21B-45_20140422	FCMW21B-45_20141103	FCMW21B-45_20150520	FCMW21B-45
SAMPLE DATE			Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds						
CIS-1,2-DICHLOROETHENE	µg/L	70	**7.6**	**3.6**	**3**	**1.4**
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses						
ETHANE	µg/L	--	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)						
CHLORIDE	mg/L	--	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**1.42**	NA	**0.17**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-84.4**	NA	**-88**
PH	S.U.	--	NA	**9.8**	NA	**6.92**
SPECIFIC CONDUCTANCE	uS/cm	--	NA	**599**	NA	**0.535**
TEMPERATURE	°C	--	NA	**28.82**	NA	**30.11**
TURBIDITY	NTU	--	NA	**0.26**	NA	**0.6**
Microbiological						
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA
FILTERED MISCELLANEOUS						
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA

Notes:
* - Groundwater Cleanup Goals. Record of Decision, Flash Cleaners Superfund Site. September 2010.
-- = no value for this parameter.
NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
µS/cm - microSiemens per centimeter
S.U. - Standard Unit
°C - degrees Celsius
1 - Value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U = concentration less than laboratory method detection limit
J = concentration estimated
Shaded cells indicate concentrations greater than GCG
Bold values indicate a detection

TABLE 3-3

VOLATILE ORGANIC CONTAMINANTS AND NATURAL ATTENUATION INDICATOR PARAMETERS
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LOCATION			FCMW22 (25 ft)				FCMW22 (45 ft)			
SAMPLE ID	UNIT	GCG*	FCMW22A-25_20140423	FCMW22A-25_20141103	FCMW22A-25_20150520	FCMW22A-25	FCMW22B-45_20140423	FCMW22B-45_20141103	FCMW22B-45_20150520	FCMW22B-45
SAMPLE DATE			Apr-14	Nov-14	May-15	Oct-15	Apr-14	Nov-14	May-15	Oct-15
Volatile Organic Compounds										
CIS-1,2-DICHLOROETHENE	µg/L	70	0.5 U	0.5 U	0.5 U	0.5 U	**0.13 J**	**0.13 J**	0.5 U	0.5 U
TETRACHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	µg/L	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	µg/L	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Gasses										
ETHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
METHANE	µg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
MISCELLANEOUS PARAMETERS (MG/L)										
CHLORIDE	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA
DISSOLVED OXYGEN	mg/L	--	NA	**1.59**	NA	**0.11**	NA	**1.59**	NA	**0.1**
OXIDATION REDUCTION POTENTIAL	mV	--	NA	**-74.3**	NA	**-82**	NA	**-81.2**	NA	**-72**
PH	SU	--	NA	**8.51**	NA	**6.99**	NA	**8.71**	NA	**6.86**
SPECIFIC CONDUCTANCE	uS/cm	--	NA	**977**	NA	**1.149**	NA	**2795**	NA	**6.777**
TEMPERATURE	°C	--	NA	**26.83**	NA	**26.9**	NA	**27.25**	NA	**26.92**
TURBIDITY	NTU	--	NA	**0.15**	NA	**1.11**	NA	**1.28**	NA	**0.43**
Microbiological										
DEHALOCOCCOIDES	CELLS	--	NA	NA	NA	NA	NA	NA	NA	NA
FILTERED MISCELLANEOUS										
DISSOLVED ORGANIC CARBON (mg/L)	mg/L	--	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
* - Groundwater Cleanup Goals. Record of Decision, Flash Cleaners Superfund Site. September 2010.
-- = no value for this parameter.
NA = not analyzed
mg/L - milligrams per liter
µg/L - micrograms per liter
mV - millivolt
NTU - Nephelometric turbidity unit
µS/cm - microSiemens per centimeter
S.U. - Standard Unit
°C - degrees Celsius
J - Value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U = concentration less than laboratory method detection limit
J = concentration estimated
Shaded cells indicate concentrations greater than GCG*
Bold values indicate a detection

TABLE 5-3
SUMMARY OF MONITORING WELL ANALYTICAL RESULTS EXCEEDING REGULATORY CRITERIA
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location sample_id top_depth bottom_depth sample_date	EPA MCL	EPA Tap Water	FDEP GCTL	FCMW01 FCGW01MW01 5 15 20090303	FCMW02 FCGW02MW02 5 15 20090304	FCMW02 FCGW02MW02-AVG 5 15 20090304	FCMW02 FCGW02MW02-D 5 15 20090304	FCMW03 FCGW03MW03 5 15 20090303	FCMW04 FCGW04MW04 29.5 34.5 20090304	FCMW05 FCGW05MW05 4 14 20090305	FCMW06 FCGW06MW06 20 25 20090305	FCMW07 FCGW07MW07 95 100 20090305	FCMW08 FCGW08MW08 40 45 20090305	FCMW09 FCGW09MW09 40 45 20090305	FCMW10 FCMW10 63 68 20091116	FCMW11 FCMW11 95 100 20091117
Volatile Organics (ug/L)																
1,1-DICHLOROETHENE	7	340	7	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	1.2 J	0.5 UJ
1,2,3-TRICHLOROBENZENE	NA	29	70	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	70	2.3	70	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	600	370	600	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.11 J	0.5 U
1,3,5-TRIMETHYLBENZENE	NA	370	10	1.3	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U		
2-BUTANONE	NA	7100	4200	1 U	1 U	1 U	1 U	100 U	1 U	1 U	1000 U	1 U	1 U	50 U	5 UR	5 UR
4-ISOPROPYLTOLUENE	NA	NA	NA	0.26 J	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U		
ACETONE	NA	22000	6300	4 U	4 U	4 U	4 U	400 U	4 U	4 U	4000 U	4 U	4 U	200 U	5 UR	5.9 UR
BENZENE	5	0.41	1	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
BROMOCHLOROMETHANE	NA	NA	91	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	80	0.12	0.6	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
CARBON DISULFIDE	NA	1000	700	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.12 J
CHLORODIBROMOMETHANE	80	0.15	0.4	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
CHLOROFORM	80	0.19	70	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.29 J [T]	0.2 J [T]	25 U	0.5 U	2.3 [T]
CHLOROMETHANE	NA	190	2.7	6.8 UJ	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70	370	70	1.5	0.16 J	0.18 J	0.5 U	4100 [M][T][G]	1.4	0.5 U	11000 [M][T][G]	14	0.5 U	2100 [M][T][G]	200 [M][G]	54
CYCLOHEXANE	NA	13000	NA	0.62	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 UJ	0.5 UJ
DICHLORODIFLUOROMETHANE	NA	390	1400	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
ETHANE	NA	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U		
ETHENE	NA	NA	NA	2.6 U	2.6 U	2.6 U	2.6 U	120	2.6 U	2.6 U	95	2.6 U	2.6 U	2.6 U		
ETHYLBENZENE	700	1.5	30	4.4 [T]	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
ISOPROPYLBENZENE	NA	880	0.8	1.3 [G]	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
M+P-XYLENES	10000	1200	20	0.79 J	1 U	1 U	1 U	100 U	1 U	1 U	1000 U	1 U	1 U	50 U	0.5 U	0.5 U
METHANE	NA	NA	NA	2900	10	17.5	25	930	61	1.4 U	3000	58	40	39		
METHYL CYCLOHEXANE	NA	NA	NA	1	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.24 J	0.5 U
METHYL TERT-BUTYL ETHER	NA	12	20	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.18 J	0.21 J
METHYLENE CHLORIDE	5	4.8	5	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.5 U
N-BUTYLBENZENE	NA	NA	NA	0.79	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U		
N-PROPYLBENZENE	NA	1300	NA	2	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U		
O-XYLENE	10000	1200	20	0.41 J	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 UJ	0.5 UJ
SEC-BUTYLBENZENE	NA	NA	NA	0.66	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U		
TERT-BUTYLBENZENE	NA	NA	NA	0.15 J	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U		
TETRACHLOROETHENE	5	0.11	3	11.43 J [T]	0.5 U	0.50 U	0.5 U	240 [M][T][G]	0.5 U	2.5 [T]	13000 [M][T][G]	0.5 U	0.5 U	25 U	0.56 J [T]	0.5 U
TOLUENE	1000	2300	40	0.5 U	0.5 U	0.50 U	0.5 U	50 U	0.5 U	0.5 U	500 U	0.5 U	0.5 U	25 U	0.5 U	0.18 J
TRANS-1,2-DICHLOROETHENE	100	110	100	0.5 U	0.5 U	0.50 U	0.5 U	74	0.5 U	0.5 U	500 U	0.27 J	0.5 U	240 [M][T][G]	4.2	1.7
TRICHLOROETHENE	5	2	3	0.61	0.5 U	0.50 U	0.5 U	12000 [M][T][G]	0.5 U	0.5 U	5700 [M][T][G]	4.2 [T][G]	0.5 U	25 U	200 [M][T][G]	0.5 U
VINYL CHLORIDE	2	0.016	1	1.7 [T][G]	0.5 U	0.50 U	0.5 U	1900 [M][T][G]	0.5 U	0.5 U	2000 [M][T][G]	0.5 U	0.5 U	92 [M][T][G]	110 [M][T][G]	0.5 U
Miscellaneous Parameters (mg/L)																
NITRATE	10	58	10	0.05 U	0.2	0.185	0.17	0.05 U	0.05 U							
NITRITE/NITRATE-N	NA	NA	10													
TOTAL ORGANIC CARBON	NA	NA	NA	19	10	10	10	18	12	6.3	43	8.8	13	20		

***NITRATE AND NITRITE SCREENING LEVELS ARE IN MG/L**

Bold/Shaded values indicate exceedance of criteria.

Notes:

NA = No criteria available for this constituent.
U = concentration less than laboratory method detection limit.
J = concentration estimated
MCL = Maximum Contaminant Level
GCTL = FDEP Groundwater Cleanup Target Level
ug/L = micrograms per liter
[M] = exceeds EPA MCL; [T] = exceeds EPA Tap Water Criteria
[G] = exceeds FDEP GCTL

TABLE 5-3
SUMMARY OF MONITORING WELL ANALYTICAL RESULTS EXCEEDING REGULATORY CRITERIA
REMEDIAL INVESTIGATION REPORT
FLASH CLEANERS
POMPANO BEACH, FLORIDA
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location **sample_id** top_depth bottom_depth sample_date	**EPA MCL**	**EPA Tap Water**	**FDEP GCTL**	FCMW12 **FCMW12** 40 45 20091116	FCMW13 **FCMW13** 40 45 20091117	FCMW14 **FCMW14** 45 50 20091117	FCMW15 **FCMW15** 63 68 20091117	FCMW16 **FCMW16011** 11 11 20091118	FCMW16 **FCMW16025** 25 25 20091118	FCMW16 **FCMW16045** 45 45 20091118	FCMW16 **FCMW16068** 68 68 20091118	FCMW16 **FCMW16100** 100 100 20091118	FCMW17 **FCMW17011** 11 11 20091119	FCMW17 **FCMW17025** 25 25 20091119	FCMW17 **FCMW17045** 45 45 20091119	FCMW17 **FCMW17068** 68 68 20091118	FCMW17 **FCMW17100** 100 100 20091118	FCMW18 **FCMW18011** 11 11 20091119
Volatile Organics (ug/L)																		
1,1-DICHLOROETHENE	7	340	7	0.5 UJ	0.87 J	0.5 UJ	5.9 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROBENZENE	NA	29	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U
1,2,4-TRICHLOROBENZENE	70	23	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U
1,2-DICHLOROBENZENE	600	370	600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U
1,3,5-TRIMETHYLBENZENE	NA	370	10															
2-BUTANONE	NA	7100	4200	5 UR	5 UR	5 UR	5 UR	5.3 J	5 UR	5 UR	5 UR	5 UR	180 J	44 J	220 J	180 J	52 J	54 J
4-ISOPROPYLTOLUENE	NA	NA	NA															
ACETONE	NA	22000	6300	8.3 UR	5 UR	5 UR	5 UR	18 J	20 J	8.4 J	11 J	7.4 J	27 J	9.4 J	8.2 J	21 J	13 J	12 J
BENZENE	5	0.41	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.27 J	0.5 U	0.5 U	0.44 J [T]	0.5 U	0.14 J
BROMOCHLOROMETHANE	NA	NA	91	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.12 J	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	80	0.12	0.6	0.5 U	0.5 U	0.5 U	0.5 U	0.13 J [T]	0.5 U	0.12 J	0.5 U	0.5 U	0.3 J [T]	0.21 J [T]	0.39 J [T]	0.35 [T][G]	0.5 U	0.5 U
CARBON DISULFIDE	NA	1000	700	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.15 J	0.11 J	0.12 J	0.28 J	0.5 U	0.5 U	0.5 U
CHLORODIBROMOMETHANE	80	0.15	0.4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.13 J	0.18 J [T]	0.5 U	0.5 U
CHLOROFORM	80	0.19	70	0.5 [T]	0.5 U	1.7 [T]	1.3 [T]	3.4 [T]	5.8 [T]	3.4 [T]	2.6 [T]	2.3 [T]	10 J [T]	7.7 [T]	9.6 [T]	13 [T]	5.4 [T]	3.4 [T]
CHLOROMETHANE	NA	190	2.7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.29 J	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70	370	70	110 [M][T][G]	99 [M][T][G]	0.6	2500 [M][T][G]	0.5 U	0.5 U	0.5 U	0.23 J	3.6	0.5 U	0.15 J	0.29 J	0.11 J	0.88	0.5 U
CYCLOHEXANE	NA	13000	NA	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.21 J	0.11 J	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	NA	390	1400	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.58	0.5 U	0.5 U	0.5 U
ETHANE	NA	NA	NA	2.6 U	2.6 U		2.6 U	9.4		3.2								
ETHENE	NA	NA	NA	2.6 U	2.6 U		2.6 U	8.8		2.6 U								
ETHYLBENZENE	700	1.5	30	0.5 U	0.5 U	0.5 U	0.5 U	0.11 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.53	0.3 J	0.5 U
ISOPROPYLBENZENE	NA	680	0.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.19 J	0.12 J	0.5 U	0.5 U
M+P-XYLENES	10000	1200	20	0.5 U	0.5 U	0.5 U	0.5 U	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.53	0.48 J	1.1	0.98	0.9	0.5 U
METHANE	NA	NA	NA	18	47 J		100	17		31								
METHYL CYCLOHEXANE	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
METHYL TERT-BUTYL ETHER	NA	12	20	0.15 J	2.5 J	0.5 UJ	0.5 UJ	0.5 UJ	0.51 J	0.29 J	0.5 UJ	0.59 J	0.27 J	0.21 J	0.26 J	0.3 J	0.22 J	0.5 U
METHYLENE CHLORIDE	5	4.8	5	0.5 U	0.5 U	0.5 U	0.5 U	0.74	1.4	0.5 U	0.5 U	0.5 U	0.61	0.53	0.92	0.6	0.5 U	0.57
N-BUTYLBENZENE	NA	NA	NA															
N-PROPYLBENZENE	NA	1300	NA															
O-XYLENE	10000	1200	20	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.11 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.28 J	0.24 J	0.51	0.49 J	0.39 J	0.5 U
SEC-BUTYLBENZENE	NA	NA	NA															
TERT-BUTYLBENZENE	NA	NA	NA															
TETRACHLOROETHENE	5	0.11	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE	1000	2300	40	0.17 J	0.5 U	0.5 U	0.17 J	0.48 J	0.36 J	0.21 J	0.15 J	0.13 J	0.48 J	0.3 J	0.61	0.73	0.35 J	0.22 J
TRANS-1,2-DICHLOROETHENE	100	110	100	0.79	67	0.19 J	1700 [M][T][G]	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.14 J	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	5	2	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2	0.016	1	11 [M][T][G]	1.2 [M][T][G]	0.5 U	28 [M][T][G]	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Miscellaneous Parameters (mg/L)																		
NITRATE	10	58	10															
NITRITE/NITRATE-N	NA	NA	10	0.05 U	0.05 U		0.05 U	0.05 U		0.05 U								
TOTAL ORGANIC CARBON	NA	NA	NA	23	18		15	69		19								

***NITRATE AND NITRITE SCREENING LEVELS ARE IN MG/L**

Bold/Shaded values indicate exceedence of criteria.

Notes:

NA = No criteria available for this constituent.
U = concentration less than laboratory method detection limit.
J = concentration estimated.
MCL = Maximum Contaminant Level
GCTL = FDEP Groundwater Cleanup Target Level
µg/L = micrograms per liter
[M] = exceeds EPA MCL; [T] = exceeds EPA Tap Water Criteria;
[G] = exceeds FDEP GCTL

TABLE 5-3
SUMMARY OF MONITORING WELL ANALYTICAL RESULTS EXCEEDING REGULATORY CRITERIA
REMEDIAL INVESTIGATION REPORT
FLASH CLEANERS
POMPANO BEACH, FLORIDA
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location sample_Id top_depth bottom_depth sample_date	EPA MCL	EPA Tap Water	FDEP GCTL	FCMW18 FCMW18025 25 25 20091119	FCMW18 FCMW18045 45 45 20091119	FCMW18 FCMW18068 68 68 20091119	FCMW18 FCMW18068-AVG 68 68 20091119	FCMW18 FCMW18068-D 68 68 20091119	FCMW18 FCMW18100 100 100 20091119	FCMW19 FCMW19011 11 11 20091120	FCMW19 FCMW19011-AVG 11 11 20091120	FCMW19 FCMW19011-D 11 11 20091120	FCMW19 FCMW19025 25 25 20091120	FCMW19 FCMW19045 45 45 20091120	FCMW19 FCMW19068 68 68 20091120	FCMW19 FCMW19100 100 100 20091120	FCMW20 FCMW20011 11 11 20091121
Volatile Organics (ug/L)																	
1,1-DICHLOROETHENE	7	340	7	0.5 U	0.5 U	0.5 UJ	0.50 UJ	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.76	0.5 U	0.5 U	0.5 U
1,2,3-TRICHLOROBENZENE	NA	29	70	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.19 J
1,2,4-TRICHLOROBENZENE	70	2.3	70	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.23 J
1,2-DICHLOROBENZENE	600	370	600	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3,5-TRIMETHYLBENZENE	NA	370	10														
2-BUTANONE	NA	7100	4200	9.4 J	15 J	5 UR	5 UR	5 UR	9.7 J	7.5 J	8.2 J	8.9 J	5 UR	5 UR	5 UR	5 UR	5 UR
4-ISOPROPYLTOLUENE	NA	NA	NA														
ACETONE	NA	22000	6300	5.5 J	10 J	5 UR	5.6 J	5.6 J	5.9 J	19 J	20.5 J	22 J	5.6 J	5 UR	5 UR	13 J	9 UR
BENZENE	5	0.41	1	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.25 J	0.245 J	0.24 J	0.5 U	0.5 U	0.5 U	0.21 J	0.5 U
BROMOCHLOROMETHANE	NA	NA	91	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	80	0.12	0.6	0.5 U	0.5 U	0.3 J [T]	0.30 J [T]	0.3 J [T]	0.11 J [T]	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.34 [T]	0.5 U
CARBON DISULFIDE	NA	1000	700	0.5 U	0.5 U	0.13 J	0.13 J	0.13 J	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.12 J
CHLORODIBROMOMETHANE	80	0.15	0.4	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.11 J	0.5 U
CHLOROFORM	80	0.19	70	2.2 [T]	0.9 [T]	0.1 [T]	30 [G]	3.4 [T]	1.2 [G]	3.8 [T]	1.65 [T]	3.4 [T]	3.3 [T]	1.2 [T]	0.4 [T]	0.8 [T]	4.8 [T]
CHLOROMETHANE	NA	190	2.7	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CIS-1,2-DICHLOROETHENE	70	370	70	0.5 U	0.5 U	13 J	13.5 J	14	0.14 J	4.1	4.2	4.3	28	349 [M] [T] [G]	0.23 J	1.5	0.5 U
CYCLOHEXANE	NA	13000	NA	0.5 U	0.5 U	0.1 J	0.10 J	0.1 J	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.13 J
DICHLORODIFLUOROMETHANE	NA	390	1400	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHANE	NA	NA	NA							10	9.9	9.8					
ETHENE	NA	NA	NA							8.8	8.45	8.1					
ETHYLBENZENE	700	1.5	30	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.24 J	0.5 U
ISOPROPYLBENZENE	NA	680	0.8	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
M+P-XYLENES	10000	1200	20	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.16 J	0.165 J	0.17 J	0.19 J	0.5 U	0.5 U	0.83	0.5 U
METHANE	NA	NA	NA							17	17	17					
METHYL CYCLOHEXANE	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 UJ	0.50 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U
METHYL TERT-BUTYL ETHER	NA	12	20	0.5 U	0.29 J	0.46 J	0.47 J	0.48 J	0.3 J	0.14 J	0.155 J	0.17 J	0.19 J	0.5 U	0.24 J	0.17 J	0.21 J
METHYLENE CHLORIDE	5	4.8	5	0.5 U	0.51	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N-BUTYLBENZENE	NA	NA	NA														
N-PROPYLBENZENE	NA	1300	NA														
O-XYLENE	10000	1200	20	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.10 J	0.1 J	0.5 U	0.5 U	0.5 U	0.33 J	0.5 U
SEC-BUTYLBENZENE	NA	NA	NA														
TERT-BUTYLBENZENE	NA	NA	NA														
TETRACHLOROETHENE	5	0.11	3	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE	1000	2300	40	0.11 J	0.25 J	0.15 J	0.15 J	0.15 J	0.22 J	0.34 J	0.335 J	0.33 J	0.24 J	0.24 J	0.5 U	0.46 J	0.25 J
TRANS-1,2-DICHLOROETHENE	100	110	100	0.5 U	0.5 U	0.18 J	0.19 J	0.2 J	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	50 J	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	5	2	3	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	2	0.018	1	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	11 [M] [T] [G]	11.5 [M] [T] [G]	12 [M] [T] [G]	19 [M] [T] [G]	2 [M] [T] [G]	0.5 U	0.5 U	0.5 U
Miscellaneous Parameters (mg/L)																	
NITRATE	10	58	10														
NITRITE/NITRATE-N	NA	NA	10							0.24	0.235	0.23					
TOTAL ORGANIC CARBON	NA	NA	NA							31	30	29					

***NITRATE AND NITRITE SCREENING LEVELS ARE IN MG/L**

Bold/Shaded values indicate exceedance of criteria.

Notes:

NA = No criteria available for this constituent.
U = concentration less than laboratory method detection limit.
J = concentration estimated.
MCL = Maximum Contaminant Level
GCTL = FDEP Groundwater Cleanup Target Level
µg/L = micrograms per liter
[M] = exceeds EPA MCL. [T] = exceeds EPA Tap Water Criteria.
[G] = exceeds FDEP GCTL

TABLE 5-3
SUMMARY OF MONITORING WELL ANALYTICAL RESULTS EXCEEDING REGULATORY CRITERIA
REMEDIAL INVESTIGATION REPORT
FLASH CLEANERS
POMPANO BEACH, FLORIDA
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location sample_id top_depth bottom_depth sample_date	EPA MCL	EPA Tap Water	FDEP GCTL	FCMW20 FCMW20025 25 25 20091121	FCMW20 FCMW20045 45 45 20091121	FCMW20 FCMW20068 68 68 20091121	FCMW20 FCMW20100 100 100 20091121	FCMW21 FCMW21011 11 11 20091122	FCMW21 FCMW21025 25 25 20091122	FCMW21 FCMW21045 45 45 20091122	FCMW21 FCMW21068 68 68 20091122	FCMW21 FCMW21100 100 100 20091122	FCMW21 FCMW21100-AVG 100 100 20091122	FCMW21 FCMW21100-D 100 100 20091122
Volatile Organics (ug/L)														
1,1-DICHLOROETHENE	7	340	7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
1,2,3-TRICHLOROBENZENE	NA	29	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
1,2,4-TRICHLOROBENZENE	70	23	70	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
1,2-DICHLOROBENZENE	600	370	600	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
1,3,5-TRIMETHYLBENZENE	NA	370	10											
2-BUTANONE	NA	7100	4200	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
4-ISOPROPYLTOLUENE	NA	NA	NA											
ACETONE	NA	22000	6300	7.7 UR	9.8 UR	27 J	11 UR	16 UR	7.5 UR	7.2 UR	9 UR	13 UR	13.5 UR	14 UR
BENZENE	5	0.41	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
BROMOCHLOROMETHANE	NA	NA	91	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
BROMODICHLOROMETHANE	80	0.12	0.6	0.18 J [T]	0.5 U	0.59 [T]	0.5 U	0.54 J [T]	0.5 U	0.5 U	0.21 J [T]	0.14 J [T]	0.14 J [T]	0.13 J [T]
CARBON DISULFIDE	NA	1000	700	0.5 U	0.5 U	0.16 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
CHLORODIBROMOMETHANE	80	0.15	0.4	0.5 U	0.5 U	0.15 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
CHLOROFORM	80	0.19	70	3 [T]	0.9 [T]	7.6 [T]	15 J [T]	5.9 J [T]	4.5 J [T]	4.2 J [T]	7.7 J [T]	10 J [T]	10 J [T]	10 J [T]
CHLOROMETHANE	NA	190	2.7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
CIS-1,2-DICHLOROETHENE	70	370	70	5.4	20	6.3 J	0.36 J	0.5 U	0.5 U	7.1	12	4.6	4.55	4.5
CYCLOHEXANE	NA	13000	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
DICHLORODIFLUOROMETHANE	NA	390	1400	0.5 U	0.5 U	0.5 U	0.5 U	0.25 J	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
ETHANE	NA	NA	NA											
ETHENE	NA	NA	NA											
ETHYLBENZENE	700	1.5	30	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
ISOPROPYLBENZENE	NA	660	0.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
M+P-XYLENES	10000	1200	20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
METHANE	NA	NA	NA											
METHYL CYCLOHEXANE	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
METHYL TERT-BUTYL ETHER	NA	12	20	1.5	0.24 J	0.2 J	0.27 J	0.19 J	0.11 J	0.27 J	0.24 J	0.22 J	0.225 J	0.23 J
METHYLENE CHLORIDE	5	4.8	5	0.5 U	0.5 U	0.5 U	0.5 U	0.75	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
N-BUTYLBENZENE	NA	NA	NA											
N-PROPYLBENZENE	NA	1200	NA											
O-XYLENE	10000	1200	20	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
SEC-BUTYLBENZENE	NA	NA	NA											
TERT-BUTYLBENZENE	NA	NA	NA											
TETRACHLOROETHENE	5	0.11	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
TOLUENE	1000	2300	40	0.21 J	0.19 J	0.21 J	0.29 J	0.3 J	0.12 J	0.12 J	0.19 J	0.3 J	0.29 J	0.28 J
TRANS-1,2-DICHLOROETHENE	100	110	100	0.5 U	0.43 J	0.17 J	0.5 U	0.5 U	0.5 U	0.11 J	0.15 J	0.14 J	0.13 J	0.12 J
TRICHLOROETHENE	5	2	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
VINYL CHLORIDE	2	0.016	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U
Miscellaneous Parameters (mg/L)														
NITRATE	10	58	10											
NITRITE/NITRATE-N	NA	NA	10											
TOTAL ORGANIC CARBON	NA	NA	NA											

***NITRATE AND NITRITE SCREENING LEVELS ARE IN MG/L**

Bold/Shaded values indicate exceedance of criteria.

Notes:

NA = No criteria available for this constituent.
U = concentration less than laboratory method detection limit.
J = concentration estimated.
MCL = Maximum Contaminant Level
GCTL = FDEP Groundwater Cleanup Target Level
µg/L = micrograms per liter
[M] = exceeds EPA MCL; [T] = exceeds EPA Tap Water Criteria
[G] = exceeds FDEP GCTL

Appendix G: EPA Region 4 Technical Services Memorandum: Vapor Intrusion Potential in the FCMW20 Area

United States Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth St. SW, Atlanta, Georgia 30303-8960

June 6, 2016

MEMORANDUM

SUBJECT: Vapor Intrusion Potential in the FCMW20 Area
Flash Cleaners Site
Pompano Beach, Florida

FROM: Ben Bentkowski, P. G., Hydrologist
Scientific Support Section
Superfund Division

THROUGH: Glenn Adams, Chief
Scientific Support Section
Superfund Division

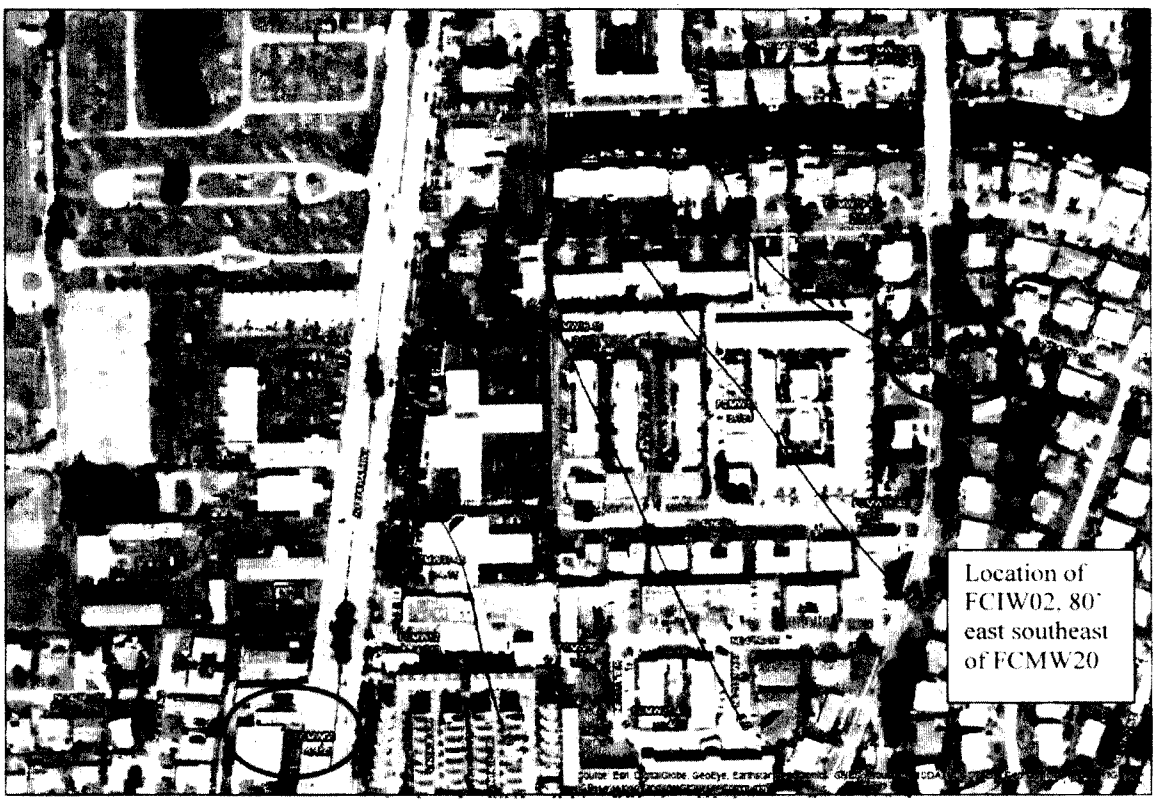
TO: Ralph Howard
Remedial Project Manager
Superfund Division

Some questions have arisen during the preparation of the current Five Year Review (5YR) regarding the protectiveness of the remedy for the vapor intrusion pathway in the vicinity of a private irrigation well, FCIW02. This memorandum will provide a limited recap of site remedial investigation information and then focus on the facts associated with the irrigation well, and the closest monitoring well, FCMW20.

Site History

Flash Cleaners was a small private dry cleaners that had dry cleaning operations from 1977 to 2001 at 4131 North Federal Highway (U.S. Hwy 1), Pompano Beach, FL. Between 2001 and approximately 2014 the facility operated a 'pick-up/drop off' operation presumably with the actual dry cleaning being performed off site. There were a series of escalating investigations and the site was placed on the NPL in September 2008. The Remedial Investigation was done in two phases in 2009 and 2010

with the Final RI report issued in July 2010. This investigation included 155 groundwater screening samples collected from various depths for 39 locations. There are 25 permanent monitoring wells, some with multi-chamber tubing allowing sampling from multiple depths from one well. The remedial action was performed successfully and the annual monitoring reports have shown continually reducing concentrations in the monitoring wells and a plume foot print that ~~is~~ continues to shrink.



This figure is from the 2014 Annual Report (Fig 3-2) and is meant to show the location of the Flash Cleaners site in the lower left of the figure and the location of FCMW20, approximately 1,250 feet to the northeast. Additionally this figure shows the direction of groundwater flow in the intermediate depth of the surficial aquifer, to the northeast. Irrigation FCIW02 is located 80 feet side gradient to FCMW20.

The matter at hand is whether the volatile organic compound (VOC) detections in FCIW02 pose a risk to the residents for the vapor intrusion pathway. The most recent data for FCIW02 and its nearest monitoring well, FCMW20 are included in the November 2015 sampling results reported in

the 2015 Annual Groundwater and Soil Vapor Extraction Monitoring Report, January 2016. For convenience, the analytical results are copied from Figure 3-4 and displayed here:

FCMW20	
CIS-1,2-DCE	1.5 U
PCE	1.5 U
TRANS-1,2-DCE	1.5 U
TCE	1.5 U
VINYL CHLORIDE	1.5 U
FCMW20	
CIS-1,2-DCE	.4
PCE	1.5 U
TRANS-1,2-DCE	1.5 U
TCE	1.5 U
VINYL CHLORIDE	**47**
FCMW20	
CIS-1,2-DCE	**59**
PCE	1.5 U
TRANS-1,2-DCE	1.5 U
TCE	1.5 U
VINYL CHLORIDE	**76**
FCMW20	
CIS-1,2-DCE	.79
PCE	1.5 U
TRANS-1,2-DCE	1.5 U
TCE	1.5 U
VINYL CHLORIDE	1.5 U
FCMW20	
CIS-1,2-DCE	1.5 U
PCE	1.5 U
TRANS-1,2-DCE	1.5 U
TCE	1.5 U
VINYL CHLORIDE	1.5 U

Units are µg/L for groundwater

FCIW20	
CIS-1,2-DCE	**140**
PCE	1.5 U
TRANS-1,2-DCE	1.25 J
TCE	1.5 U
VINYL CHLORIDE	**66**

The shallowest interval for FCMW20 is 11 feet below land surface (bls) and that depth was selected during the design of this multi-chamber well to monitor the water table. This is critical for an evaluation of the vapor intrusion pathway because VOCs must be present at the water table to be available to volatize from the groundwater into the soil gas; from the liquid phase to the vapor phase. In this specific case, there is clean groundwater with no detections of VOCs at the water table. Therefore, there is not a completed vapor intrusion pathway for the buildings and residents in the area of FCMW20.

Specifically to bolster this conclusion, the OSWER TECHNICAL GUIDE FOR ASSESSING AND MITIGATING THE VAPOR INTRUSION PATHWAY FROM SUBSURFACE VAPOR SOURCES TO INDOOR AIR, OSWER Publication 9200.2-154, June 2015 (The Guide), lists on Page 19, the five conditions that must be met for there to be a completed vapor intrusion pathway:

For purposes of this Technical Guide, the vapor intrusion pathway is referred to as "complete" for a specific building or collection of buildings when the following five conditions are met under current conditions:

1. A subsurface source of vapor-forming chemicals is present (e.g., in the soil or in groundwater) underneath or near the building(s);
2. Vapors form and have a route along which to migrate (be transported) toward the building(s);
3. The building(s) is(are) susceptible to soil gas entry, which means openings exist for the vapors to enter the building and driving 'forces' exist to draw the vapors from the subsurface through the openings into the building(s);
4. One or more vapor-forming chemicals comprising the subsurface vapor source(s) is (or are) also present in the indoor environment; and
5. The building(s) is (or are) occupied by one or more individuals when the vapor-forming chemical(s) is (or are) present indoors.

The critically missing portion of this pathway is the "Vapor form…" in No. 2. Since there are no detections of VOCs at the water table, no toxicologically significent levels vapors can form, ergo, no complete vapor intrusion pathway.

The Guide goes on further to state:
If one (or more) of these conditions is currently absent and **is reasonably expected to be absent in the future** (e.g., vapor migration is significantly and persistently impeded by natural geologic, hydrologic, or biochemical (e.g., biodegradation) processes and conditions), the vapor intrusion pathway is referred to as "incomplete."

The sampling data results for FCMW20 reported in the 2010 Final Remedial Investigation Report indicates that no site related VOCs were detected in this well (Table 5-3, Page 5-33). Drinking water chlorination byproducts are reported in many of the monitoring wells, particularly chloroform. This is not suprising as municipal water is used for irrigation in this neighborhood but these are not site related. In the years between the RI report in 2010 and the November 2015 sampling results, the sampling focused on intervals where the RI data indicated detections, so the 11' interval of FCMW20 had not been monitored. However, the November 2015 data presented on Page 3 of this memo indicated that the shallowest groundwater still reported no detections of site related VOCs. Given the fact that the contaminated ground plume continues to attenuate and there have been no site related VOC detected in FCMW20' 11' interval within the data set, it is concluded that site related VOCs are reasonably expected to be absent in the shallow groundwater in the future.

Regarding the construction and operation of FCIW02, I refer the reader to your email of May 20, 2016, 2:58 p.m. which goes into considerable detail. As a brief summary, FCIW02 has a total depth of 80 feet below land surface and little other information can be provided by the current homeowner. As a practical matter, pumps are hung in wells in the lower half of the well so as to avoid the possiblity of the well being pumped dry. To support the conclusion that the pump is drawing from some depth and not at the water table, please look at the analytical results displayed on Page 3. FCMW20 intervals 25' and 45' have vinyl chloride results of 47 µg/L and 76 µg/L respectively. The analytical

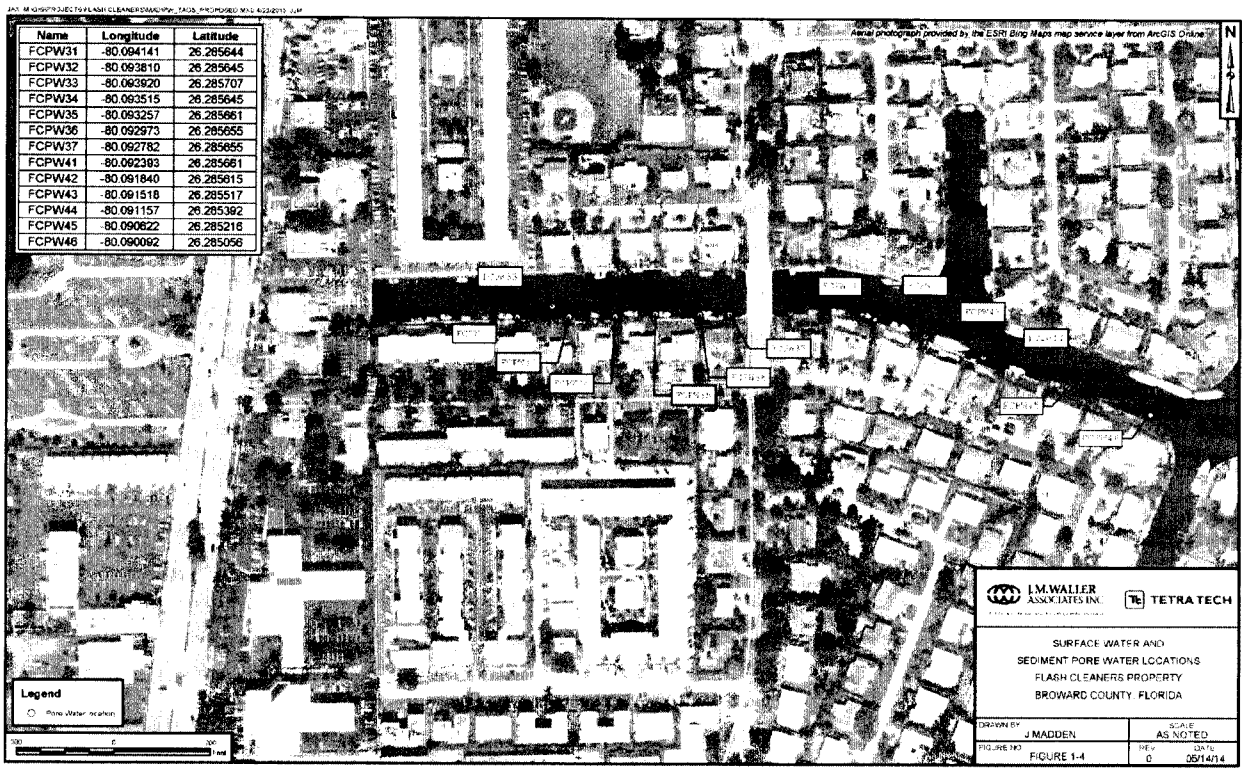
results of FCIW02 for vinyl chloride fall within this range at 66 ug/L. It seems logical that an operating irrigation well pulling from a depth would have similar concentrations as the closest monitoring well at a similar depth.

Entering the realm of the hypothetical, one could take the maximum analytical results from the monitored intervals for FCMW20 and FCIW02 and run them through the Vapor Intrusion Screening Level (VISL) calculator. Vinyl chloride is reported at 76 µg/L in FCMW20, 45' and 1,2 cis-DCE is detected in FCIW02. There is no vapor intrusion screening value for 1,2 cis-DCE, so 1,1-DCA might be considered a surrogate for screening purposes. The VISL results are totaled to indicate a cancer risk of 1.6E-05 and a HI of 2.2E-02 were this groundwater present at the water table. These screening values fall within EPA's cancer risk range and less than a HI of 1 which suggests that no remedial action be taken but monitoring would be appropriate. It is suggested that the 11 foot interval for FCMW20 be included in future groundwater sampling and analysis for VOCs. This would provide data to continue to support the conclusion that the shallowest groundwater in this immediate area does not indicate a completed vapor intrusion pathway.

In Summary, irrigation well FCIW02 is 80' away from FCMW20 and is likely drawing from an intermediate depth which is monitored by FCMW20. The fact that FCMW20 has in the past and currently indicates no site related VOCs in the shallowest/water table depth supports the conclusion that there is not a complete vapor intrusion pathway in this area and further supports the appropriate conclusion is that the remedy is protective for purposes of the Five Year Review. It is recommended that the 11' interval for FCMW20 be included in future groundwater monitoring to provide the data to continue to support the protectiveness statement and assure that the vapor intrusion pathway is not complete.

If you have any questions, please contact me.
Ben Bentkowski, P.G.
Technical Services Section
Bentkowski.Ben@epa.gov 404-562-8507

Appendix H: Surface Water and Porewater Sampling Locations



Name	Longitude	Latitude
FCPW31	-80.094141	26.285644
FCPW32	-80.093810	26.285645
FCPW33	-80.093920	26.285707
FCPW34	-80.093515	26.285645
FCPW35	-80.093257	26.285661
FCPW36	-80.092973	26.285655
FCPW37	-80.092782	26.285655
FCPW41	-80.092393	26.285661
FCPW42	-80.091840	26.285615
FCPW43	-80.091518	26.285517
FCPW44	-80.091157	26.285392
FCPW45	-80.090622	26.285216
FCPW46	-80.090092	26.285056

Appendix I: Risk Assessment Analysis in Support of Question B

1. 2010 ROD cleanup goals for soil

The 2010 ROD cleanup goals for soil were the lower of the residential, industrial and leachability-based SCTLs promulgated by FDEP in 2005. The lowest value for all soil COCs was the leachability-based SCTLs, which are back-calculated from applicable GCTLs. Because the GCTLs have not changed since the 2010 ROD, the leachability-based values remain valid as cleanup goals. However, to ensure the leachability-based SCTL still remains lower than the lower of the two health-based SCTLs (residential or industrial), the leachability-based cleanup goals were compared to the November 2015 EPA residential-based RSLs because FDEP has not revised the SCTLs since 2005. As demonstrated in Table I-1, the remedial goals established in the ROD remain valid as the goals equate to cancer risks below EPA's lower bound of the risk management range of 1×10^{-6} and well below the noncancer hazard quotient of 1.0.

Table I-1: Evaluation of Toxicity Value Changes on Soil Cleanup Goals

COC	ROD Cleanup Goal (mg/kg)[a]	EPA 2015 Residential RSL[b] (mg/kg)		Comparison to RSL	
		1×10^{-6} Risk	HQ=1	1×10^{-6} Risk[c]	HQ=1[d]
PCE	0.03	24	81	1.3×10^{-9}	0.0004
TCE	0.03	0.94	4.1	3.2×10^{-8}	0.007
cis-1,2-DCE	0.4	NA	160	NA	0.003
Vinyl chloride	0.007	0.059	70	1.2×10^{-7}	0.0001

Notes:

a. From Table 19 of the 2010 ROD.

b. Current RSLs, dated November 2015, are available at http://www.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 12/14/2015).

c. Cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1×10^{-6} risk:
Cancer risk = (ROD Cleanup Goal ÷ Soil Cancer RSL) × 10^{-6}

d. The noncancer hazard index was calculated using the following equation:
Hazard Index = (ROD Cleanup Goal ÷ Soil Noncancer RSL)

NA = Not Available

mg/kg = milligram per kilogram

2. Indoor air sampling, March 2015

The EPA evaluated vapor intrusion during the 2010 RI at the Flash Cleaners Site because of VOCs in groundwater and soil under the Site building. The human health risk assessment indicated that concentrations in indoor air result in cancer risks within the EPA's risk management range and a noncancer HI below the threshold of 1.0 under an unrestricted exposure scenario. Although vapor intrusion did not contribute significantly to overall risk as presented in the ROD, the soil remedy required indoor air monitoring in the Flash Cleaners building during the period of groundwater remedial action to detect the potential for vapor intrusion.

In 2015, the EPA approved an Addendum to the 2014 SVE O&M Work Plan. The main purpose of this modification was to evaluate whether the SVE system had met the soil cleanup goals. The addendum specified (in addition to other sampling) that indoor air monitoring be performed while the system was running, and again one month after the system had been shut down, to evaluate the potential for vapor intrusion into the Flash Cleaners building in the absence of the SVE system operating. Before system shutdown, 24-hour indoor ambient air samples were collected on February 17-18, 2015, in the Flash Cleaners building and the adjacent business building to establish a baseline. In addition, one outdoor ambient air sample was collected behind the Flash Cleaners building. After the SVE system was shut down for over a month, the ambient air locations were resampled on March 25-26, 2015. On March 26, 2015, the contractor completed sub-slab soil vapor sampling in the Flash Cleaners building at each of the four SVE wells. In addition, the EPA installed and sampled four temporary sub-slab soil vapor monitoring points.

The vapor intrusion sampling results are summarized as follows:

- There were no exceedances of the EPA's 2015 residential or industrial ambient air RSLs in soil vapor samples collected before system startup.
- There were no COC exceedances of the EPA's industrial or residential air RSLs in indoor ambient air from the Flash Cleaners building or the adjacent business building.
- There were exceedances in the Flash Cleaners building for contaminants not identified as COCs (non-COCs) in the RI or ROD, including 1,2-DCA, benzene, chloroform, ethylbenzene and naphthalene.

To clarify the third bullet, these five non-COC chemicals were not detected in site groundwater at the Flash Cleaners property during the RI; only one detection of benzene (7 micrograms per kilogram (μg/kg) in soil) was recorded; and therefore none of the five chemicals was designated a COC. As a conservative measure to evaluate significance of the non-COC RSL exceedances, the five non-COCs exceeding the air RSLs were evaluated further in a screening-level cumulative risk and noncancer hazard evaluation using the EPA's 2015 VISL Calculator (Version 3.4). The maximum concentration of the non-COCs were entered into the calculator under both residential and commercial/industrial land uses. Table I-2 shows that the cumulative cancer risks under both land use assumptions fall within the EPA's risk management range of 1×10^{-6} to 1×10^{-4}. In addition, the cumulative noncancer HI is less than or equal to 1.0 for residential and

commercial/industrial land uses. These results indicate that no unacceptable risk is presented. It should be noted that the indoor air samples were collected with the building completely closed and without benefit of any air circulation, fans or air conditioning. Any system of air handling, heating or cooling implemented for the building's use would be expected to reduce the levels of any air contaminants, regardless of source. The indoor air and subslab data are summarized in Tables G-3 and G-4, respectively.

Table I-2 Screening-Level Vapor Intrusion Risk Evaluation Using Indoor Air Samples following SVE Shutdown

Contaminant	Maximum Indoor Air µg/m³[a]	Residential[b]		Commercial/Industrial[b]	
		Cancer Risk	Noncancer Hazard Quotient	Cancer Risk	Noncancer Hazard Quotient
Benzene	0.73	2×10^{-6}	0.02	5×10^{-7}	0.006
Chloroform	0.69	6×10^{-6}	0.007	1×10^{-6}	0.002
1,2-DCA	1.4	1×10^{-5}	0.2	3×10^{-6}	0.05
Ethylbenzene	4.8	4.3×10^{-6}	0.005	1×10^{-6}	0.001
Naphthalene	2.6	3×10^{-5}	0.8	7×10^{-6}	0.2
	Total	5×10^{-5}	1.0[c]	1×10^{-5}	0.2

Notes:
a. Obtained from Evaluation of the SVE System at Flash Cleaners, prepared by J.M. Waller Associates, Inc. August 2015.
b. November 2015 VISL calculator version 3.4.6 at: http://www.epa.gov/oswer/vaporintrusion/guidance.html (accessed 12/21/2015).
c. This number has been rounded from 1.032 to 1, a common risk assessment practice.
µg/m³ = microgram per cubic meter

The lack of COC detections in indoor ambient air suggests that groundwater contamination does not pose a threat of vapor intrusion at the Site. Benzene and ethylbenzene were detected at similar concentrations in indoor air samples collected during the 2010 RI. However, these constituents are commonly associated with locations near busy highways or roads and were not retained as COCs in the 2010 Human Health Risk Assessment. In addition, benzene has historically been detected outdoors at concentrations exceeding screening criteria. The RI concluded that benzene and ethylbenzene are likely attributable to a different source because the results are not consistent with other onsite soil and groundwater data. 1,2-DCA, chloroform and naphthalene were not detected in indoor ambient air during the 2010 RI nor evaluated in the Human Health Risk Assessment.

Table I-3: Summary of February and March 2015 Indoor Air Data

Table 3
Positive Detection Results for Indoor Ambient Air Samples
Flash Cleaners Superfund Site
Pompano Beach, Florida
Page 2 of 2

LOCATION	USEPA Residential Air RSL	USEPA Industrial Air RSL	FLASH-AIR0003					
SAMPLE ID			FLASH-AIR0003-20150217	FLASH-AIR0004-20150217	FLASH-AIR0004-20150217	FLASH-AIR0003-20150325	FLASH-AIR0004-20150325	FLASH-AIR0004-20150325
SAMPLE DATE			20150218	20150218	20150218	20150326	20150326	20150326
SAMPLE CODE			ORIG	AVG	DUP	ORIG	AVG	DUP
MATRIX			AS	AS	AS	AS	AS	AS
VOLATILE ORGANICS FOR AIR REPORTED IN METERS CUBED (UG/M³)								
1,2,4-TRIMETHYLBENZENE	7.3	31	0.68 U	0.67 U	0.66 U	2.1	1.6	1.1
1,2-DICHLOROETHANE	0.11	0.47	0.68 U	0.67 U	0.66 U	1.4 [R][I]	0.88 [R][I]	0.72 U
2-HEXANONE	31	130	0.68 U	0.67 U	0.66 U	0.63 U	0.675 U	0.72 U
4-METHYL-2-PENTANONE	3100	13000	0.68 U	0.67 U	0.66 U	0.67	0.67	0.72 U
ACETONE	32000	140000	15	13	11	25	18	11
ALPHA PINENE	NC	NC	0.68 U	0.67 U	0.66 U	1.1	0.73	0.72 U
BENZENE	0.36	1.6	0.68 U	0.67 U	0.66 U	0.69 [R]	0.69 [R]	0.72 U
CHLOROFORM	0.12	0.53	0.68 U	0.67 U	0.66 U	0.69 [R][I]	0.69 [R][I]	0.72 U
CHLOROMETHANE	94	390	0.76	0.73	0.7	0.63 U	0.675 U	0.72 U
CYCLOHEXANE	6300	26000	1.4 U	1.35 U	1.3 U	5.3	3	1.4 U
DICHLORODIFLUOROMETHANE	100	440	2.5	2.45	2.4	2.1	2.05	2
D-LIMONENE	NC	NC	0.68 U	0.67 U	0.66 U	6.4	3.38	0.72 U
ETHANOL	NC	NC	11	12.5	14	90	49.8	9.6
ETHYL ACETATE	73	310	1.5	6.25	11	22	11.75	1.5
ETHYLBENZENE	1.1	4.9	0.68 U	0.67 U	0.66 U	4.8 [R]	3.15 [R]	1.5 [R]
HEXANE	730	3100	0.68 U	0.67 U	0.66 U	1.2	0.78	0.72 U
ISOPROPANOL	210	880	7.7	11.85	16	26	19.5	13
M,P-XYLENES	NC	NC	1.4	1.85	2.3	8.9	6.75	4.6
METHYLENE CHLORIDE	100	1200	0.68 U	0.67 U	0.66 U	1.6	0.98	0.72 U
NAPHTHALENE	0.083	0.36	0.68 U	1.67 [R][I]	2.6 [R][I]	0.63 U	0.675 U	0.72 U
N-BUTYL ACETATE	NC	NC	0.68 U	0.67 U	0.66 U	2.9	1.63	0.72 U
N-HEPTANE	NC	NC	0.68 U	0.67 U	0.66 U	2.3	1.7	1.1
NONANE	21	88	0.68 U	0.67 U	0.66 U	0.93	0.645	0.72 U
OCTANE	NC	NC	0.68 U	0.67 U	0.66 U	0.96	0.66	0.72 U
O-XYLENE	100	440	0.68 U	0.72	1.1	3.1	2.4	1.7
PROPYLENE	3100	13000	3.1	4.15	5.2	9.8	7.35	4.9
STYRENE	1000	4400	0.68 U	0.67 U	0.66 U	1	0.68	0.72 U
TETRACHLOROETHENE	11	47	0.68 U	0.67 U	0.66 U	2.1	1.23	0.72 U
TOLUENE	5200	22000	2.7	3.1	3.5	57	32.45	7.9
TRICHLOROFLUOROMETHANE	730	3100	1.4	1.35	1.3	1.3	1.25	1.2

Notes:
AS - Air sample
NC - No criteria for parameter
UG/M³ - Micrograms per cubic meter
Shaded concentrations exceed at least one of the criteria compared.
Bold concentrations depict detection
Risk Screening Levels taken from June 2015 edition of the Regional Screening Levels for Chemical Contaminants at Superfund Sites

[R] = Exceeds EPA Residential Air Risk Screening Level
[I] = Exceeds EPA Industrial Air Criteria Risk Screening Level

Laboratory qualifiers:
J - Estimated concentration
U - The chemical was not detected

Table I-4: Summary of February and March 2015 Subslab Data

Table 4
Sub-slab Soil Vapor Sample Results
Flash Cleaners Superfund Site
Pompano Beach, Florida

LOCATION	USEPA Residential Air RSL	USEPA Industrial Air RSL	FLASH-SV1	FLASH-SVE1	FLASH-SV2	FLASH-SVE2	FLASH-SV3	FLASH-SVE3
SAMPLE ID			FLASH-SV1-20150326	FLASH-SVE1-20150326	FLASH-SV2-20150326	FLASH-SVE2-20150326	FLASH-SV3-20150326	FLASH-SVE3-20150326
SAMPLE DATE			20150326	20150326	20150326	20150326	20150326	20150326
SAMPLE CODE			NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
MATRIX			SG	SG	SG	SG	SG	SG
TOP DEPTH (FT BLS)			0	1.5	0	1.5	0	1.5
BOTTOM DEPTH (FT BLS)			0.5	5.5	0.5	5.5	0.5	5.5
VOLATILE ORGANICS FOR AIR REPORTED IN METERS CUBED (UG/M3)								
1,1-DICHLOROETHENE	250	980	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
BENZENE	0.36	1.6	0.5 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
CIS-1,2-DICHLOROETHENE	NC	NC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
ETHYLBENZENE	1.1	4.9	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
M+P-XYLENES	NC	NC	2 U	2 U	2 U	2 U	2 U	2 U
O-XYLENE	NC	440	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
TETRACHLOROETHENE	11	47	2	1 U	7	1 U	1 U	1 U
TOLUENE	5,000	22000	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
TRANS-1,2-DICHLOROETHENE	NC	NC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
TRICHLOROETHENE	0.48	2	1 U	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	0.17	2.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

LOCATION	USEPA Residential Air RSL	USEPA Industrial Air RSL	FLASH-SV4	FLASH-SVE4	FLASH-SVE4		FLASH-SVE5
SAMPLE ID			FLASH-SV4-20150326	FLASH-SVE4-20150326	FLASH-SVE4-20150326-AVG	FLASH-SVE4-20150326-D	FLASH-SVE5-20150326
SAMPLE DATE			20150326	20150326	20150326	20150326	20150326
SAMPLE CODE			NORMAL	OHM	AVG	DUP	NORMAL
MATRIX			SG	SG	SG	SG	SG
TOP DEPTH (FT BLS)			0	1.5	1.5	1.5	1.5
BOTTOM DEPTH (FT BLS)			0.5	5.5	5.5	5.5	5.5
VOLATILE ORGANICS FOR AIR REPORTED IN METERS CUBED (UG/M3)							
1,1-DICHLOROETHENE	250	980	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
BENZENE	0.36	1.6	0.5 U	0.6 U	0.6 U	0.6 U	0.6 U
CIS-1,2-DICHLOROETHENE	NC	NC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
ETHYLBENZENE	1.1	4.9	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
M+P-XYLENES	NC	NC	2 U	2 U	2 U	2 U	2 U
O-XYLENE	NC	440	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
TETRACHLOROETHENE	11	47	1 U	2	2	2	1 U
TOLUENE	5,000	22000	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
TRANS-1,2-DICHLOROETHENE	NC	NC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
TRICHLOROETHENE	0.48	2	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	0.17	2.8	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Notes:
NC - No criteria for parameter
SG - Soil Gas / Matrix
UG/M3 - Micrograms per cubic meter
Bold concentrations: detect detection
Risk Screening - levels taken from June 2013 edition of the Regional Screening Levels for Chemical Contaminants at Superfund Sites

Laboratory Qualifiers
U - The compound was not detected

Appendix J: Notice of Federal Lien and Release of Federal Lien Documents

INSTR # 112879425 Page 1 of 3, Recorded 03/20/2015 at 11:39 AM
Broward County Commission, Deputy Clerk 1016

3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

DEED OF RELEASE OF FEDERAL LIEN
PURSUANT TO THE SUPERFUND AMENDMENTS
AND REAUTHORIZATION ACT OF 1986

NOTICE IS HEREBY GIVEN by the United States of America that the Federal Superfund Lien filed on May 26, 2010, in the office of the Broward County Commission Deputy Clerk, Florida, and referenced in Deed Book 47109, Pages 1002-1004, pursuant to the Superfund Amendments and Reauthorization Act, 42 U.S.C. Section 9607(l), as amended, in reference to the following described lands:

South 1/2 Lot 4, Block 10, Beacon Heights, Section B, Plat Book 44, Page 43, Broward County, and

North 1/2 Lot 4, Block 10, Beacon Heights, Section B, Plat Book 44, Page 43, Broward County,

with respect to the liabilities of Flash Cleaners, Inc., in Pompano Beach, Florida, is hereby **RELEASED**.

Franklin E. Hill, Director
Superfund Division

Sworn and subscribed before me
this 19th day of February, 2015

Felicia Jackson
Notary Public

FELICIA JACKSON
MY COMMISSION EXPIRES
NOTARY PUBLIC
AUGUST 15, 2016
CLAYTON COUNTY, GEORGIA

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3

CFN # 109352616
OR BK 47109 Pages 1003 - 1004
RECORDED 05/26/10 14:00:48
BROWARD COUNTY COMMISSION
DEPUTY CLERK 1037
#1, 2 Pages

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
61 Forsyth Street, S.W., Atlanta, GA 30303

NOTICE OF FEDERAL LIEN

FOR COSTS INCURRED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY
UNDER THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986

NOTICE IS HEREBY GIVEN by the United States of America that it holds a lien on the lands and premises described below and situated in the State of Florida as provided by Section 107(l) of the Superfund Amendments and Reauthorization Act of 1986 (SARA), Public Law No. 99-499, amending the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. Section 9601 et seq., to secure the payment to the United States of all costs and damages covered by that Section for which Flash Cleaners, Inc., is liable to the United States under Section 107(a) of CERCLA as amended. The costs and damages for which the referenced party is liable are for removal or remedial actions and administrative costs incurred by the United States to date plus interest and all future costs that the United States may incur in taking response actions upon the subject property. Additional costs may be incurred. The lien for which this instrument gives notice exists in favor of the United States upon all real property and rights to such property which belong to said party and are, have been, or will be subject to, or affected by, removal and remedial actions as defined by federal law, in or near Pompano Beach, Broward County, Florida, including the following described land:

DESCRIPTION OF PROPERTY
A tract or parcel of land located at 4131 North Federal Highway in Pompano Beach, Broward County, Florida, the same being particularly described in the Official Records of Broward County, Book 32553 Page 0067 and Book 14913 Page 763.

The full legal description of the property is:

> Lot 4, Block 10, BEACON HEIGHTS SECTION B, according to the Plat thereof recorded in Plat Book 41, Page 43, of the Public Records of Broward County, Florida

The Broward County Tax Folio ID numbers for the property are:

> 4843 18 06 0420 and 4843 18 06 0421

Such property is also known as the "Flash Cleaners Superfund Site."

This statutory lien exists and continues until the liability for such costs and damages (or for any decree or judgment against such party arising out of liability) is satisfied or becomes unenforceable through the operation of the statute of limitations as provided by Section 113 of Public Law No. 99-499, 42 U.S.C. Section 9613.

2

For further information, interested parties should contact Melissa Waters of the U.S. Environmental Protection Agency, Superfund Enforcement and Information Management Branch, at 404/562-8873 and reference the Flash Cleaners Superfund Site.

IN WITNESS WHEREOF, the United States has caused this instrument to be executed through the United States Environmental Protection Agency, and the Director of the Superfund Division and/or his authorized representative, in his official capacity as Director of the Superfund Division of the United States Environmental Protection Agency, Region 4.

Signed and dated at Atlanta, Georgia, this 4th day of May, 2010.

UNITED STATES of AMERICA and
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

United States of America)
State of Georgia)
County of Fulton)

By: _____
Franklin E. Hill
Director, Superfund Division
U.S. EPA, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

The foregoing instrument was acknowledged before me this 4th day of May, 2010, by Franklin E. Hill, known to me to be the person who has executed the foregoing instrument on behalf of the United States Environmental Protection Agency, for the purposes therein expressed, and that he was duly authorized to do so.

Notary Public in the County of Clayton, in the State of Georgia.

_____
Notary Public Signature

Felicia Jackson
Notary Public Printed Name

My commission expires on 8-15-2011.

Appendix K: Memorandum of Understanding Institutional Control

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement ("MOA") is made this 11 day of March, 2010 between the U.S. Environmental Protection Agency, ("EPA") and the South Florida Water Management District ("SFWMD"). The purpose of this MOA is to develop a framework for cooperation between the EPA and the SFWMD and to set forth the mutual understanding of the parties concerning cooperative efforts to minimize the potential effects of groundwater contamination in areas within the SFWMD's jurisdiction that are impacted or potentially impacted by Superfund sites, including procedures for information sharing and assisting in the implementation of certain institutional controls through the application of regulatory practices within the SFWMD's jurisdiction, to prevent potential human exposure to contaminated groundwater in areas impacted or potentially impacted by Superfund sites.

WITNESSETH

WHEREAS, pursuant to the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. 9601 et seq., and the National Contingency Plan, 40 CFR 300 et seq., EPA has the authority to conduct response actions at Superfund sites within the State of Florida;

WHEREAS, the EPA has designated sites within the SFWMD's geographic jurisdiction as Superfund sites;

WHEREAS, institutional controls are frequently used by EPA as part of selected response actions at Superfund sites;

WHEREAS, EPA policy defines institutional controls as non-engineering instruments such as administrative or legal controls that eliminate or minimize the potential of human exposure to contaminants and chemicals of concern and that protect the integrity of the remedy by limiting land or resource utilization. Institutional controls at a particular Superfund site may be selected as a part of a removal or remedial action. Institutional controls selected as a part of a remedial action are identified in the Record of Decision ("ROD") and may be more specifically established during the Remedial Design. At many Superfund sites, institutional controls are used to eliminate potential human exposure to contaminated groundwater beneath the Superfund site property and other adjacent or nearby properties;

WHEREAS, a groundwater institutional control may be a restriction on the use of contaminated groundwater by restricting the issuance of water use permits and/or a restriction on construction of potable and irrigation wells within an area impacted by a Superfund site. Implementation and enforcement of institutional controls for contaminated groundwater may require the assistance of regulatory authorities such as the SFWMD and various local governmental authorities;

WHEREAS, SFWMD has adopted rules to govern the consumptive use of water and the construction, abandonment, and repair of water wells within the geographic boundaries of SFWMD, to implement the provisions of Parts II and III of Chapter 373, Florida Statutes ("F.S."), respectively;

WHEREAS, such rules are adopted by SFWMD to ensure that the provisions of Chapter 373, F.S., are implemented and to preserve the water and natural resources of the state and promote the health, safety, and general welfare of the people of the state, including Chapters 40E-2, 40E-3, and 40E-20, Florida Administrative Code ("F.A.C.");

WHEREAS, SFWMD has also adopted by reference and implements regulations promulgated by the Florida Department of Environmental Protection governing the construction of water wells, including the construction of water wells within delineated areas of contamination, as set forth in Chapters 62-532 and 62-524, F.A.C.;

WHEREAS, within the geographic boundaries of SFWMD, unless otherwise exempt, a permit must be obtained prior to the construction, repair, modification or abandonment of a water well, including wells within areas delineated pursuant to Chapter 62-524, F.A.C., which encompass areas within which ground water contamination may exist or is known to exist;

WHEREAS, the SFWMD has delegated the authority to issue permits for the construction, repair, modification or abandonment of water wells to various local governmental agencies within the geographic boundaries of the SFWMD;

WHEREAS, within the geographic boundaries of the SFWMD, unless otherwise exempt, a water use permit must be obtained prior to the use or withdrawal of water for all uses except domestic uses and fire fighting purposes;

WHEREAS, pursuant to Rules 40E-2.381 and 40E-20.381, F.A.C., the SFWMD is authorized to impose upon any water use permit issued by SFWMD such reasonable conditions as are necessary to assure that the permitted use or withdrawal will be consistent with the overall objectives of the SFWMD, and shall deny an application for a water use permit if use or withdrawal fails to meet the conditions for issuance set forth in Rules 40E-2.301 or 40E-20.301, F.A.C.;

WHEREAS, EPA and the SFWMD desire to cooperate in exercising their respective regulatory authority to prevent the potential spread of ground water contamination, protect aquifer water quality and promote public health, safety and welfare; and

WHEREAS, the Clean Water Act § 104(a) and (b), 33 U.S.C. 1254(a) and (b), provides EPA the authority to cooperate with organizations such as SWFMD on strategies to address water pollution, including groundwater and surface water pollution.

NOW THEREFORE, EPA and the SFWMD agree as follows:

1. As to EPA:

A. The EPA shall notify SFWMD in writing of any area of groundwater impacted by a Superfund site within the jurisdiction of SFWMD.

B. Attached hereto and incorporated herein by reference as Appendix 1 is a list of agreed-upon Superfund sites within the jurisdiction of SFWMD to which this MOA shall be applicable and which shall hereinafter be referred to as the Superfund Areas. EPA shall provide SFWMD with a written description, aerial depiction and electronic data in a format compatible with the District's Geographic Information System showing the extent of the known and potential groundwater contamination for each of the Superfund Areas contained in Appendix 1. Electronic data should be provided in a shapefile that is in State Plane Feet East Zone, North American Datum of 1983 HARN, with units in feet and vertical units in feet, NAVD 88. Geometry should be polygon, if applicable. Attributes will need column descriptions and domains, and metadata should be FGCD compliant. EPA shall periodically provide an updated written description, aerial depiction and electronic data to SFWMD for each Superfund Area as often as necessary to maintain an accurate boundary of the Superfund Area, or at least every five years.

C. EPA shall consult with SFWMD to establish an inner and outer boundary of the area of groundwater impacted or potentially impacted by a Superfund Area. The inner boundary shall be known as the contamination zone or Zone A. The area between the inner and outer boundary shall be known as the buffer zone or Zone B.

D. For each Superfund Area, consistent with EPA's policies on conducting Five-Year Reviews, EPA will ensure a well survey is conducted at least every five years within Zones A and B or the area of the extent of groundwater contamination if greater. The well survey will be conducted through field inspection and will identify any new wells constructed or operating since the last review was conducted. EPA shall also provide to SFWMD available monitoring and other site assessment reports demonstrating the status of groundwater contamination.

E. EPA agrees that if any portion of a Superfund Area appended or proposed to be appended to this MOA is situated within an area delineated as an area of ground water contamination pursuant to Section 373.309(1)(e), F.S., EPA will incorporate in its institutional controls for such Superfund Area provisions for complying with the regulations promulgated in Chapter 62-524, F.A.C., if applicable.

2. As to SFWMD:

A. Upon receipt of the electronic and other descriptive data for a Superfund Area including the contamination zone and buffer zone for such Superfund Area, SFWMD will transmit the same to the various state and/or local agencies to which

SFWMD has delegated authority to issue well construction permits pursuant to Chapter 40E-3, F.A.C.

B. When reviewing and approving water use permit applications involving activity to be undertaken on property located within a Superfund Area (hereinafter referred to as a Permit Application), SFWMD will, where appropriate, impose such reasonable conditions as are necessary to assure that the permitted use or withdrawal will be consistent with the overall objectives of the SFWMD.

C. For well construction permits, SFWMD will request the local agency to which authority for issuance of well construction permit has been delegated, include appropriate conditions which may include, but are not limited to, prohibiting use of the well as a potable water supply, requiring notice to well owners of potential ground water contamination, including the requirements of Chapter 62-524, F.A.C., limiting the depth of the well, or requiring specific methods of construction.

D. SFWMD agrees that following receipt of an application for a water use permit for activity located within Zone A of a Superfund Area, SFWMD will provide the EPA with a copy of the Request for Additional Information ("RAI"), if one is issued, and/or a copy of the Staff Report.

E. SFWMD will request local agencies to which it has delegated authority to issue well construction permits provide the EPA with a copy of any RAI sent to the applicant, if the local agency has determined that an RAI is necessary.

F. Pursuant to Rule 40E-2 and 40E-20, F.A.C., SFWMD will recommend denial of any application for a water use permit for an activity in Zones A or B of a Superfund Area if the use or withdrawal of water would cause significant degradation of surface or groundwater quality through induced movements of pollutants into a water resource that is not polluted or the use or withdrawal otherwise fails to meet the conditions for issuance set forth in Rules 40E-2.301 and 40E-20.301, F.A.C.

G. SFWMD will request local agencies to which it has delegated authority to issue well construction permits deny an application for a water well construction permit for activity in Zones A or B of a Superfund Area if use of the proposed well fails to meet the conditions for issuance set forth in Rule 40E-3.301, F.A.C.

H. SFWMD will provide notice to EPA of the receipt of a written request for a variance or waiver pursuant to Section 120.542, F.S., and Chapter 28-104, F.A.C., or an objection or petition for an administrative hearing in relation to a water use permit application for an activity located or proposed to be located within a Superfund Area.

I. SFWMD will request local agencies to which it has delegated authority to issue well construction permits provide notice to EPA of the receipt of a written request for a variance or waiver pursuant to Section 120.542, F.S., Chapter 28-104, F.A.C., or Rule 40E-3.0511(4), F.A.C., or an objection or petition for an administrative hearing in

relation to a water well construction permit application for an activity located or proposed to be located within a Superfund Area.

3. As to both parties:

A. Both parties agree to make their staffs available for timely consultation as to the potential for impacts to the water resource occurring within Zones A and B of a Superfund Area as a result of proposed activity for which a water use permit application or water use permit renewal application is received by SFWMD.

B. This MOA may be amended in writing upon mutual consent, as the parties deem necessary and such amendments shall take effect upon execution by both parties.

C. Additions or deletions to the list of Superfund Areas contained in Appendix 1 hereto may be made at any time upon mutual consent of the parties.

D. Each party hereby designates the position set forth below as its contact person who shall be responsible for receiving all notices as described herein and for assisting with coordination and overall implementation of this MOA for the respective agency:

For EPA: Division Director
U.S. Environmental Protection Agency
Region IV, Superfund Division
61 Forsyth Street, NW
Atlanta, Georgia 30303-8960

For SFWMD: Division Director
Water Use Regulation Division
South Florida Water Management District
3301 Gun Club Road, MSC 4324
West Palm Beach, Florida

E. This MOA shall become effective on the latest day and year executed by either the EPA or the SFWMD as noted below.

F. Either party may terminate this MOA upon written notice to the other party.

G. The parties agree that this MOA imposes no formal contractual obligations and is not enforceable by either party against the other or by any third party.

H. Neither party is responsible for the funding, payment, and/or reimbursement of any costs incurred by the other party for any activities performed pursuant to this MOA. Any provision of this MOA that may require an obligation of funds by EPA shall be subject to the availability of appropriated funds and no provision

herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341.

I. This MOA does not create any right or benefit, substantive or procedural, enforceable by law or equity, by persons who are not party to this agreement, against SFWMD or EPA, their officers or employees, or any other person. This MOA does not direct or apply to any person outside of SFWMD and EPA.

J. The undersigned representative(s) certify that they are fully authorized to execute this MOA.

IN WITNESS WHEREOF, each party, or a lawful representative, has executed this agreement on the date set forth next to their signature below.

U.S. Environmental Protection Agency

A. Stanley Meiburg
Acting Regional Administrator

South Florida Water Management District
By its Governing Board

Eric Buermann, Chairman

Legal Form Approved:

By: _____
Jennifer Bokankowitz, Esq.

Attested:

By: _____
District Clerk/Asst. Secretary
Dated: March 11, 2010

GOVERNING BOARD OF SOUTH FLORIDA WATER MANAGEMENT DISTRICT
STATE OF FLORIDA
SEAL
Established 1949

APPENDIX 1

1. Solitron Microwave Superfund Site. EPA ID No. FLD045459526, Port Salerno, Martin County , Florida (March 2010)

2. Trans Circuits, Inc. Superfund Site, EPA ID No. FLD091471904, Lake Park, Palm Beach County, Florida (March 2010)

3. Flash Cleaners Superfund Site, EPA ID No. FLD083111005, Pompano Beach, Broward County, Florida (July 2012)

4. Florida Steel Corporation Superfund Site, EPA ID No. FLD050432251, Indiantown, Martin County, Florida (March 2013)

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Fourth Five-Year Review Report
for
Petroleum Products Corporation
FLD980798698

Pembroke Park
Broward County, Florida

December 2015

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

for Franklin E. Hill, Director
Superfund Division

12/3/15
Date:

11015352

Fourth Five-Year Review Report
for
Petroleum Products Corporation
3130 SW 19th Street
Pembroke Park
Broward County, Florida

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List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
BDL	Below Detection Limit
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FDEP	Florida Department of Environmental Protection
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
IAROD	Interim Action Record of Decision
IC	Institutional Control
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter
µg/m3	Micrograms per Cubic Meter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PPC	Petroleum Products Corporation
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To-Be-Considered
USACE	U.S. Army Corps of Engineers
VISL	Vapor Intrusion Screening Levels
VOC	Volatile organic compound

Executive Summary

The 2-acre Petroleum Products Corporation Superfund site (the Site) is located in Pembroke Park, Broward County Florida. From 1957 to 1971, the Petroleum Products Corporation (PPC) operated an oil re-refining facility on the site property. Currently, the Pembroke Park Warehouses occupy the property. The warehouses include storage units, commercial businesses, and light industrial businesses. A residential area (Bamboo Park Mobile Homes) is next to the Site to the south. Commercial and industrial businesses occupy buildings to the west, north, and east.

PPC operators used sulfuric acid clay in the re-refining process. They disposed of waste oil and sulfuric acid waste in unlined open pits. On-site waste disposal resulted in contamination of soil and groundwater with solvents, sulfuric acid, and heavy metals. During operations, residents south of the Site would observe oil slicks and informed local and state agencies. After investigating site contamination, the United States Environmental Protection Agency issued an Administrative Order on Consent (AOC) to PPC in 1985 to conduct a cleanup. The EPA added the Site to the Superfund program's National Priorities List (NPL) on July 22, 1987. The EPA addresses the Site as three operable units (OUs). OU1 addresses product recovery and containment of the groundwater plume, OU2 addresses soil contamination and OU3 addresses groundwater contamination.

PPC conducted initial cleanup actions and installed a free-product recovery system, which operated from 1985 to 1991. The EPA issued an Interim Action Record of Decision (IAROD) for OU1 in 1990, later modified by a 1991 Explanation of Significant Differences (ESD). A second treatment system using air stripping and activated carbon operated with limited success between 1994 and 1998. In 1998, the potentially responsible party (PRP) Group, made up of more than twenty generators, began a third free-product recovery method using a vacuum-enhanced bioslurper unit. The EPA documented the recovery method change in a 1998 ESD. The bioslurper unit operated until September 2012, when the Florida Department of Environmental Protection (FDEP) changed the remedy to quarterly monitoring and free-product collection on an as-needed basis. The EPA is preparing a ROD for OU2. An OU3 ROD will be prepared after the OU2 remedy is implemented. The triggering action for this five-year review (FYR) was the signing of the previous FYR on December 14, 2010.

The remedy for OU1 (Product Recovery), is currently protective of human health and the environment in the short term. The site is within a delineated area, a form of Institutional Control, which requires the State's District office approval for well placement. Site wells are being monitored by the PRP's contractor and oil/sludge is collected if detected in perimeter wells. In order for the remedy to be protective in the long term, a final remedy will need to be selected. Currently, a final remedy selection is scheduled for OU1 and OU2 in FY 2016.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Petroleum Products Corporation		
EPA ID: FLD980798698		
Region: 4	**State:** FL	**City/County:** Pembroke Park/Broward County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA		
Author name: Johnny Zimmerman-Ward (Reviewed by the EPA)		
Author affiliation: Skeo Solutions		
Review period: March 2015 – November 2015		
Date of site inspection: March 31, 2015		
Type of review: Statutory		
Review number: 4		
Triggering action date: December 14, 2010		
Due date *(five years after triggering action date)*: December 14, 2015		

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): OU1	Issue Category: Remedy Performance			
	Issue: The OU1 remedy of product recovery no longer uses a bioslurping unit. The product recovery is through scheduled bi-weekly well inspections, product pumping, baling and off-site disposal until a final remedy is selected for OU1 (product recovery) and OU2 (soil).			
	Recommendation: Finalize the sitewide remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State/PRP	EPA	12/14/2017

Protectiveness Statement

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date*
OU1	Short-term Protective	

Protectiveness Statement:
The remedy for OU1 is currently protective of human health and the environment in the short term. An Institutional Control, through a delineated area, is in place that prevents well placement without District office approval. Site wells are being monitored bi-weekly with removal of product in perimeter wells. The Site has scheduled inspections by a PRP and State contractor. In order for the remedy to be protective in the long term, a final remedy will need to be selected. A final remedy for OU1 (product recovery) and OU2 (soil) is scheduled for FY 2016.

Environmental Indicators

- *Current human exposures at this site are under control.*
- *Contaminated groundwater migration is not under control.*

Are Necessary Institutional Controls in Place?

☐ All ☒ Some ☐ None
The Site needs further evaluation to determine if additional groundwater and land use restrictions are needed.

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

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

Fourth Five-Year Review Report
for
Petroleum Products Corporation Superfund Site

1.0 Introduction

The purpose of a Five Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. FYR reports document FYR methods, findings, and conclusions. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The EPA prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Petroleum Products Corporation Superfund site (the Site) in Pembroke Park, Broward County, Florida. The EPA's contractor conducted this FYR from March to November 2015. The EPA is the lead agency for developing and implementing the remedy for the PRP financed cleanup at the Site. The FDEP, as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the fourth FYR for the Site. The triggering action for this statutory review is the previous FYR. The FYR is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of three operable units (OUs). This FYR report addresses OU1 (product recovery).

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
Petroleum Products Corporation (PPC) started operating as a re-refiner of waste oil at the Site	1957
PPC initiated major changes in its operation after a large rainfall caused the disposal pit to overflow, producing an oil slick on the lakes of a nearby mobile home community	1970
PPC ended operations and began operating as a storage and distribution facility. PPC constructed warehouses on the northern and western sections of the property	1971
PPC cleaned up portions of the Site in response to two warning notices from Broward County Environmental Quality Control Board	May-June 1979
Florida Department of Environmental Regulation, now FDEP, issued a Notice of Violations requesting PPC remove additional waste oils from the Site and submit a detailed sampling analysis plan	June 1983
The EPA issued an Administrative Order on Consent (AOC) to PPC to conduct a removal action	April 1, 1985
The EPA proposed the Site to the National Priorities List (NPL)	April 10, 1985
The PRP completed the removal action	October 10, 1985
The State initiated OU1 combined remedial investigation/feasibility study (RI/FS)	April 1, 1986
The EPA listed the Site on the NPL	July 22, 1987
The EPA initiated the OU1 RI/FS and the PRP completed the OU1 RI/FS	September 15, 1989
FDEP approved PPC to participate in the State's petroleum cleanup program	August 1990
The EPA completed the OU1 RI/FS and signed the OU1 interim action Record of Decision (ROD)	October 5, 1990
The free-product recovery system installed in 1985 stopped operating	1991
The EPA issued an Explanation of Significant Differences (ESD) deferring closeout of the surface drainage system until a final remedy decision was made for the Site	March 11, 1991
PRP initiated a remedial design (RD) for the recovery system	October 1, 1991
The EPA issued a Consent Decree	December 11, 1991
The EPA prepared a Baseline Risk Assessment (BRA)	June 1992
PRP completed RD and initiated remedial action (RA)	June 10, 1993
PRP initiated operation of a second treatment system using air stripping and activated carbon	1994
PRP initiated a RD for second recovery system	December 30, 1997
Operation of the second treatment system using air stripping and activated carbon ended	1998
The EPA issued a second ESD to document differences in recovery technologies and the change to a bioslurper system	August 3, 1998
Operation of bioslurper unit initiated	May 26, 1999
PRP completed RA and began Long-Term Response Action	July 13, 1999
AOC filed	September 14, 1999
Bioslurper unit temporarily shut down due to discovery of free product in injection well	November 1999
The EPA signed the first FYR	September 19, 2000
AOC filed	April 24, 2001
Soil Assessment Report for Bamboo Park Mobile Homes issued	November 2002
Twenty-four monitoring wells abandoned	March 2004
The EPA signed the second FYR	December 20, 2005
Potable well survey performed	May 2006
Remedial Alternative Evaluation Report prepared	December 22, 2008
The EPA and the U.S. Army Corps of Engineers (USACE) signed an Interagency Agreement to address an RI/FS for OU2	2009
Light Non-Aqueous Phase Liquid (LNAPL) removed from Warehouse Bay 261	March 18-19, 2009

Event	Date
Site Assessment Report issued for potential contamination on western property	December 15, 2009
The EPA signed the third FYR	December 14, 2010
PRP group conducted a soil removal action at Bamboo Park Mobile Homes and EPA contractors conducted an air study	February 2011
The EPA issued the final air study report	April 28, 2011
Operation of bioslurper unit ended and interim remedy switched over to monitoring and as-needed removals	September 2012
Pembroke Business Park, LLC entered into a 40-year master lease agreement with Pembroke Park Warehouses	October 2, 2014

3.0 Background

3.1 Physical Characteristics

The 2-acre Site is located at 3130 SW. 19th Street in an industrial and commercial area of Pembroke Park, Broward County, Florida. Pembroke Road borders the Site to the north, South Park Road to the west, Carolina Street to the south and SW. 31st Avenue to the east (Figure 1). The Bamboo Park Mobile Homes (Figure 3) are south of the Site across Carolina Street. Interstate 95 is about 0.2 miles east of the Site.

The Site is in a flat, low-lying coastal area with shallow depressions. Elevation ranges from 5-8 feet above sea level. Very little undisturbed topography remains because pavement or warehouse buildings cover most of the Site. Fill materials were imported to build up the area for development, and the warehouses are 4 feet higher than surrounding areas south and west of the Site. The Site lies above the Biscayne aquifer, a federally designated sole-source aquifer in southern Florida.

3.2 Land and Resource Use

Between 1958 and 1971, PPC operated an oil-refining facility on site. Currently, the Pembroke Park Warehouses occupy the property. The warehouses house storage units; commercial businesses, including a gun range; and light industrial businesses including a construction company. The Site is zoned for commercial/industrial use, and current zoning prohibits schools and residential uses of the property. The surrounding area is highly developed with commercial/industrial activities and residential areas. A high-density neighborhood of mobile homes is next to the Site, south of Carolina Street. Land use is anticipated to remain the same in the future.

The Site lies within the radius of influence of two major well fields for the cities of Hallandale (about 0.5 mile east) and Hollywood (about 1.5 miles northwest). Residences and businesses on site and near the Site receive drinking water from the public water supply. The Site is within the South Florida Water Management District. All groundwater well usage requires prior approval from the District.

3.3 History of Contamination

From 1958 to 1971, PPC operated an oil-refining facility on the southern half of the Site. PPC refined used oil using sulfuric acid clay. This process created waste sulfuric acid and spent clay contaminated with chlorinated solvents, metals, and other contaminants. The facility included a tank farm with 22 aboveground storage tanks and two unlined disposal pits. During operations, PPC disposed of about 150,000 gallons of contaminated and used oil in the unlined pits. The sludge pits are from 2.6-21 feet

below ground surface. The pits contain a heterogeneous mixture of black and oily materials with a strong petroleum odor (Figure 2).

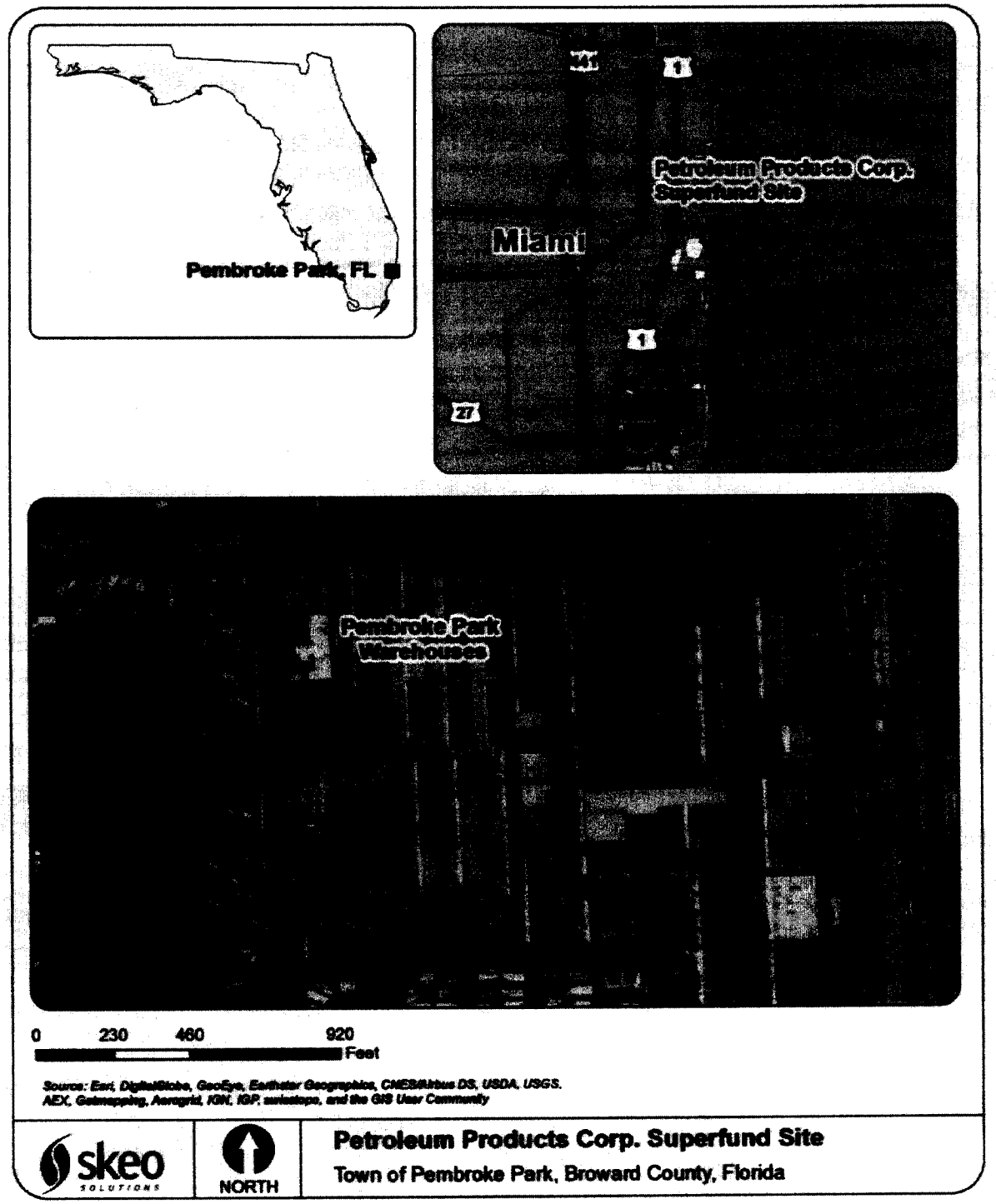
During operations, residents of the Bamboo Park Mobile Homes complained to PPC and local authorities about oil overflows from PPC disposal pits. A major rainfall in 1970 resulted in saturation of the ground, causing waste oil in the disposal pits to rise and overflow. This created oil slicks on the lake next to the mobile home park. In 1971, PPC prepared the site property for sale and filled disposal pits with a mixture of sludge and clean fill. The owner and operator of PPC sold the Site to a private property owner who still owns most of the property. In 1972, the new owner built warehouses over the former pits on the northern and western sections of the site property. PPC continued limited operations on the southeast corner of the Site until 1985, when PPC ended operations. The site property owner then built additional warehouse buildings in this area.

3.4 Initial Response

The Broward County Environmental Quality Control Board issued two warning notices to PPC in May 1979. Later that year, PPC began cleaning up some of the Site. In June 1983, Florida Department of Environmental Regulation, now the FDEP, issued a Notice of Violations requesting that PPC remove additional waste oils and submit a detailed sampling and analysis plan. PPC hired an environmental consulting firm to conduct sampling on their behalf. The sampling found waste oil floating on top of the Biscayne aquifer. Groundwater also contained oil, grease, petroleum hydrocarbons, volatile organic compounds (VOCs) and several inorganic compounds. Subsequent studies by FDEP confirmed that the plume was migrating east-southeast toward Carolina Avenue and the residential area (Figure 2).

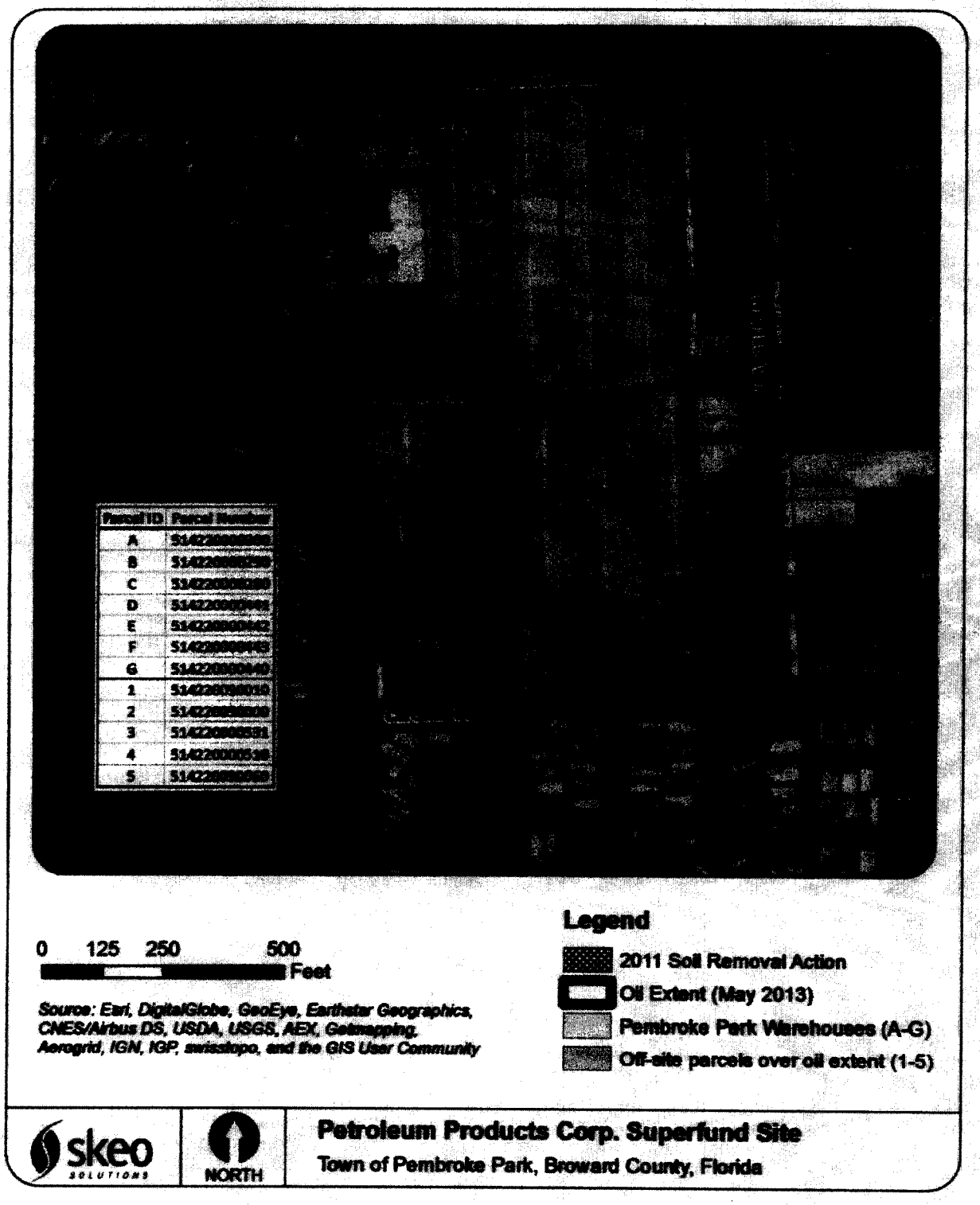
In March 1985, PPC entered into an AOC with the EPA, agreeing to perform cleanup under EPA oversight. Actions outlined in the AOC include: emptying, cleaning and properly disabling/abandoning tanks; testing all oil, water, and sludge prior to disposal; properly disposing of or recycling oil; and removing asbestos from the boiler house. In October 1985, PPC completed these activities and removed 262 waste drums of sludge. As the PRP, PPC also installed a free-product oil recovery system in 1985. This system consisted of a 30-inch diameter, 23-foot deep extraction well that recovered 25 gallons per minute. Between 1985 and 1991, the system removed about 6,900 gallons of waste oil. The EPA first proposed the Site for the Superfund program's NPL in April 1985, and finalized the Site's NPL listing on July 22, 1987.

Figure 1: Site Location Map



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

Figure 2: Site Map



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

3.5 Basis for Taking Action

After adding the Site to the NPL, the PRPs, which included PPC and the Pembroke Park Warehouses, completed a two-phase remedial investigation (RI) under EPA oversight between 1986 and 1987.

The 1986-1987 RI found the following:

- Extensive soil contamination was restricted to the southern half of the original PPC property. In the disposal pit areas, there was highly contaminated sludge almost 28 feet below the ground surface.
- Lead, chromium and other inorganic contaminants exceeded Florida groundwater standards in several shallow monitoring wells. The shallow groundwater contaminant plumes coincided with the main area of soil contamination and had not migrated far off site.
- The limited extent of contaminant transport was primarily controlled by relatively flat hydraulic gradient and low groundwater flow.
- Vertical migration of contaminants into the more transmissive zone of the Biscayne aquifer had occurred. However, the extent of lateral migration within this zone was limited by very low hydraulic gradients.
- The degraded condition of on-site drainage culverts provided a direct pathway for contaminants to enter the groundwater system.
- The Site was a stable system that posed no immediate threat to municipal water supplies as long as the contaminants did not spread.

A 1992 Baseline Risk Assessment (BRA) evaluated risk exposure pathways for current land use scenarios involving incidental ingestion of soils by on-site workers and children. The BRA also evaluated dermal adsorption of surface water by on-site workers and children. The BRA found that cancer risks in the exposure scenarios were less than EPA's benchmark. Potential risks would be noncarcinogenic in nature. Seepage of light non-aqueous phase liquid (LNAPL) into buildings and release of volatilized chemicals would likely present an unacceptable exposure and risk. Such seepage had been reported at the Site. For future land use scenarios, the BRA considered ingestion of groundwater, and inhalation or dermal adsorption by adult and child residents. The greatest risks included consumption of lead-, acetone- and vinyl chloride-contaminated groundwater, or soil by residents living south of the Site and future migration of contaminants to the surficial depth for potable water. The BRA found little to no significant ecological risks because the Site is mostly developed and most contamination is under pavement or buildings.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP. The nine criteria are:

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Permanence

4. Reduction of Toxicity, Mobility or Volume through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

4.1 Remedy Selection

The EPA is addressing the site cleanup as three OUs. OU1 addresses free oil product recovery and containment of the groundwater plume, OU2 addresses contaminated soil, and OU3 addresses contaminated groundwater. The EPA has issued an Interim Action ROD for OU1. A ROD for OU2 and OU3 has not been completed. The EPA and the U.S. Army Corps of Engineers (USACE) entered into an inter-agency agreement in 2009 to conduct the RI/FS for OU2. The RI and supplemental human health risk assessment has been completed. A final FS is planned for FY2016 and a ROD for OU1/2 is planned for 2016.

1990 Interim Action ROD

On October 5, 1990, the EPA signed an Interim Action Record of Decision (IAROD) for OU1 to contain contamination sources until further alternatives for source control can be assessed. The selected remedy in the OU1 IAROD included retiring non-operating wells; closing storm drainage wells that discharge to the Biscayne aquifer; conducting a private well survey to identify groundwater users; and modifying the groundwater recovery system to remove more oil and contain future migration of contaminants. The IAROD outlined contaminants of concern (COCs) for the contaminant plume and shallow soil (Table 2). The IAROD did not establish COCs or remedial goals for groundwater and deeper soils, which will be established when the EPA issues RODs for OU2 and OU3.

The 1990 IAROD did not list remedial action objectives (RAOs), but listed the following goals:

- Contain the plume within the boundaries of the Site.
- Prevent further water infiltration into the disposal pit area by preventing infiltration of water into the soils.
- Increase the recovery of waste oil from the groundwater.

Table 2: On-Site and Off-Site COCs for OU1

Site Area	COCs
Biscayne aquifer surficial zone, on site	Aluminum, Chromium, Lead, Manganese
Biscayne aquifer surficial zone, off site	Aluminum, Chromium, Iron, Lead, Manganese Trichloroethylene
Biscayne aquifer intermediate zone, off site	Aluminum Iron
Shallow soil, off site	Arsenic, Lead
Note: Site areas and COCs are from the 1990 interim ROD.	

Modifications to the 1990 IAROD

Since 1990, the EPA has modified the interim OU1 remedy twice. The first modification, documented in the March 11, 1991 ESD, deferred closeout of the surface drainage system until the EPA selected and implemented a remedy for OU2. This was done because excavation of contaminated soil could destroy

the drainage system. A second ESD on August 3, 1998, documented the differences between recovery technologies in the original remedial design and the modified bioslurper system, which was selected to recover free product at the Site in 1999.

4.2 Remedy Implementation

In August 1990, FDEP approved PPC's participation in the state-funded petroleum cleanup program, called the State of Florida's Inland Protection Trust Fund. In December 1991, the EPA and the PRPs entered into a Consent Decree for implementation of cleanup activities outlined in the 1990 IAROD. By 1991, contractors hired by the PRP Group conducted a survey of existing culvert drainage wells at the Site and confirmed that they did not present a direct pathway to the Biscayne aquifer. In response, the EPA issued the 1991 ESD deferring closeout until development of the OU2 remedy. In June of 1993 the Remedial Design was completed for OU1. In 1994 the Remedial Action was initiated. A second treatment system which included air stripping and activated carbon was utilized.

Free-Product Recovery and Treatment by Air Stripping

To address recovery of free product, the PRP Group divided the Site into two zones characterized by location and viscosity; the southern side (Zone 1) contains low-viscosity oil and the northern side (Zone 2) contains high-viscosity oil. The original approach to capturing free product in Zone 1 involved a groundwater pump-and-treat system to lower the groundwater table. The depression would encourage flow of free product above the groundwater table toward extraction points. A system with two air stripping towers and activated carbon treated extracted groundwater. Due to buildup of hydrogen sulfide, hydrogen peroxide was added to the treatment system. Treated groundwater was then discharged to an injection well. This treatment system operated from 1994 to December 1998, and recovered about 3,500 gallons of free product. Because the system operated below the rate recommended in the remedial design, the PRP Group decided to try another recovery technology.

Bioslurper Recovery System and Treatment

In 1998, the EPA issued the second ESD documenting the change from extraction and treatment to a bioslurper system, which began operating in May 1999. The bioslurper recovery system extracted groundwater, free product, and soil gas. At the extraction point, the three substances were separated and treated above ground. The bioslurper used a vacuum enhanced recovery system by creating a pressure gradient to move waste oil into the recovery well. Treated groundwater and soil gas were discharged back into the aquifer and atmosphere, respectively. The PRP Group constructed the bioslurper system on the southern end of the Site at Zone 1. The lessons learned during Phase I operation at Zone 1 were applied to Phase II, which expanded the extraction system to the northern area of the Site.

The bioslurper system temporarily shut down in April 2000, due to free-product emulsification blocking the activated carbon system. The treatment process then switched over to chemical treatment with ferric sulfate to avoid blockage. However, chemical treatment resulted in higher concentrations of iron and sulfate. FDEP issued an Underground Injection Control permit allowing for variance in the discharge concentration to 5 milligrams per liter (mg/L) of iron and 500 mg/L of sulfate. The PRP Group began Phase II operation of the bioslurper system for Zone 2 in August 2001. To date, the bioslurper system has recovered about 40,000 gallons of oil and free product.

Between 2008 and 2009, FDEP asked the PRP Group to evaluate various methods to further enhance and optimize recovery of free product. This included a December 2008 Remedial Alternative Evaluation of thermal treatment technologies to lower oil viscosity and enhance extractability. In June 2009, FDEP

tasked the PRP Group to conduct an Oil Viscosity Study to assess the feasibility of using thermal conductive heating. The study concluded that thermal conductive heating would lower the viscosity and improve recovery rates, but the optimal temperature may damage PVC piping in the recovery well system. A high cost of implementation and lack of available funding has impeded implementation of thermal-enhanced treatment technologies at the Site. In September 2012, the PRP Group ended operation of the bioslurper unit. After deactivation of the bioslurper system, the PRP Group shifted to quarterly groundwater and free-product monitoring to evaluate site conditions.

Emergency Removal

In March 2009, FDEP tasked the PRP Group to clean up Warehouse Bay 261 in the Pembroke Park Warehouses. Free product had seeped through the foundation and accumulated in a pit on the floor, posing a threat of exposure to free product. On March 18 and 19, 2009, the PRP contractor removed 400 gallons of LNAPL. The relatively large amount of free product recovered prompted FDEP to believe that future recovery of free product could occur directly from Warehouse Bay 261. There was some LNAPL in Warehouse Bay 261 during the FYR site inspection in 2010.

Surrounding Areas of Contamination

In March 2010, FDEP tasked a contractor to investigate and potentially conduct a source removal action on a residential property just south of the Site in the Bamboo Park Mobile Homes (2301 SW 31st Avenue). In February 2011, the PRP group excavated an estimated 330 cubic yards of shallow contaminated petroleum-impacted soils around the residential property.

4.3 Operation and Maintenance (O&M)

Under the State's petroleum cleanup program, the State reimburses PPC for costs associated with removal, the RI/FS, remedial design/remedial action and long-term O&M of the waste oil recovery system.

The EPA outlined an O&M plan in the 1998 Final Remedial Action Plan and the 1999 Operations, Monitoring and Maintenance Manual. The main objective of O&M is to recover free product and minimize lateral migration of LNAPL. FDEP hired Environmental Consulting and Technology, Inc. (ECT) to create and submit monitoring and system performance reports. Quarterly and annual monitoring reports document the following: total operational hours, pressure of the liquid pump ring, volume of processed water and collected free product, flow and concentration of vapor gas, and measurements before and after rotating extraction wells. ECT submits reports each quarter in addition to annual groundwater monitoring reports from wells on and off site. Measured parameters during annual groundwater sampling include benzene, toluene, ethyl benzene, xylenes and methyl tertiary butyl ether (EPA Method 8021B), polynuclear aromatic hydrocarbons (EPA Method 8270) and Florida Petroleum Range Organics.

Operation of the bioslurper system continued until September 2012. Since 2012, ECT has continued monitoring, since the last FYR in 2010, petroleum LNAPL levels, groundwater levels, and performing groundwater sampling for on-site wells. A rough estimate of the costs to operate the remedial system, including contractor oversight and associated analytical sampling, was about $150,000 per quarter from January 2010 to September 2012. Cost estimates since 2012 have not been available.

Table 3: Annual O&M Costs

Date Range	Total Estimated Cost
January-December 2010	$600,000
January-December 2011	$600,000
January-September 2012	$450,000
Total	**$1,650,000**

5.0 Progress Since the Last Five-Year Review

The 2010 FYR included four issues and recommendations. This report summarizes each recommendation and its current status below.

Table 4: Progress on Recommendations from the 2010 FYR

Recommendation	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Determine if site contamination is affecting the Hallandale public water supply wells that are located within a half mile of the Site and evaluate the Site to determine if interim institutional controls are necessary to limit use of groundwater.	PRP	10/1/2011	The EPA, FDEP, and PRP continue studying the contaminant plume in relation to the influence of well fields for the cities of Hallandale and Hollywood. Plume migration may be related to the well fields, but remedial investigations continue.	Ongoing
Determine if the Site and neighboring properties require interim land use controls until a ROD has been created for OU2.	EPA/FDEP/ PRP	10/1/2014	The EPA/FDEP addressing OU1 and OU2. RI/FS is in process to determine if neighboring properties are affected and if institutional controls beyond the existing Florida Delineated Groundwater Area restrictions on groundwater use are needed.	Considered and Not Implemented
Assess options to improve the effectiveness of the bioslurper system, and based on those results, set goals that can be used to assess the system performance.	PRP	10/1/2011	FDEP ended operation of the bioslurper unit due to limited recovery and high operational costs. The EPA and FDEP are continuing to assess recovery and treatment options as development of the OU1/2 and OU3 RODs continues.	Ongoing
Determine if a vapor intrusion study is necessary and appropriate.	EPA	10/1/2011	The EPA conducted a 2011 field-sampling event for a vapor intrusion assessment and evaluation. The April 28, 2011 Air Study Report did not reveal an impact from vapor intrusion. A more in depth evaluation of the data may be considered for future action.	4/28/2011

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in March 2015 and scheduled its completion for December 2015. The EPA remedial project manager (RPM) Michael Taylor led the EPA site review team, which also included Brad Jackson (USACE), Kelsey Helton, and Jeff Ray (FDEP), and contractor support provided to the EPA by Skeo Solutions. In March 2015, the EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

6.2 Community Involvement

In March 2015, the EPA published a public notice in the Sun Sentinel newspaper announcing the commencement of the FYR process for the Site, providing contact information for EPA, and inviting community participation. The press notice is available in Appendix B. EPA has not been contacted by the public as a result of the advertisement.

The EPA will make the final FYR Report available to the public. Upon completion of the FYR, the EPA will place copies of the document in the designated site repository: Broward County Public Library, located at 100 S. Andrews Avenue, Fort Lauderdale, Florida 33301.

6.3 Document Review

This FYR included a review of relevant site-related documents, including the IAROD, remedial action reports, and recent monitoring data. Appendix A provides a complete list of the documents reviewed.

<u>ARARs Review</u>

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate under federal or state laws.

- Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental laws that specifically address a hazardous substance, remedial action, location or other circumstance found at a CERCLA site.

- Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are more stringent than federal requirements may be applicable or relevant and appropriate.
- To-Be-Considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, TBC criteria are particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Remedial actions are required to comply with the action-, chemical- and location-specific ARARs identified in the ROD. The 1990 IAROD aimed to contain the contaminated plume within the boundaries of the Site and did not establish chemical-specific ARARs for soil and groundwater COCs. The EPA will reference maximum contaminant levels (MCLs), as well as Florida's GCTLs and SCTLs as ARARs when a final remedy is selected for OU2 (soil) and OU3 (groundwater). The interim ROD did establish groundwater and soil COCs, which included aluminum, chromium, lead, and manganese for on-site groundwater; aluminum, chromium, iron, lead, manganese and trichloroethylene for off-site groundwater; and arsenic and lead for off-site soils (Table 2). As part of the ongoing RI/FS and development of the OU2 and OU3 RODs, the EPA will review and select ARARs for site COCs. In the interim, until a final remedy is selected, groundwater use is prohibited within the Florida Groundwater Delineated Area on and around the Site.

Institutional Control Review

On March 10, 2015, EPA contractor staff conducted research using Broward County's online Official Records Search at: https://officialrecords.broward.org/oncoreV2/Search.aspx. Contractor staff found the deed information pertaining to the Pembroke Park Warehouses listed in Table 5.

Table 5: Deed Documents from Broward County Official Records Search

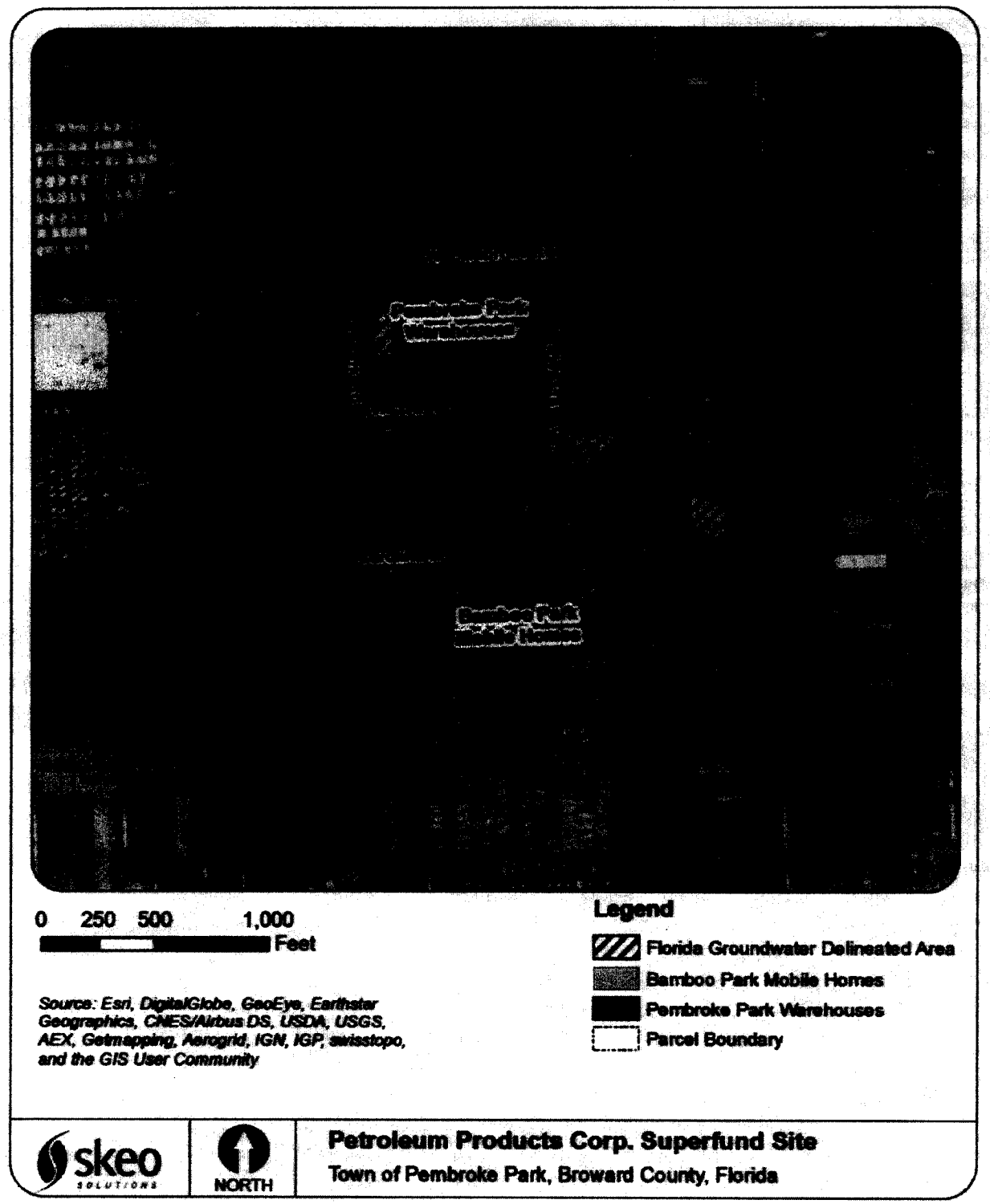
1/9/2004	Property Deed	Document transferring property from Pembroke Park Warehouses, LLC to Five Y Investments, Inc. The document specifies that zoning and/or restrictions imposed by governmental authorities on conditions, easements, restrictions, and covenants are subject to the conveyance.	36762	1538
10/1/2012	Property Deed	Re-recorded version of 2004 property deed to correct scrivener's error of legal description.	49121	1308
10/2/2014	Memorandum of Lease	Document recording the memorandum of a master lease between Pembroke Park Warehouses Holding Company and Pembroke Business Park, LLC commencing on August 1, 2014, and expiring on July 31, 2044.	51140	790

Table 6: Institutional Control (IC) Summary Table

Groundwater	Yes	No	514220090010, 514220000510, 514220030060, 514220000440, 514220000441, 514220000442 and 514220000443	Restrict installation of groundwater wells	The Site lies within a Florida Groundwater Delineated Area, which restricts well placement.[3]

1. The EPA has not yet issued RODs for OU2 or OU3.
2. Additional parcels may also be impacted by the Site.
3. Florida's groundwater delineation information is available online at: http://www.dep.state.fl.us/water/groundwater/delineate.htm.

Figure 3 shows the Florida Groundwater Delineated Area, within which the Site is located. The Florida Groundwater Delineated Area restricts well installations.



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

6.4 Data Review

LNAPL and Free-Product Recovery

Since ending operation of the bioslurper unit in September 2012, the PRP Group switched to quarterly monitoring of 12 groundwater wells and 32 recovery wells for the presence and level of petroleum LNAPL. Table 7 lists the amount of free product bailed and recovered for each period and the amount of treated groundwater since the previous FYR.

Table 7: Volume of Recovered LNAPL and Treated Groundwater from 2009-2012

Monitoring Period	Free-Product LNAPL Recovered (gallons)	Groundwater Treated (gallons)
12/14/2009 – 3/15/2010	208	333,830
3/25/2010 – 6/14/2010	270	461,590
6/14/2010 – 9/13/2010	334	967,160
9/13/2010 – 12/12/2010	273	599,640
12/13/2010 – 3/13/2011	282	591,690
3/14/2011 – 6/12/2011	258	567,670
6/13/2011 – 9/11/2011	237	458,238
9/12/2011 – 12/12/2011	308	346,380
12/12/2011 – 3/11/2012	117	345,580
3/12/2012 – 6/10/2012	314	1,245,180
6/11/2012 – 9/30/2012	337	1,693,410
Totals	**2,938**	**7,610,368**

Groundwater

Groundwater results for each quarter indicated lead concentrations above regulatory standards. The July 2014 quarterly report also reported arsenic concentrations above regulatory standards. The interim ROD lists both lead and arsenic as COCs. Other contaminants detected at varying levels and frequencies above regulatory standards include: benzene, chlorobenzene, 1, 4-dioxane, bromodichloromethane and beta-hexachlorocyclohexane.

Vapor Intrusion

On February 15-17, 2011, EPA's Science and Ecosystem Support Division personnel conducted an air sampling study at the Site to assess VOC concentrations and the risk to human health. The study aimed to assess VOC concentrations from Warehouses 164 and 261, which contain open sumps and pools of exposed free product, and assess the "worst case scenario" exposure level of personnel working in these warehouse bays. The EPA issued the final sampling report on April 28, 2011.

In March 2014, the USACE prepared a supplemental human health risk assessment (HHRA) as part of the OU2/OU3 RI. The HHRA identified trespassers, tenants, indoor workers, outdoor workers, residents, and construction workers as potential receptors for vapor inhalation under current and future land uses. Several chemicals detected in indoor air in 2011 exceeded the 2014 EPA regional screening levels for residential and industrial air; however, no chemicals exceeded the occupational health levels or posed excess cancer risk. The 2011 concentrations measured during lower ambient wind conditions were further compared to EPA's June 2015 vapor intrusion screening levels (VISL) based on a current industrial use. The results indicate the concentration of 1,2,4-trimethylbenzene in Building 164 slightly exceeds the VISL; however, the indoor sample collected during higher wind conditions is well below the VISL. These results indicate that this exposure pathway should be evaluated using multiple lines of evidence as required by EPA's 2015 vapor intrusion guidance.

6.5 Site Inspection

A site inspection occurred on March 31, 2015. Site inspection participants included: Michael Taylor (EPA RPM), Brad Jackson (USACE), Kelsey Helton (FDEP), Jeff Ray (FDEP), and Johnny Zimmerman-Ward and Rosemary Han (Skeo Solutions).

The inspection team met at the Site and toured the property starting at the fenced-in area housing the bioslurper unit. The inspection team discussed the Site's status after the bioslurper remedy was discontinued (in September 2012) due to slow recovery performance and high operation costs. At the time of the inspection, the EPA was in the process of developing an RI/FS for OU2 (soil) with the assistance of USACE. After the inspection team discussed the remedy status, the team walked north toward Pembroke Road to inspect monitoring wells, the asphalt surface, the general condition of site structures and current warehouse tenants.

At the northern end of the Site, the inspection team noticed warning signs FDEP had posted to inform people about potential contamination at the Site. Some emergency contact numbers were illegible and several signs were missing. Inspection participants also noted the location and condition of site monitoring wells, many of which were not locked or had broken caps. After walking to the northwestern corner, the inspection team walked south to observe additional monitoring wells, a water spigot near a formerly seeping well and the building located above one of the former disposal pits. The team observed cracks in the asphalt near the gun range.

The inspection team walked south across Carolina Street to observe conditions at the Bamboo Park Mobile Homes. The team discussed the 2011 removal of contaminated soil from a mobile home property. Along Carolina Street, the inspection team observed damaged fencing indicative of trespassing at the southeast corner of the site property. The inspection team met with the current Master Tenant who operates the warehouses under a 30-year agreement with the property owner. The Master Tenant discussed planned cosmetic repairs and upgrades to the warehouses and asphalt.

Skeo Solutions visited the Broward County Main Library, the local information repository, and identified hard copies of the 1992 Administrative Record, the 1997 OU2 Administrative Record, and the 2005 FYR. The repository did not have a hard copy of the 2010 FYR and the librarian indicated that they are moving toward referencing or linking directly to online government databases for many documents. The completed site inspection checklist and the site inspection photo log are available in Appendices D and E, respectively.

6.6 Interviews

The FYR process included interviews with parties affected by the Site, including the current landowners and regulatory agencies involved in site activities or aware of the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. Interviews with the Master Tenant, a property manager and a tenant of the business park took place during the site inspection on March 31, 2015. Additional interviews with the RPM, the PRP Group consultant and FDEP took place over email. Interview summaries are below. Appendix C provides the complete interviews.

de maximis, inc. (PRP Group Consultant)
de maximis, inc. is the consultant for the PRP Group. The consultant commented that the bioslurping remedy was effective in removing oil/free product and remediating groundwater and that the current practice of monitoring and bailing as needed is functioning as intended. Typically, de maximis, inc. has not received complaints from neighboring residents. They respond to ensure that infrequent oil seeps are properly cleaned up when reported by warehouse tenants after heavy rainfall. The consultant indicated that the PRP Group has not received intermittent updates about RI activities for OU2 and OU3. They suggested that monthly calls would be a good way for the involved parties to develop the final ROD for OU2 and OU3.

Master Tenant (Pembroke Business Park)
The Master Tenant is aware of the Site's history, and said that project cleanup/reuse activities have not affected tenant activities at the property. The Master Tenant stated that there have been some minor issues with trespassing and petty theft. The Master Tenant became aware of the Site's history and the cleanup process in order to qualify for the Prospective Purchaser Agreement.

Michael Taylor (EPA Region 4 RPM)
Michael Taylor indicated that the bioslurping unit idled in October 2012 because the system was not collecting a significant amount of waste oil. As a result, the EPA has requested an alternative approach for OU1 product recovery that will fulfill the requirements of the OU1 Consent Decree. As an interim remedy, the EPA will continue monitoring activities and recovery of oil from perimeter wells on an ad hoc basis. Mr. Taylor also indicated that the EPA is continuing development of a RI/FS for OU2. Although the only institutional control in place is restriction of well installation in the Florida Groundwater Delineated Area, which includes the Site, the EPA is reviewing the need for additional institutional controls and restrictive covenants during the OU2 and OU3 assessment.

Regarding impacts to the surrounding community, he noted that community interest from warehouse tenants is minimal, except for a few issues related to noise or odors. A Master Tenant for the Pembroke Park Warehouses, who will look over the property for 30 years, received a Prospective Purchaser Agreement from the EPA. He noted that one new issue, since the previous FYR, is potential oil contamination on a property located west of the Site, called the Kelsey Property. FDEP is currently the lead agency on this property.

Senior Property Manager (Pembroke Business Park)
The property manager is aware of the Site's contamination and cleanup history. The property manager stated that they are aware of activities happening at the Site and are not aware of any current issues or complaints regarding the Site.

Tenant 1 (Pembroke Business Park)
This tenant understands that the business park is on an EPA site, but is not knowledgeable about the Site's contamination or cleanup history. The tenant is not aware of any problems with the Site. The tenant suggested that the EPA could share an emergency contact, in case of any future issues.

7.0 Technical Assessment

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

There are three OUs designated for this site. This FYR is for the review of OU1, product recovery. A remedy decision has not been completed for OU2 (soil) and OU3 (groundwater) at this time. Although the bioslurper unit functioned as designed the system no longer extracted free product at a desirable rate considering cumulative repair and operational costs. The PRP contractor idled the bioslurper unit on September 28, 2012. The PRP Group initially switched to quarterly monitoring with product collection, bailing, and cleanup of exposed free product on an as-needed basis. The USACE noted areas of LNAPL seepage during remedial investigations in 2012 and 2013. In the Pembroke Park Warehouses, LNAPL was observed rising through the ground in areas of low resistance, including cracks in the asphalt and next to extraction wells. In late 2014, the PRP Group initiated bi-weekly site assessments that include perimeter well checks and product collection. The remedy for product recovery is functioning with the bi-weekly collection of product from the site wells on a short term basis.

The owners of the Pembroke Park Warehouses know to inform the EPA and FDEP of any exposed free product or oil on the property if it is encountered. The tenants at the facility are informed by the Master Tenant and owner of this Superfund site and EPA's activities upon signing or renewing their lease/agreements.

During the FYR site inspection, several signs were missing. It is suspected some of the metal signs were taken for recyclable value. FDEP and the EPA replaced these signs after the site inspection. The signs have been placed around the property warning about potential hazardous substances and providing FDEP and EPA emergency contacts.

The southern end of the Site contains a fenced area. It includes the bioslurper unit equipment and storage for recovered LNAPL. During the site inspection, the fence at the southeastern corner of the Site was observed cut, creating an unsecured area in the security fence. This area identified was mentioned to the PRP Group and FDEP. The contractor made arrangements for repairing the fence after the inspection.

The Site and surrounding parcels fall within a Florida Groundwater Delineated Area. This is an institutional control that is currently in place. The Delineated Area inhibits consumption of contaminated groundwater by prohibiting placement of potable wells within the designated zone. In addition, public utilities provide drinking water to the Pembroke Park Warehouses and surrounding businesses and homes.

The EPA is working with USACE, FDEP, and the PRP Group to develop a ROD for OU2 and OU1. The ROD is scheduled for completion in FY2016.

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

The 1990 IAROD goal was to contain the contaminated groundwater plume and conduct product recovery actions to reduce site contamination. The 1990 decision document did not establish chemical specific ARARs for groundwater or soil COCs. The IAROD stated the selected interim remedy was not intended to meet MCLs for groundwater or address any applicable cleanup standards or regulation, and that cleanup goals would be established in the final ROD. The EPA will establish ARARs upon

completion of the OU2 RI/FS, during final remedy selection. The OU1/2 ROD is scheduled for completion in the fall of 2016.

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

During the site inspection, the bioslurper unit and a few barrels containing collected free product were stored on the southern end of the property, surrounded by a fence with a locked gate. However, site inspection participants observed an area along Carolina Avenue where the fence was cut. This could present an access to the stored material. The issue was relayed to the PRP Group and contractor. Repairs to the fence were addressed after the site inspection.

No other information is known that would question the protectiveness of the remedy.

7.4 Technical Assessment Summary

The current, interim action remedy is functioning in the short-term for product recovery. The bioslurper unit was operational until late 2012. The recovery system continued with oil recovery but was diminishing in the volume of collected material. The PRP Group and FDEP decided to move actions toward a bi-weekly site monitoring and product collection from the perimeter wells. The collected material is temporarily stored in containers on-site in a secured area. Once an adequate volume of material is collected the contractor schedules for transportation to an off-site disposal facility. Alternative actions are being reviewed to enhance the volume of product recovery while a final remedy is being addressed. The final remedy for the OU2 will also address OU1.

The Site is within a Florida Groundwater Delineated Area, which restricts use of groundwater as potable water and installation of drinking water wells. However, there are no formal institutional controls in place to restrict certain activities, such as construction and digging. EPA and the FDEP have discussed the notification of site activities with the owner and Master Tenant. No site activities that would include digging or changes to site structures are permitted without their consent. The EPA is working on the RI/FS for OU2 and OU3, which will fully address contaminated soil and groundwater, as well as the need for institutional controls. As part of the OU2 and OU3 RI/FS, the EPA will continue to study the contaminant plume and the full extent of contamination that may affect surrounding properties. In addition, based on the results of the screening-level vapor intrusion evaluation it is recommended that this exposure pathway be evaluated using multiple lines of evidence using EPA's current vapor intrusion evaluation guidance.

8.0 Issues, Recommendations and Follow-up Actions

Table 8: Issues and Recommendations Identified in the Five-Year Review

OU(s): OU1	Issue Category: Remedy Performance			
	Issue: The OU1 remedy of product recovery no longer uses a bioslurping unit. The product recovery is through scheduled bi-weekly well inspections, product pumping, baling and off-site disposal until a final remedy is selected for OU1 (product recovery) and OU2 (soil).			
	Recommendation: Finalize the sitewide remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State/PRP	EPA	12/14/2017

The following additional items, though not expected to affect protectiveness, warrant additional follow-up:

- The EPA recommends that FDEP or the PRP Group should replace or repair several broken well caps to ensure that no wells remain unsecured.
- The EPA recommends that FDEP should replace several stolen or missing signs that warned tenants and visitors about potential site contamination and listed emergency contact information.

9.0 Protectiveness Statement

Table 9: Protectiveness Statement

Operable Unit: OU1	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date*
Protectiveness Statement: *The remedy for OU1 is currently protective of human health and the environment in the short term. An Institutional Control, through a delineated area, is in place that prevents well placement without District office approval. Site wells are being monitored bi-weekly with removal of product in perimeter wells. The Site has scheduled inspections by a PRP and State contractor. In order for the remedy to be protective in the long term, a final remedy will need to be selected. A final remedy for OU1 (product recovery) and OU2 (soil) is scheduled for FY 2016.*		

10.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

Annual Report 2009 Petroleum Products Corporation NPL Site. Prepared by de maximis, inc. for EPA Region 4. March 10, 2010.

Annual Report 2010 Petroleum Products Corporation NPL Site. Prepared by de maximis, inc. for EPA Region 4. March 11, 2011.

Annual Report 2011 Petroleum Products Corporation NPL Site. Prepared by de maximis, inc. for EPA Region 4. March 30, 2012.

Baseline Risk Assessment for the Petroleum Products Corporation Superfund Site. Prepared by Clement International Corporation for EPA Region 4. June 17, 1992.

Draft Remedial Investigation Report for Former Petroleum Products Superfund Site. Prepared by U.S. Army Corps of Engineers for EPA Region 4. March 2014.

Explanation of Significant Differences for Petroleum Products Corporation Superfund Site Operable Unit 1. Prepared by EPA Region 4. March 11, 1991.

Explanation of Significant Differences for Petroleum Products Corporation Superfund Site Operable Unit 1. Prepared by EPA Region 4. August 3, 1998.

Final Report for Petroleum Products Air Study. Prepared by EPA Region 4. April 28, 2011.

First Five-Year Review Report for Petroleum Products Corporation Superfund Site. Prepared by EPA Region 4. September 8, 2000.

First Quarter Report 2012 Petroleum Products Corporation NPL Site. Prepared by de maximis inc. for EPA Region 4. May 30, 2012.

First Quarter Report 2013 Petroleum Products Corporation NPL Site. Prepared by de maximis inc. for EPA Region 4. June 14, 2013.

Interim Record of Decision for Petroleum Products Corp. Operable Unit 1. Prepared by EPA Region 4. October 5, 1990.

Quarterly Monitoring Report for Petroleum Products Corporation Superfund Site. Prepared by ECT for Florida Department of Environmental Protection. July 2014.

Second Five-Year Review Report for Petroleum Products Corporation Superfund Site. Prepared by EPA Region 4. December 20, 2005

Second Quarter Report 2012 Petroleum Products Corporation NPL Site. Prepared by de maximis inc. for EPA Region 4. August 14, 2012.

Second Quarter Report 2013 Petroleum Products Corporation NPL Site. Prepared by de maximis inc. for EPA Region 4. August 1, 2013.

Second Quarter Report 2014 Petroleum Products Corporation NPL Site. Prepared by de maximis inc. for EPA Region 4. August 11, 2014.

Semiannual Report 2014 for Petroleum Products Corporation NPL Site. Prepared by de maximis inc. for EPA Region 4. February 12, 2015.

Source Removal Event 1 PPC Bamboo Trailer Park. Prepared by ECT for Florida Department of Environmental Protection. January 2011.

Third Five-Year Review Report for Petroleum Products Corporation Superfund Site. Prepared by EPA Region 4. December 14, 2010.

Third Quarter Report 2012 Petroleum Products Corporation NPL Site. Prepared by de maximis inc. for EPA Region 4. December 5, 2012

Appendix B: Press Notice

The U. S. Environmental Protection Agency, Region 4
Announces a Five-Year Review for
The Petroleum Products Corp. Superfund Site,
Pembroke Park, Broward County, Florida

Purpose/Objective: EPA is conducting a Five-Year Review of the remedy for the Petroleum Products Corp. Superfund site (the Site) in Pembroke Park, Florida. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect human health and the environment.

Site Background: The 2-acre Site is a former used oil refining facility. The Site is located near two municipal water well fields for the cities of Hallandale and Hollywood. During the refining process, operators generated sulfuric acid sludge and contaminated clay, which was disposed of in on-site pits. Due to improper disposal practices as well as catastrophic oil spills, an estimated 30,000 to 125,000 gallons of used oil containing chlorinated solvents, transformer oil, and heavy metals contaminated the Biscayne aquifer, which is the primary aquifer for south Florida. In addition, about 130,000 cubic yards of contaminated soil continues to discharge oily materials, contaminating groundwater around the Site to a depth of about 50 feet below the ground surface. Major contaminants consist of chlorinated solvents, transformer oil, and heavy metals including lead, aluminum, chromium, iron, and manganese.

Cleanup Actions: The cleanup plan for the Site covers three operable units (OUs): OU1 (waste oil recovery), OU2 (soil), and OU3 (groundwater). EPA issued the OU1 Record of Decision (ROD) in 1990. EPA has not yet issued RODs for OU2 and OU3. Major components of the OU1 remedy include decommissioning the non-operating wells that remain on site; closing the storm drainage wells that deposit wastewater and stormwaters into the Biscayne aquifer; conducting a private well water survey to identify present groundwater users in the affected area; and modifying the present recovery system in an effort to remove a larger volume of oil from groundwater and to contain the contaminant plume. A bioslurping system (vacuum-enhanced recovery of waste oil) collected waste oil from the groundwater surface between 1999 and 2012. The system recovered more than 30,000 gallons of light non-aqueous phase liquids since EPA initiated the interim cleanup. Annual groundwater sampling and monitoring, which began in 2003, will continue to determine contaminant concentration levels, migration and overall effectiveness of the system.

Five-Year Review Schedule: The National Contingency Plan requires review of remedial actions that result in any hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure every five years to ensure the protection of human health and the environment. The fourth of the Five-Year Reviews for the Site will be completed by December 2015.

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

Michael Taylor, Remedial Project Manager
404-562-8762
taylor.michael@epa.gov

L'Tonya Spencer, Community Involvement Coordinator
404-562-8463 | 1-800-435-9234 (Toll Free)
spencer.latonya@epa.gov

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

Additional site information is also available at the Site's document repository, located at Broward County Public Library, 100 S. Andrews Ave. - Level 5, Ft. Lauderdale, Florida 33301 and online:
http://www.epa.gov/region4/superfund/sites/npl/florida/petroprofl.html

Appendix C: Interview Forms

Petroleum Products Corp. Superfund Site Five-Year Review Interview Form

Site Name: Petroleum Products Corp. **EPA ID No.:** FLD980798698
Interviewer Name: Johnny Zimmerman-Ward **Affiliation:** Skeo Solutions
Subject Name: Master Tenant **Affiliation:** Pembroke Business Park
Subject Contact Information:
Time: 12:30 P.M. **Date:** 3/31/2015
Interview Location: Site
Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Master Tenant

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes, in general. We did research about the Site before we took over.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   It has not affected us. We are aware of their presence and know to contact them if we spot anything.

3. What have been the effects of this Site on the surrounding community, if any?

   Other than this property, I am not aware of any effects.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No. There has been some minor trespassing with stolen lights or signs.

5. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site?

   Yes

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   No, so far it has been fine. We were made well aware of the Site and the process in order to qualify for the Prospective Purchaser Agreement.

Petroleum Products Corp. Superfund Site **Five-Year Review Interview Form**

Site Name:	**Petroleum Products Corp.**	**EPA ID No.:**	**FLD980798698**
Interviewer Name:	**Rosemary Han**	**Affiliation:**	**Skeo Solutions**
Subject Name:	**Michael Miller**	**Affiliation:**	**de maximis, inc.**
Subject Contact Information:	**865 691 5052**	**m2@demaximis.com**	
Time:		**Date:**	**April 29, 2015**
Interview Location:	**Interview via email**		
Interview Format (circle one):	**In Person**	**Phone**	**Mail** **Other: Email**

Interview Category: Potentially Responsible Party (PRP) Group

1. What is your overall impression of the remedial activities at the Site?

   As you know, the Site is divided into three operable units. The OU1 (waste oil recovery) has been under effective remediation since the 1990s. The great majority of the remediation work was accomplished by using a large scale bioslurper system for recovery of oil/free product removal, which removed 34,410 gallons of oil/free product. The bioslurper system was stopped in September 2012 as directed by FDEP. Oil/free product levels are currently being monitored and wells are hand bailed, as needed, when oil levels reach a certain level. OU2 (soils) and OU3 (groundwater) are currently in the stage of the EPA preparing the RI, HHRA and FS reports – activities that have been going on since 2009. In addition to the soil and groundwater sampling as a part of the RI for OU2/OU3, groundwater sampling continues on an annual basis as a part of ongoing monitoring of groundwater.

2. What have been the effects of this Site on the surrounding community, if any?

   There has been no discernible effect on the surrounding community. Site work regarding monitoring activities and past large scale bioslurper operations for recovery of free product (OU1) have not been an inconvenience to renters of warehouse space. Businesses in the warehouse spaces continued to operate throughout the operational period of the bioslurper system.

3. What is your assessment of the current performance of the remedy in place at the Site?

   The bioslurping remedy for OU1 was effective in removing oil/free product and also resulted in remediation to groundwater. The current monitoring and bailing for oil/free product is working to remove free product when the oil is over 3 inches deep at the wells being monitored. The remedies for OU2 and OU3 have not been selected.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

   There have been no inquiries or complaints from neighboring residents. On a very infrequent basis, there are inquiries from warehouse tenants after observing oil seeps through the site pavement following heavy rain events. When reported, the oil seeps are quickly remedied and cleaned up.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   No. The [PRP] Group has received intermittent updates with regard to HHRA and RI activities for OU2 and OU3 being conducted by the COE [USACE] under EPA direction. Furthermore, it seems that estimated time frames by the Agency are always exceeded in terms of next steps and responses to the Group's comments on deliverables. The [PRP] Group has received no update in regard to the FS for OU2.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   Regular contact with the agencies would help keep everyone informed as to status. A standing monthly call, for example, could be of benefit. The agencies and the remaining parties need to work together to achieve a final ROD for the Site in an expedited manner. The ACOE's [USACE's] work to achieve this goal has taken too long, has been of poor quality, and has delayed the resolution of the final OUs.

Petroleum Products Corp. Superfund Site **Five-Year Review Interview Form**

Site Name:	**Petroleum Products Corp.**	**EPA ID No.:**	**FLD980798698**
Interviewer Name:	**Rosemary Han**	**Affiliation:**	**Skeo Solutions**
Subject Name:	**Michael Taylor**	**Affiliation:**	**EPA Region 4**
Subject Contact Information:			
Time:	**9am**	**Date:**	**4/7/2015**
Interview Location:	**SNAFC, Atlanta, GA**		

Interview Format (circle one): In Person Phone Mail Other: Email

Interview Category: EPA Remedial Project Manager

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

   The bioslurping unit was idled in October 2012. The PRP Group and FDEP indicated the system was not collecting a significant volume of waste oil to continue the process. The EPA has requested an alternative approach to address the OU1 (product recovery). The EPA and the PRP Group has a Consent Decree for OU1 and expects the requirements from the group to be fulfilled and their obligations to this site addressed. Meanwhile, the EPA, through an Interagency Agreement, continues with the RI/FS for OU2 (soil).

2. What have been the effects of this Site on the surrounding community, if any?

   The surrounding community has expressed minimal interest in the day to day activities since the majority of work on OU1 has been unseen due to collecting oil from the groundwater surface. The dominant issues in the past have been odor and noise related. These issues are secondary to the multiple business activities that are being conducted throughout the rental facility and around the Site. The Site is located in a very congested and highly populated area.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?

   There have not been any new complaints since the previous Five Year Review report. The Kelsey Property, located at the corner of Park Road and Carolina Street, remains to be of interest with the State's involvement and the concerns of oil contamination on the property. The Site has a new Master Tenant which received a Prospective Purchaser Agreement from the EPA. The new Master Tenant has signed a 30 year lease with the property owner to care for the property.

4. What is your assessment of the current performance of the remedy in place at the Site?

   The current remedy is an interim remedy for product recovery identified as OU1. The recovery of product was through the process of the bioslurping system which has been turned off since October 2012. The current assessment appears to be a monitoring activity with occasional collection of waste

oil if identified in the perimeter wells. The current situation is a temporary solution but not a permanent remedy for this site.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   The Site continues to be in a State Delineated Area, which is a form of institutional control. This designation prevents the installation of wells for irrigation and potable water. Additional ICs and restrictive covenants associated with this facility will be reviewed during the OU2 and OU3 assessments.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.

   I am not aware of any new concerns since the previous five year review.

7. Do you have any comments, suggestions, or recommendations regarding the management or operation of the Site's remedy?

   The EPA is currently conducting investigations for OU2 (soil) and OU3 (groundwater). This review addresses the OU1 (product recovery). The bioslurping unit was operational until October 2012. The PRP Group should continue to address the OU1 component as agreed within the Consent Decree.

Petroleum Products Corp. Superfund Site Five-Year Review Interview Form

Site Name: Petroleum Products Corp. **EPA ID No.:** FLD980798698
Interviewer Name: Rosemary Han **Affiliation:** Skeo Solutions
Subject Name: Senior Property Manager **Affiliation:** Pembroke Business Park
Subject Contact Information:
Time: 1:00 P.M. **Date:** 3/31/2015
Interview Location: Leasing Office
Interview Format (circle one): In Person Phone Mail Other:
Interview Category: Property Manager

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes.

2. What is your overall impression of the project, including cleanup, maintenance, and reuse activities (as appropriate)?

   It is all fine.

3. What have been the effects of this Site on the surrounding community, if any?

   None.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism, or trespassing?

   No.

5. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

   No.

6. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might the EPA convey site-related information in the future?

   Yes, normally EPA, USACE, and other contractors keep us informed when they visit.

7. Do you have any comments, suggestions, or recommendations regarding any aspects of the project?

   No.

Petroleum Products Corp. Superfund Site Five-Year Review Interview Form

Site Name: Petroleum Products Corp. **EPA ID No.:** FLD980798698
Interviewer Name: Johnny Zimmerman-Ward **Affiliation:** Skeo Solutions
Subject Name: Tenant 1 **Affiliation:**
Subject Contact Information:
Time: 11:00 A. M. **Date:** 3/31/2015
Interview Location: Site
Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Tenants/Surrounding Businesses

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   I know we are on an EPA site, but that is all.

2. What is your overall impression of the project, including cleanup, maintenance, and reuse activities (as appropriate)?

   I guess they are doing their job because we have never had seeps or problems.

3. What have been the effects of this Site on the surrounding community, if any?

   No idea. Nothing has ever been brought to my attention.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism, or trespassing?

   No.

5. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

   No.

6. Do you feel well informed regarding the Site's activities and remedial progress? If not, how might the EPA convey site-related information in the future?

   We know about the Site. Unless something was hazardous, it would not impact me.

7. Do you have any comments, suggestions, or recommendations regarding any aspects of the project?

   If something was an issue, maybe an emergency contact.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Petroleum Products Corp.	**Date of Inspection:** 3/31/2015
Location and Region: Pembroke Park, Broward County, Florida	**EPA ID:** FLD980798698
Agency, Office or Company Leading the Five-Year Review: EPA Region 4	**Weather/Temperature:** Sunny and clear sky/75°F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Oil recovery
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

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

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

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

   Agency Florida Department of Environmental Protection
   Contact Kelsey Helton ____ Name ____ Title ____ Date ____ Phone No.
   Problems/suggestions ☐ Report attached: ____

   Agency Florida Department of Environmental Protection
   Contact Jeff Ray ____ Name ____ Title ____ Date ____ Phone No.
   Problems/suggestions ☐ Report attached: ____

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

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

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

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

Master Tenant, Pembroke Business Park

Property Manager, Pembroke Business Park

Tenant 1

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

1. **O&M Documents**

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

Remarks: _____

2. **Site-Specific Health and Safety Plan**	☐ Readily available	☐ Up to date	☒ N/A
☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

3. **O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5. **Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

6. **Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

7. **Ground Water Monitoring Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

8. **Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☒ Contractor for state

☐ PRP in-house ☐ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: 1/1/2010	To: 12/31/2010	$600,000	☐ Breakdown attached
Date	Date	Total cost	
From: 1/1/2011	To: 12/31/2011	$600,000	☐ Breakdown attached
Date	Date	Total cost	
From: 1/1/2012	To: 12/31/2012	$450,000	☐ Breakdown attached
Date	Date	Total cost	

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks: The warehouses are accessible through entry roads, but a fence does surround the city-owned parcel housing the discontinued bioslurper equipment. There is a small gap on the southeast corner of the perimeter fence, suggesting possible trespassing.

B. Other Access Restrictions

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

Remarks: FDEP installed several warning signs about the presence of hazardous materials with a listed emergency contact number. Some signs were stolen or removed.

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

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

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ _____ _____

Name Title Date Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: No ICs are in place other than the restrictions on the creation of new wells, because the Site is in a Florida Groundwater Delineated Area.

D. General

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

Remarks: Circumstantial evidence of scrap metal or sign theft and hole cut in fence.

2. **Land Use Changes On Site** ☐ N/A

Remarks: The Site will continue to be used as industrial and commercial warehouses and storage units for a variety of businesses.

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

Remarks: Areas around the Site are generally commercial or industrial use, with residential areas directly to the south.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

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

Remarks: There are some potholes on the paved roadways of the Site; the Mater Tenant expressed plans to place a new asphalt layer over the roads and paved areas within the complex.

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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

Arial extent: _____ Depth: _____

Remarks: _____

2.	**Cracks**	☐ Location shown on site map	☐ Cracking not evident
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable	☐ N/A
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks: _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement

Arial extent: _____ Depth: _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type:_____ Arial extent: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Arial extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Arial extent: _____ Depth: _____

Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions

☐ Location shown on site map Arial extent: _____

Size: _____

Remarks: _____

6. **Excessive Vegetative Growth** Type: _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Arial extent: _____

Remarks: _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

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

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

Remarks: _____

2. **Gas Monitoring Probes**

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

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

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

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

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

Remarks: _____

4. **Extraction Wells Leachate**

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

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

Remarks: _____

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

Remarks: _____

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

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

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

Remarks: _____

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

Remarks: _____

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

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

☐ Siltation not evident

Remarks: _____

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

☐ Erosion not evident

Remarks: _____

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

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N/A

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

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

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

Remarks: _____

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

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

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

Area extent: _____ Depth: _____

Remarks: _____

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

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

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

A. Ground Water Extraction Wells, Pumps and Pipelines ☐ Applicable ☐ N/A

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

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

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

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

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

C. Treatment System ☐ Applicable ☐ N/A

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

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

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

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of ground water treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

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

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

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

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

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemicals and equipment properly stored

Remarks: _____

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

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

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

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☐ Is routinely submitted on time ☐ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

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

Remarks: Some wells had covers flipped up and one monitoring well did not have a properly fitting cover. Wells may need to be properly locked and secured.

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

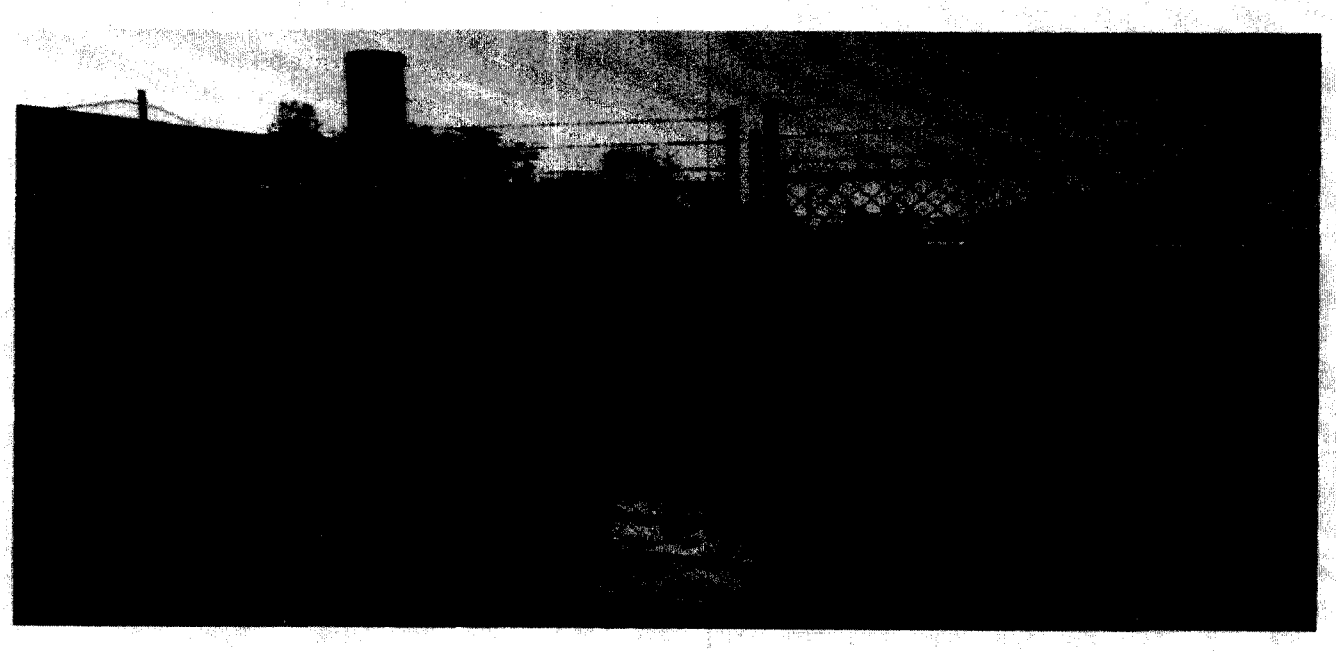
A. Implementation of the Remedy

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

	The objective of the OU1 remedy is to contain contamination until the EPA and FDEP identify a method for source control and remedial actions for soil and groundwater. The bioslurper system for extracting LNAPL and oil product from groundwater stopped operating in 2012, due to inefficiency and high costs associated with its operation. No active remedy is currently in place. At the time of the inspection, the EPA and USACE were working on the RI/FS for OU2 (soil), which may enable continued cleanup of OU1.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. At the time of the FYR, there was no active O&M at the Site other than groundwater monitoring.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. Ending the use of a bioslurper left the Site with no active remedy. Other than the restrictions on well installation under the requirements of the Florida Groundwater Delineated Area, there are no ICs to restrict the use of existing wells or prohibit activities that may lead to uncontrolled exposure scenarios. The current property manager is generally aware of the environmental issues and knows to notify authorities if any oil surfaces through the ground, but this is not an adequate measure to control potential exposure to contaminated materials or prohibit activities that may create new exposure pathways while future remedial actions are pending. Additional remedial investigation may be required to determine the full extent of oil and contaminant migration.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The EPA and FDEP could consider implementing ICs in the form of restrictive covenants on impacted site parcels which would prohibit inappropriate use until a ROD is in place for OU2 and OU3. The EPA and FDEP should also properly secure monitoring and extraction wells and replace missing signs around the warehouse complex.

Site Inspection Team
Michael Taylor (EPA Region 4 RPM)
Brad Jackson (USACE)
Kelsey Helton (FDEP)
Jeff Ray (FDEP)
Johnny Zimmerman-Ward (Skeo Solutions)
Rosemary Han (Skeo Solutions)

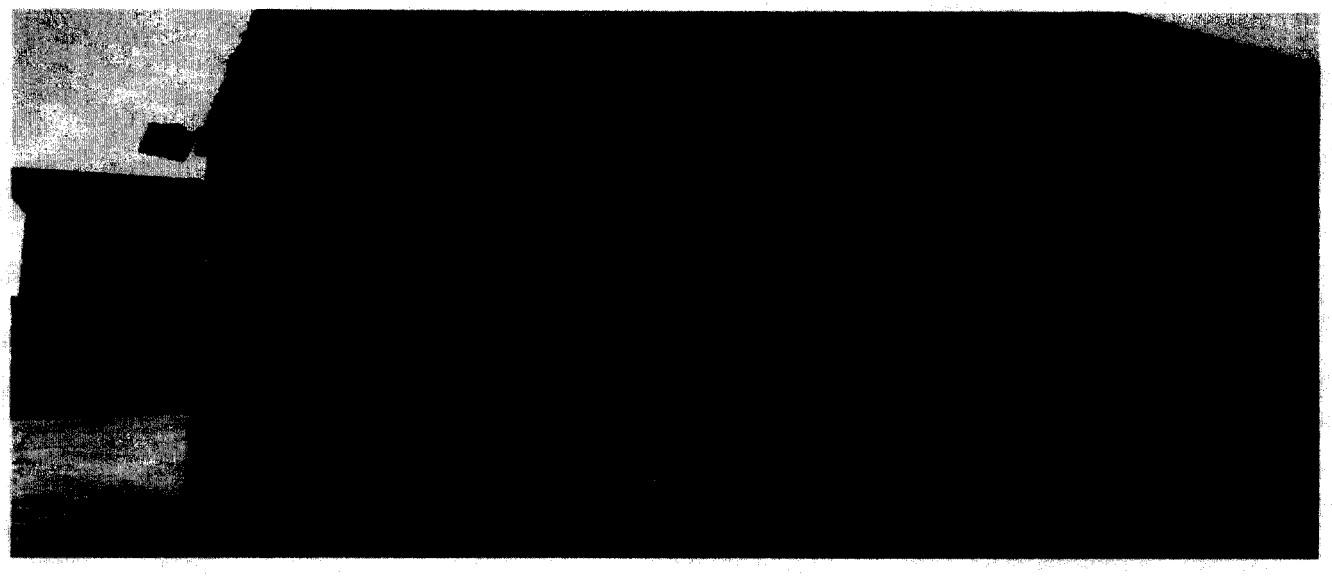
Appendix E: Photographs from Site Inspection Visit



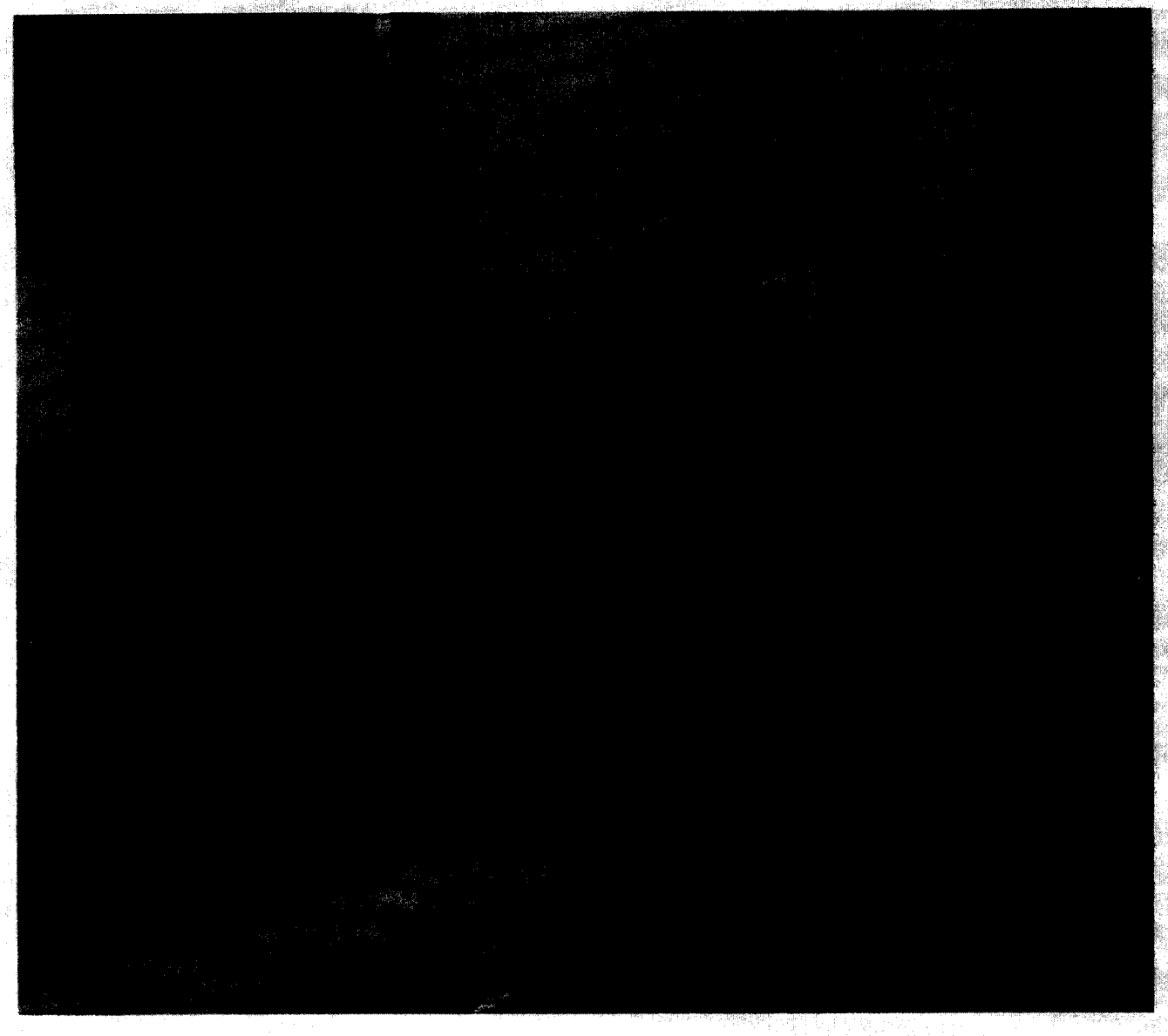
Locked and secured entry gate to the bioslurping unit on the southern end of the Site.

Access point to the bioslurping unit drainage pipes in an alleyway.

View of the alleyway between warehouse buildings near the source area, facing south, with the bioslurping unit access points and monitoring wells in the middle.



Warning sign about disturbing contaminated soils and materials at the Site with emergency contact information.



A water spigot mounted on the side of a warehouse building and evidence of an oil seepage at a well.

Unoccupied trailer where the EPA conducted a 2011 removal of soil and contaminated sludge.

Appendix F: July 2014 Quarterly Groundwater Monitor and Analytical Summary

TABLE 1A: GROUNDWATER MONITORING WELL ANALYTICAL SUMMARY - VOCs and Metals

Facility ID: [illegible] — Facility Name: Petroleum Products Corporation (PPC)

Location	Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
[illegible]-7A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-9A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-10A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	7.11
[illegible]-A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.11	ND	ND	5.0 U
	[illegible]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
[illegible]-B	[illegible]	ND	ND	ND	ND	ND	ND	ND	7.11	ND	ND	5.0 U
	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
[illegible]-C	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-D	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-J	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	[illegible]
	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	[illegible]
	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	[illegible]
[illegible]-8A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-9A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-9A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-9A	[illegible]	ND	ND	ND	ND	ND	ND	ND	[illegible]	ND	ND	5.0 U
[illegible]-10A	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	ND	5.0 U	ND	ND	[illegible]
[illegible]-10A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-10A	[illegible]	ND	ND	ND	ND	ND	ND	ND	20.1	ND	ND	10.2
[illegible]-10A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
PS-[illegible]	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	ND	5.0 U	ND	ND	5.0 U
	[illegible]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
[illegible]-03	[illegible]	0.100	0.20 U	0.20 U	0.20 U	0.0	ND	0.20 U	5.0 U	ND	ND	5.0 U
	[illegible]	0.100	0.20 U	0.20 U	0.20 U	14.0	ND	0.20 U	5.0 U	ND	ND	5.0 U
[illegible]-9	[illegible]	[illegible]	1.4	0.231	0.2	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
	[illegible]	[illegible]	1.6	0.271	0.2	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
[illegible]-11A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	5.0 U
[illegible]-12A	[illegible]	0.071	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	5.0 U
[illegible]-13A	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	[illegible]
	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	[illegible]
[illegible]-OW	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	[illegible]
	[illegible]	ND	ND	ND	ND	ND	ND	ND	5.0 U	ND	ND	[illegible]
[illegible]-OW	[illegible]	0.021	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	[illegible]
	[illegible]	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.20 U	5.0 U	ND	ND	[illegible]
[illegible]		1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	5	[illegible]	[illegible]
[illegible]		100	[illegible]	[illegible]	[illegible]	[illegible]	5	[illegible]	100	20	[illegible]	[illegible]

Notes:

NA = Not Available

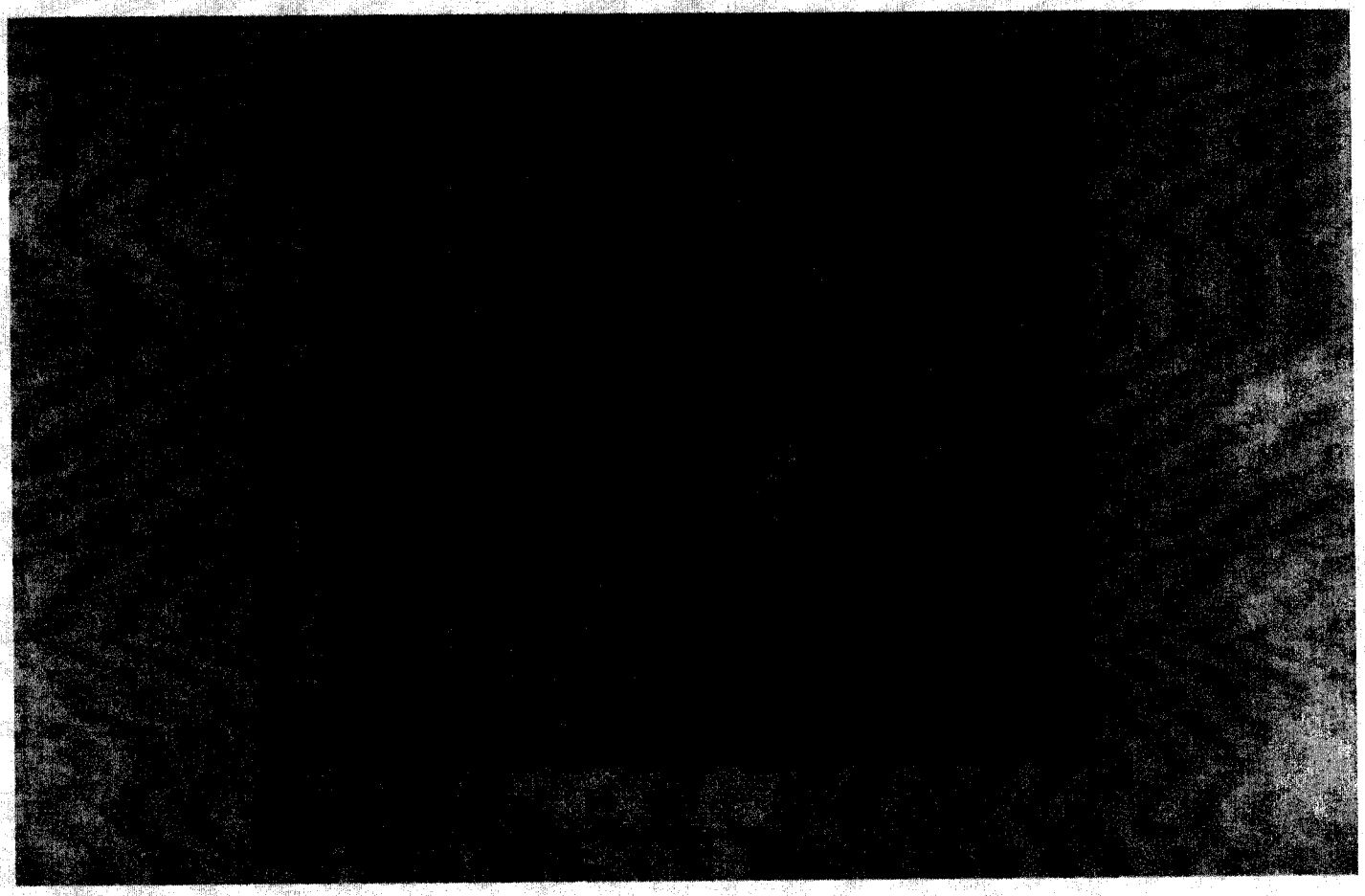
ND = Not Detected

GCTLs = Groundwater Cleanup Target Levels specified in Table I of Chapter 62-777, F.A.C.

NADCs = Natural Attenuation Default Source Concentrations specified in Table I of Chapter 62-777, F.A.C.

Bracketed GCTLs, Units

Bracketed NADC Units



Appendix G: Screening-Level Indoor Air Risk Evaluation

Table G-1: Screening-Level Indoor Air Risk Evaluation of the 2011 Indoor Air Data Collected on February 15, 2011

Chemicals	Building 164			Building 201		
	Site Indoor Air Concentration (µg/m³)	Industrial Vapor Intrusion Cancer Risk	Industrial Vapor Intrusion Hazard Quotient	Site Indoor Air Concentration (µg/m³)	Industrial Vapor Intrusion Cancer Risk	Industrial Vapor Intrusion Hazard Quotient
Acetone	1.20E+02	--	8.8E-04	4.10E+01	--	3.02E-04
Benzene	5.00E+00	3.2E-06	3.8E-02	4.20E+00	2.67E-06	3.20E-02
Bromomethane	BDL	--	BDL	6.20E-01	--	2.83E-02
Carbon Disulfide	3.10E-01	--	1.0E-04	2.70E-01	--	8.81E-05
Carbon Tetrachloride	5.60E-01	2.7E-07	1.3E-03	5.10E-01	2.50E-07	1.16E-03
Chloroform	7.30E-01	1.4E-06	1.7E-03	6.20E-01	1.16E-06	1.44E-03
Chloromethane	1.50E+00	--	3.8E-03	1.50E+00	--	3.81E-03
Cyclohexane	1.80E+01	--	6.8E-04	7.00E+00	--	2.66E-04
Dichlorobenzene, 1,2-	4.40E+00	--	5.0E-03	9.40E-01	--	1.07E-03
Dichlorobenzene, 1,4-	8.40E-01	7.5E-07	2.4E-04	2.30E-01	2.06E-07	6.56E-05
Dichlorodifluoromethane	2.70E+00	--	6.2E-03	2.70E+00	--	6.16E-03
Dioxane, 1,4-	1.20E+00	4.9E-07	9.1E-03	9.40E-01	3.83E-07	7.15E-03
Ethyl Acetate	3.90E+00	--	1.3E-02	8.10E+00	--	2.64E-02
Ethyl Chloride (Chloroethane)	3.80E+00	--	8.7E-05	3.80E+00	--	8.68E-05
Ethylbenzene	9.50E+00	1.9E-06	2.2E-03	7.30E+00	1.49E-06	1.67E-03
Hexane, N-	1.10E+01	--	3.6E-03	8.60E+00	--	2.80E-03
Isopropanol	1.20E+01	--	1.4E-02	1.20E+01	--	1.37E-02
Methyl Ethyl Ketone	5.20E+00	--	2.4E-04	2.20E+01	--	1.00E-03
Methyl Isobutyl Ketone	5.40E+00	--	4.1E-04	1.80E+00	--	1.37E-04
Methylene Chloride	1.30E+00	1.1E-09	4.9E-04	1.90E+00	1.55E-09	7.23E-04
Tetrachloroethylene	1.10E+00	2.3E-08	6.3E-03	2.50E+00	5.30E-08	1.43E-02
Tetrahydrofuran	BDL	--	BDL	8.10E-01	--	9.25E-05
Toluene	1.60E+02	--	7.3E-03	2.00E+02	--	9.13E-03
Trichloro-1,2,2-trifluoroethane, 1,1,2-	5.80E-01	--	4.4E-06	5.70E-01	--	4.34E-06
Trichloroethylene	2.30E+00	7.7E-07	2.6E-01	3.40E-01	1.14E-07	3.88E-02
Trichlorofluoromethane	1.80E+00	--	5.9E-04	1.30E+00	--	4.24E-04
Trimethylbenzene, 1,2,4-	3.40E+01	--	**1.1E+00**	1.70E+01	--	5.54E-01
Vinyl Acetate	2.00E-01	--	2.3E-04	2.00E-01	--	2.28E-04
Xylenes	3.30E+01	--	7.5E-02	2.80E+01	--	6.39E-02

-- toxicity value not avaialble to quantify cancer risk or noncancer Hazard Quotient.
Bold – Hazard Quotient exceeds 1.0.
BDL = Below Detection Limit
µg/m³=micrograms per cubic meter

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Fifth Five-Year Review Report
for
Hollingsworth Solderless Terminal
FLD004119681

Fort Lauderdale
Broward County, Florida

September 2016

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

Franklin E. Hill, Director
Superfund Division

Date:

8/31/16

11050133

Fifth Five-Year Review Report
for
Hollingsworth Solderless Terminal
700 Northwest 57th Place
Fort Lauderdale
Broward County, Florida

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
AROD	Amended Record of Decision
BCEQCB	Broward County Environmental Quality Control Board
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIC	Community involvement coordinator
Cis-12DCE	cis-1,2-Dichloroethylene
COC	Contaminant of Concern
EP	Extraction Procedure Toxicity Characteristic
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FYR	Five-Year Review
HSTC	Hollingsworth Solderless Terminal Company
HQ	Hazard Quotient
IC	Institutional control
MCL	Maximum Contaminant Level
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
NA	Not applicable
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SCTL	Soil Cleanup Target Level
SESD	Science and Ecosystem Support Division
SSC	Superfund State Contract
SVE	Soil Vapor Extraction
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
trans12DCE	Trans-1,2-Dichloroethylene
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

Executive Summary

The 3.5-acre Hollingsworth Solderless Terminal Superfund site (the Site) is located at 700 Northwest 57th Place, Fort Lauderdale, Broward County, Florida. The Hollingsworth Solderless Terminal Company (HSTC) manufactured solderless electrical connectors from 1968 until 1982. The manufacturing process included heat treatment in molten salt baths, degreasing using solvents, and electroplating with tin and nickel. The manufacturing process generated wash water and process wastewater contaminated with trichloroethylene (TCE) and heavy metals, which were discharged to drainfields and an injection well located on site, resulting in contamination of soil and groundwater. The U.S. Environmental Protection Agency selected a site remedy that included excavation of source area soils, in-situ vapor extraction of chlorinated hydrocarbons from contaminated soil and pumping and treatment of groundwater followed by in-situ enhanced bioremediation.

The remedy currently protects human health and the environment because contaminated soils have been removed such that no land use restrictions are needed, groundwater contamination remains on site and institutional controls are in place that restrict the use of groundwater at the Site. In order for the remedy to be protective in the long term, site monitoring wells need to be repaired and monitored on a regular basis.

The triggering action for this five-year review (FYR) was the signing of the previous FYR on September 7, 2011.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Hollingsworth Solderless Terminal		
EPA ID: FLD004119681		
Region: 4	**State:** FL	**City/County:** Fort Lauderdale/Broward

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

REVIEW STATUS
Lead agency: EPA
Author name: Galo Jackson (EPA), Claire Marcussen (Skeo), Sarah Alfano (Skeo)
Author affiliation: EPA and Skeo
Review period: December 2015 – September 2016
Date of site inspection: February 23, 2016
Type of review: Policy
Review number: 5
Triggering action date: September 7, 2011
Due date *(five years after triggering action date)*: September 7, 2016

Five-Year Review Summary Form (continued)

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	**Issue Category:** Operations and Maintenance			
	Issue: Several monitoring wells are damaged and not secure, and not all wells have been monitored on a regular basis.			
	Recommendation: Repair all wells that were damaged and not secured, and ensure all relevant wells are monitored on a regular basis.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/State	9/7/2017

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy currently protects human health and the environment because contaminated soils have been removed such that no land use restrictions are needed, groundwater contamination remains on site and institutional controls are in place that restrict the use of groundwater at the Site. In order for the remedy to be protective in the long term, site monitoring wells need to be repaired and monitored on a regular basis.

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

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

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

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

Fifth Five-Year Review Report
for
Hollingsworth Solderless Terminal Superfund Site

1.0 Introduction

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

The U.S. Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

Skeo, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Hollingsworth Solderless Terminal Superfund site (the Site) in Fort Lauderdale, Broward County, Florida. The EPA's contractor conducted this FYR from December 2015 to September 2016. The EPA is the lead agency for developing and implementing the remedy for the Superfund-financed cleanup at the Site. The Florida Department of Environmental Protection (FDEP), as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the fifth FYR for the Site. The triggering action for this policy review is the previous FYR. The FYR is required due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of one operable unit (OU).

2.0 Site Chronology

Table 1: Chronology of Site Events

Event	Date
The EPA was notified by the Broward County Environmental Quality Control Board (BCEQCB) about groundwater contamination at the Site	November 1, 1980
The Potentially Responsible Party (PRP) filed for Chapter 11 Bankruptcy	November 6, 1981
The EPA completed a preliminary assessment.	September 1, 1982
The EPA listed the Site on the National Priorities List (NPL)	September 8, 1983
The EPA completed a remedial investigation/feasibility study (RI/FS) and issued a Record of Decision (ROD)	April 10, 1986
The EPA began remedial design for the soil vapor extraction (SVE) system	December 1, 1986
The EPA completed an interim soil removal action in the East Drainfield	February 13, 1987
The EPA completed remedial design of the SVE system	September 23, 1987
The EPA began soil and groundwater remedial construction	December 10, 1987
The EPA and FDEP entered into a state Superfund State Contract (SSC) for remedy construction	September 1988
The EPA completed remedy construction of the SVE system in the East Drainfield and FDEP entered into a second SSC to share the costs of additional source remediation	December 1991
The EPA groundwater pump-and-treat system became fully operational	July 17, 1992
The EPA completed the Preliminary Close-out Report	June 4, 1993
The EPA began remedial action for groundwater	June 16, 1993
The EPA completed the remedial action for groundwater	October 24, 1994
The EPA issued the first FYR	January 22, 1996
The EPA began a second remedial design to address additional source contamination at the former South and West Drainfields	February 9, 1998
The EPA completed the second remedial design	January 5, 2000
The EPA issued the second FYR	April 3, 2000
The EPA completed a supplemental RI of soils in the South and West Drainfields	June 30, 2001
The EPA issued an Explanation of Significant Differences (ESD) to address additional soil contamination in the former South Drainfield and the septic tank in the West Drainfield	October 1, 2001
The EPA began the remedial design for the soil remedy at the South and West Drainfields.	October 30, 2001
The EPA completed the remedial design for the soil remedy at the South and West Drainfields.	February 1, 2002
The EPA completed the remedial action in the former South Drainfield and the septic tank in the West Drainfield	September 18, 2002
The EPA began a third remedial design to address residual groundwater contamination in the vicinity of the West Septic Tank and South Drainfield	March 30, 2003
The EPA completed the third FYR	December 20, 2005
The EPA completed the remedial design for groundwater in-situ enhanced bioremediation	June 29, 2006
The EPA properly abandoned the injection well that was historically used for waste disposal	October 24, 2006
The EPA completed the in-situ enhanced bioremediation pilot test for groundwater contamination in the South Drainfield and West Septic Tank	September 2007
The EPA issued an amended ROD (AROD) to address residual groundwater contamination in the South Drainfield and West Septic Tank using bioremediation	November 24, 2008
The EPA began remedial design for bioremediation of groundwater contamination in the South Drainfield and West Septic Tank area	July 20, 2009
The EPA completed remedial design for bioremediation of groundwater contamination	November 25, 2009
The EPA began remedial action for residual groundwater contamination	April 25, 2011
The EPA issued the fourth FYR	September 7, 2011
The EPA completed remedial action for residual groundwater contamination	September 29, 2011

3.0 Background

3.1 Physical Characteristics

The 3.5-acre Site is located in a commercial and industrial area of Fort Lauderdale, Florida (Figure 1). Two buildings are located on the Site, separated by Northwest 57th Place (a street). Hollingsworth Solderless Terminal Company (HSTC) used the southern building, formerly known as Plant #1, for degreasing operations. HSTC used the northern building, formerly known as Plant #2, strictly as an assembly and storage facility and was not used for wet processes. Northwest 57th Court borders Plant #1 to the south. HSTC disposed of wash and process waters, which contained high concentrations of trichloroethylene (TCE) and heavy metals, in several on-site drainfields surrounding former Plant #1, by surface discharges and in a 100-foot-deep injection well on site (Figure 2). In addition, HSTC used waste TCE to clean Plant #1 floors. Various tenants currently use both buildings for commercial operations.

The Biscayne Aquifer underlies the Site; it is composed of limestone and sandstone and is highly permeable and unconfined. In the vicinity of the Site, the top of the Biscayne aquifer is near ground surface. The Biscayne Aquifer extends down to about 200 to 250 feet below ground surface and consists of several zones. The residual contamination at the Site is present in the upper zone, which consists of unconsolidated sands down to about 50 feet. Beneath the upper zone, a transition zone is present, consisting of cemented shell and sandstone. Beneath the transition zone, a limestone layer forms the major water producing zone of the Biscayne aquifer. Below the Biscayne aquifer is the relatively impermeable Hawthorn Formation, which is about 400 feet thick. The Hawthorn Formation serves as a confining unit between the Biscayne aquifer and the brackish water of the underlying Floridan aquifer. The regional direction of groundwater flow is to the southeast.

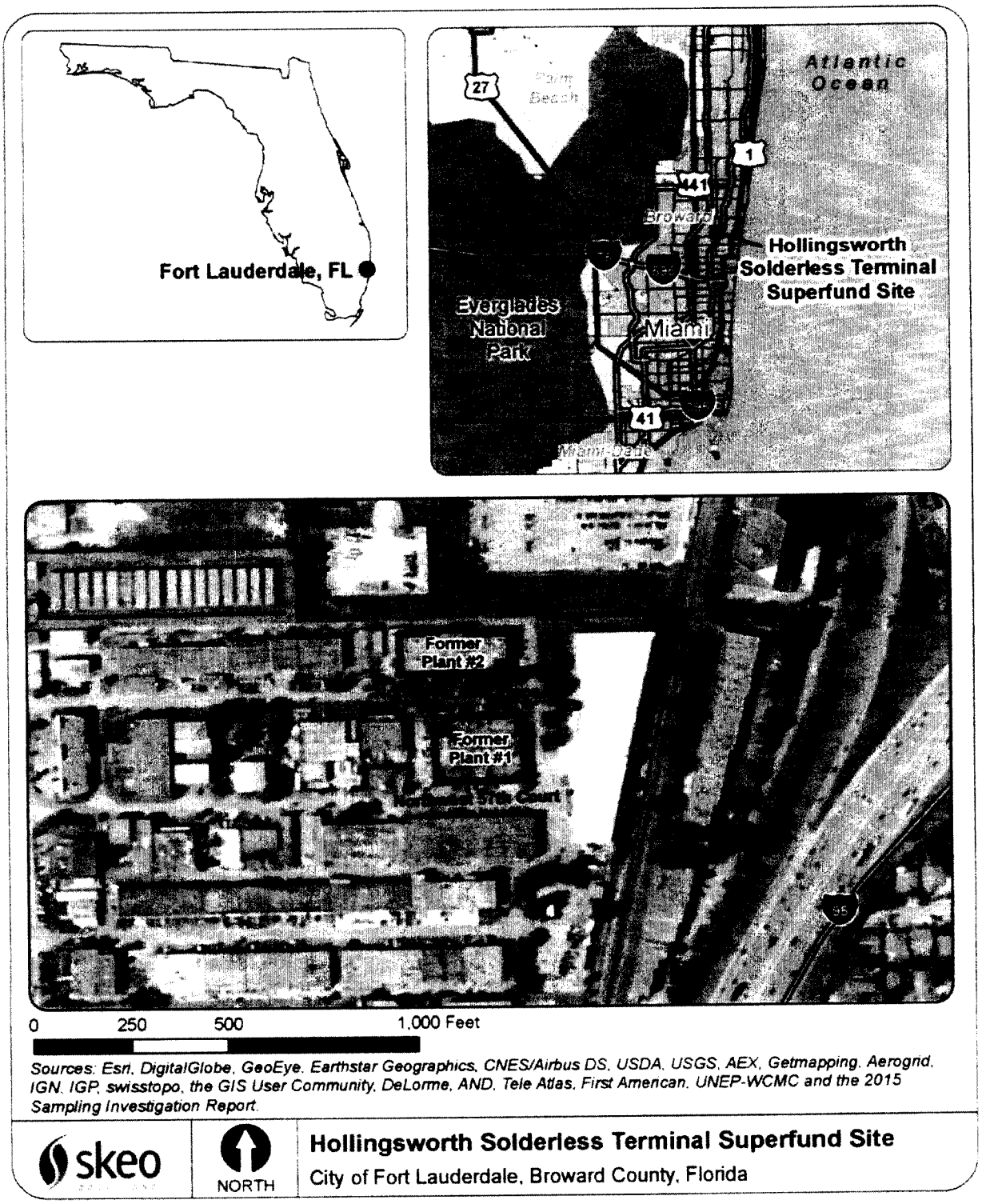
The Atlantic Ocean is located 3.6 miles to the east of the Site, and the Everglades are approximately 10 miles to the west. Cypress Creek Canal is located about 1.5 miles to the north and the Middle River Canal 2 miles to the south. The Site is located within the 100-year floodplain and has a relatively flat topography.

3.2 Land and Resource Use

The Site is located in an industrial park in Fort Lauderdale that includes a number of small warehouse buildings housing commercial and light industrial business. Between 1968 and 1982, HSTC manufactured solderless electrical terminals. After filing of bankruptcy in November 1982, HSTC dismantled and sold its plant equipment in Plant #1. The facility was purchased in a tax sale in 2004 and subsequently remodeled. Plant #1 currently houses several tenants, including a uniform distribution center, a law firm, an international car dealership, a custom woodworking company and a moving company. Plant #2 is used as office space.

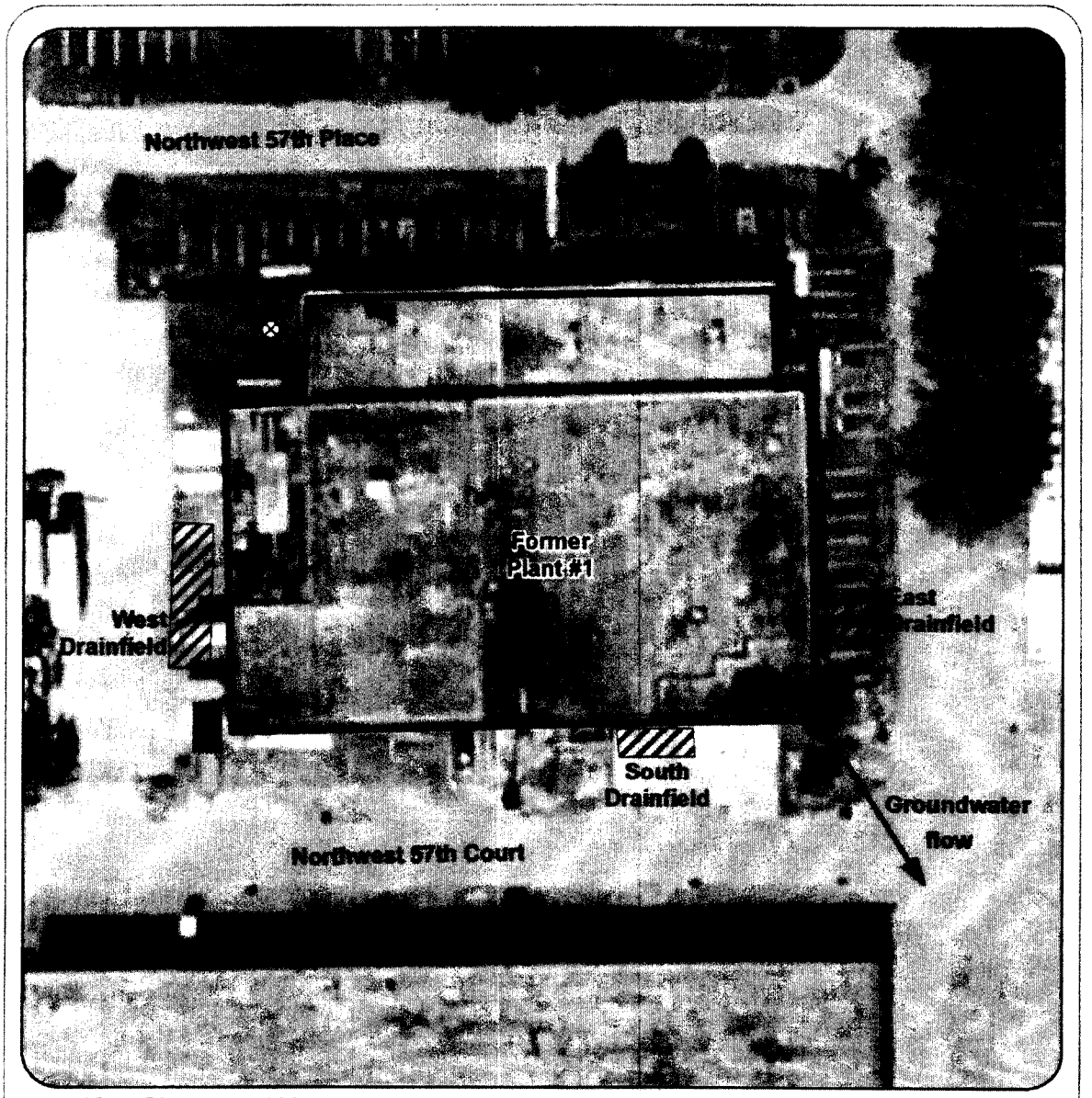
The City of Fort Lauderdale's Prospect Well Field, which supplies water to the city, is located about 2 miles west of the Site. The well field draws water from the Biscayne aquifer. Site contamination has not impacted the city water supply.

Figure 1: Site Vicinity Map



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

Figure 2: Detailed Site Features Map



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

3.3 History of Contamination

HSTC's manufacturing process included the use of molten salt baths, degreasing parts and electroplating, which is a process that involves the application of metal coatings using an electric current. The company disposed of wash and process waters, which contained high concentrations of TCE and heavy metals, by allowing waste liquids to infiltrate into the ground through industrial drainfields and by washing the floors and equipment with waste TCE that may have flowed into the building floor sump. In addition, wastes were also pumped into a 100-foot-deep on-site injection well. The industrial drainfields are referred to as the East, South and West Drainfields. In addition, a former septic tank was located south of the West Drainfield (Figure 2). The waste disposal practices contaminated soil and groundwater with TCE and heavy metals.

3.4 Initial Response

Beginning in 1977, the Broward County Environmental Quality Control Board (BCEQCB) conducted initial investigations regarding environmental issues at the facility. In 1980, during a routine inspection, BCEQCB discovered that HSTC was contaminating groundwater by disposing of process wastes into an injection well. In June 1981, BCEQCB requested assistance from the EPA under CERCLA. HSTC subsequently filed for Chapter 11 bankruptcy in November 1981 and ceased operations in 1982.

3.5 Basis for Taking Action

The EPA conducted a preliminary assessment in 1982 and listed the Site on the National Priorities List (NPL) in 1983. The EPA was unable to identify any viable potentially responsible parties (PRPs) for the Site; therefore, the EPA is using federal funds for site cleanup activities. The EPA subsequently completed a remedial investigation/feasibility study (RI/FS) in 1986 to determine the extent of contamination and evaluate possible cleanup strategies. Based on the results of the RI/FS, there were no current completed human exposure pathways to Site contaminants. However, there was a probable pathway associated with direct contact with soil if any future excavation is conducted and also a potential for future exposure to groundwater downgradient of the Site. The results of the public health evaluation indicated that lifetime cancer risks associated with future exposure to on-site groundwater were in excess of 1×10^{-4} due to presence of vinyl chloride and TCE. Although access to the Site was restricted with a fence, the public health evaluation also found that unacceptable noncancer health effects could occur as a result of future exposure of children to metals in on-site soils.

4.0 Remedial Actions

A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against the following evaluation criteria presented in the April 1986 Record of Decision (ROD):

1. Overall protection of human health and the environment
2. Level of cleanup
3. Reliability
4. Special engineering considerations
5. Implementability
6. Capital, operations and maintenance costs
7. Institutional considerations

8. Time required for implementation

4.1 Remedy Selection

The EPA selected the Site soil and groundwater remedies in the 1986 ROD, which defined the following remedial action objectives (RAOs) for site cleanup:

- Prevent further migration of contaminated groundwater into the Biscayne aquifer.
- Remove the sources of contamination from overlying soil and drainfields.

The major components of the selected remedy in the 1986 ROD included:

- Proper abandonment of the old injection well and all other on-site wells.
- On-site treatment of volatile organic compound (VOC)-contaminated soil in the East Drainfield.
- Extraction and treatment of VOC-contaminated groundwater.
- Injection of treated groundwater.

The EPA issued an Explanation of Significant Differences (ESD) in 2001 and an amended ROD (AROD) in 2008 to remediate additional soil and groundwater contamination at the Site in the South Drainfield and septic tank area near the West Drainfields. The 2001 ESD and 2008 AROD did not change the RAOs established in the 1986 ROD but included the following additional remedial components:

- Excavation of VOC-contaminated soils in the former South Drainfield and the septic tank in the West Drainfield.
- Replacement of the 1986 ROD's pump-and-treat remedy with in-situ enhanced bioremediation in the affected groundwater zone.
- Implementation of institutional controls for groundwater.

The 1986 ROD established contaminant of concern (COC) cleanup levels for the East Drainfield area soils (Table 2). The 2001 ESD established soil cleanup goals for the South and West Drainfield areas (Table 3). The 2008 AROD incorporated the updated state maximum contaminant level (MCL) for TCE and included a new COC, cis-1,2-dichloroethylene (cis-12DCE), a degradation product of TCE consistently detected above the federal MCL and the FDEP MCL during past investigation and remedial activities (Table 4).

Table 2: 1986 ROD Soil COC Cleanup Goals for East Drainfield

Soil COC	Cleanup Goal
Total VOCs	1 mg/kg
Copper	10 mg/L[a]
Lead	0.5 mg/L[a]
Nickel	1 mg/L[a]

Soil COC	Cleanup Goal
Notes: a. Cleanup goals for metals are based on leaching from soil to groundwater using the Extraction Procedure Toxicity Characteristic (EP) toxicity test (1986 ROD, page 15). mg/kg – milligrams per kilogram mg/L – milligrams per liter	

Table 3: 2001 ESD Soil COC Cleanup Goals for South and West Drainfields

Soil COC	Cleanup Goal (µg/kg)[a,b]
cis-12DCE	400
trans-1,2-dichloroethylene (trans12DCE)	700
Trichloroethylene (TCE)	30
Vinyl chloride	7
Notes: a. Leachability based on groundwater criteria specified in 62-777 Florida Administrative Code (FAC) Table II Soil Cleanup Target Levels (SCTLs). b. Values specified in Table 1 of the September 2002 Remedial Action Report. µg/kg – micrograms per kilogram	

Table 4: 2008 AROD Groundwater COC Cleanup Goals

Groundwater COC	Cleanup Goal (µg/L)[a]
cis-12DCE	70
trans12DCE	100
TCE	3.0
Vinyl chloride	1.0
Note: a. Obtained from Table 6.1 of the 2008 AROD. Represent the lower of the federal and state MCLs. µg/L – micrograms per liter	

4.2 Remedy Implementation

Soil

During the remedial design phase in 1987, the EPA conducted additional field studies to supplement and verify available site data. In February 1987, the EPA attempted to excavate and remediate contaminated soil from the East Drainfield area, as part of an interim removal action. However, due to the high water table, the EPA discontinued the removal action and decided that a soil vacuum extraction (SVE) system was needed. Metals were not detected above the ROD performance standards during the 1987 investigation, and therefore were not considered as COCs in the final remedial design. The EPA completed the remedial design and began remedial construction at the end of 1987. The EPA completed the construction of the SVE in January 1991. The SVE removed VOCs to concentrations below the 1 milligram per kilogram (mg/kg) cleanup goal by July 1991 and the EPA subsequently dismantled the SVE system in March 1992.

Additional soil required excavation at the South Drainfield and septic tank area near the West Drainfields, as documented in the 2001 ESD. The EPA completed the remedial design between October 2001 and February 2002. The EPA remediated soils in the South Drainfield and excavated the septic tank in the West Drainfield area in September 2002. Soils exceeding toxicity characteristic leaching procedure (TCLP) criteria were stabilized and shipped off site to a permitted hazardous waste treatment and storage facility while the remaining nonhazardous soils were sent off site to a nonhazardous waste landfill.

In 2000, to update the metals soil data from the North Field surface discharge area, a surface soil sample was analyzed for the target analyte metals. The sample location was selected as the probable area where HSTC operational discharges occurred based on topography and location. Copper (7,910 mg/kg) was the only constituent detected above the Florida soil cleanup target levels (SCTLs) for residential use of 150 mg/kg; however, this concentration is well below the target clean-up level for commercial/industrial use (89,000 mg/kg). The current EPA Regional Screening Levels (RSLs) for surface soil under residential and industrial use are 3,100 and 47,000 mg/kg, respectively.

Groundwater

The EPA completed the construction of the groundwater treatment system by December 1991 and determined the system was operational in July 1992. The system comprised of three extraction wells, an air-stripping tower, and two injection wells through which treated effluent was injected into the Biscayne aquifer. In 1994, the treatment system discharge was no longer meeting the permit requirements, due to fouling of the packing material in the air stripper. The EPA shut the treatment system down in August 1994 and removed the system from the Site in November 1994. Groundwater monitoring following demobilization of the remedial system indicated that groundwater contaminant levels had increased, suggesting continuing contaminant sources near the South and West Drainfields. In September 2002, the EPA completed the soil excavation in the area of the South Drainfield and removed a septic tank located near the West Drainfield. In October 2006, the EPA abandoned the old injection well. In order to meet the ROD's groundwater remediation goals, the EPA conducted an in-situ enhanced bioremediation pilot test from April 2005 through September 2007. Based on the pilot test results, the EPA amended the 1986 ROD in 2008 to select bioremediation treatment of groundwater in the source areas. The EPA completed remedial design between July and November 2009. The EPA completed the remedial action between April 2011 and September 2011; the bioremediation included injection of liquid substrates by direct-push into eight injection wells near the South Drainfield and eight injection wells near the West Drainfield.

4.3 Operation and Maintenance (O&M)

The EPA established an O&M plan for the groundwater extraction and treatment system in 1992, however, since the system was dismantled in 1994 and replaced with an in-situ bioremediation remedy, a revised O&M plan has not been prepared for the Site. The EPA continues to conduct the long-term monitoring of groundwater and repairs damaged monitoring wells as needed. The O&M activities remaining for the Site are long-term monitoring of groundwater and routine repairs to monitoring wells that have been damaged. The EPA's Science and Ecosystem Support Division (SESD) conducts the annual sampling at the Site. Table 5 summarizes the O&M costs that have occurred during this FYR period. Costs are not presented for 2011 or 2014 as groundwater was not sampled. The costs for 2015 are higher than 2012 and 2013 because more wells were sampled.

Table 5: O&M Cost Summary (2011 - 2015)

Year	Annual Average Cost
2011	--
2012	$ 5,988
2013	$ 7,475
2014	--
2015	$ 28,000
Notes: -- No sampling occurred in 2011 or 2014,	

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2011 FYR for the Site stated the following:

The remedial actions at the HSTC Site have been almost completely effective in accomplishing the remedial objectives. The remedy implemented at the HSTC Site protects health and the environment in the short term, as well as the long term.

No issues were identified in the 2011 FYR.

6.0 Five-Year Review Process

6.1 Administrative Components

The EPA Region 4 initiated the FYR in December 2015 and scheduled its completion for September 2016. The EPA remedial project manager (RPM) Galo Jackson led the EPA site review team, which also included the EPA community involvement coordinator (CIC) L'Tonya Spencer and contractor support provided to the EPA by Skeo. In January 2016, the EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

6.2 Community Involvement

In February 2016, the EPA published a public notice in the *Sun Sentinel* newspaper announcing the commencement of the FYR process for the Site, providing contact information for RPM Galo Jackson and CIC L'Tonya Spencer, and inviting community participation. The press notice is available in Appendix B. No one contacted the EPA as a result of the advertisement.

The EPA will make the final FYR Report available to the public. Upon completion of the FYR, the EPA

will place copies of the document in the designated site repository: Broward County Public Library, 100 S. Andrews Ave. - Level 5, Fort Lauderdale, FL, 33301.

6.3 Document Review

This FYR included a review of relevant site-related documents, including the ROD, AROD and ESD. Appendix A provides a complete list of the documents reviewed.

Applicable or Relevant and Appropriate Requirements (ARARs) Review

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

- 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, remedial action, location or other circumstance found at a CERCLA site.

- Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards more stringent than federal requirements may be applicable or relevant and appropriate.

- To-Be-Considered criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, To-Be-Considered criteria may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include MCLs under the federal Safe Drinking Water Act and ambient water quality criteria enumerated under the federal Clean Water Act.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated groundwater or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the chemical-specific ARARs identified in the ROD. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

Groundwater

According to the 1986 ROD, groundwater ARARs include the most stringent of the federal and state primary drinking standards or MCLs. As shown in Table 6, groundwater MCLs have not changed since the signing of the 2008 AROD.

Table 6: Previous and 2016 ARARs for Groundwater COCs

COC	2008 AROD Cleanup Goal (µg/L)[a]	Current MCL		Most stringent MCL (µg/L)	ARAR Change
		Federal µg/L)[b]	State (µg/L)[c]		
cis-12DCE	70	70	70	70	No change
trans12DCE	100	100	100	100	No change
TCE	3	5	3	3	No change
Vinyl chloride	1	2	1	1	No change

Notes:
a. Values from Table 6.1 of the 2008 AROD.
b. Federal MCLs are available at http://www.epa.gov/your-drinking-water/table-regulated-drinking-water-contaminants#Organic (accessed 1/4/2016).
c. FDEP MCLs are available at http://www.dep.state.fl.us/water/drinkingwater/vol_con.htm (accessed 1/4/2016).

Soil

Federal ARARs have not been established for the soil COCs; however, the 2001 ESD identified Florida soil cleanup standards promulgated under Florida Administrative Code (FAC) Chapter 62-777. The levels, SCTLs, are based on leachability to groundwater. As shown in Table 7, 2001 leachability-based SCTLs have not changed from the most current leachability-based SCTLs established by the FDEP in 2005. The protectiveness of the leachability-based soil cleanup goals based on direct exposure and current toxicity values is evaluated further in Section 7.2.

Table 7: Previous and Current State ARARs for Soil COCs

Soil COC	2001 ESD Leachability-based SCTL (µg/kg)[a]	Current Leachability-based SCTL (µg/kg)[b]
cis-12DCE	400	400
trans12DCE	700	700
TCE	30	30
Vinyl chloride	7	7

Notes:
a. Leachability based on groundwater criteria specified in 62-777 FAC Table II SCTLs.
b. Values obtained from http://dep.state.fl.us/waste/quick_topics/publications/wc/FinalGuidanceDocumentsFlowCharts_April2005/TechnicalReport2FinalFeb2005(Final3-28-05).pdf (accessed 1/4/16)
µg/kg = microgram per kilogram

Institutional Control Review

The remedial action selected in the 1986 ROD did not include institutional controls for groundwater. However, the groundwater contamination remains within the site boundaries and the Site is located within a delineated area pursuant to Florida's Groundwater Delineation Program. Rule 62-524.700(2) of the FAC, which prohibits permitting and construction of new potable wells in a delineated area if a

potable water supply is available within 500 feet of the property boundary, except under limited circumstances. In addition, Rules 62-524 impose restrictions on well construction, water quality testing and permitting of groundwater wells located in delineated areas. According to the 2008 AROD, because the conditions of the rule have been met and none of the exceptions apply, Rule 62-524.700(2), FAC, serves to prohibit groundwater use at the Site. Thus, the 2008 AROD amended the remedial action selected in the 1986 ROD to include Rule 62-524.700(2), FAC, as an institutional control for the groundwater remedy at the Site. According to the 2008 AROD, once the COC remediation levels have been achieved, the EPA in consultation with FDEP will make a determination on whether groundwater will be available for unrestricted uses within the bounds of the local ordinances. Figure 3 presents the location of the Site parcels relative to the Groundwater Delineation Area.

Skeo staff conducted research online using the Broward County Property Appraiser Office's website and found the deed information pertaining to the Site listed in Table 8.

Table 8: Deed Documents from Broward County Property Appraiser Office

File Date	Type of Document	Description	Book #	Page #
3/22/1971	Warranty Deed	Transfer of lot 9 Block 2 of Powerline Industrial Mall from private party to HSTC.	4452	32
3/18/1971	Warranty Deed	Transfer of lots 10 and 11 of Powerline Industrial Mall from Tram Inc. to HSTC.	4450	86
5/24/2001	Tax Deed	Royal Palm Beach Investors, Inc. purchased lots 10 and 11 of Powerline Industrial Mall from HSTC.	31634	1144
2/22/2006	Warranty Deed	Allows for the EPA to undertake all post-cleanup monitoring and O&M necessary to remediate the property.	41505	814

Note:
Source: https://officialrecords.broward.org/oncorev2/ (Accessed on 3/30/16)

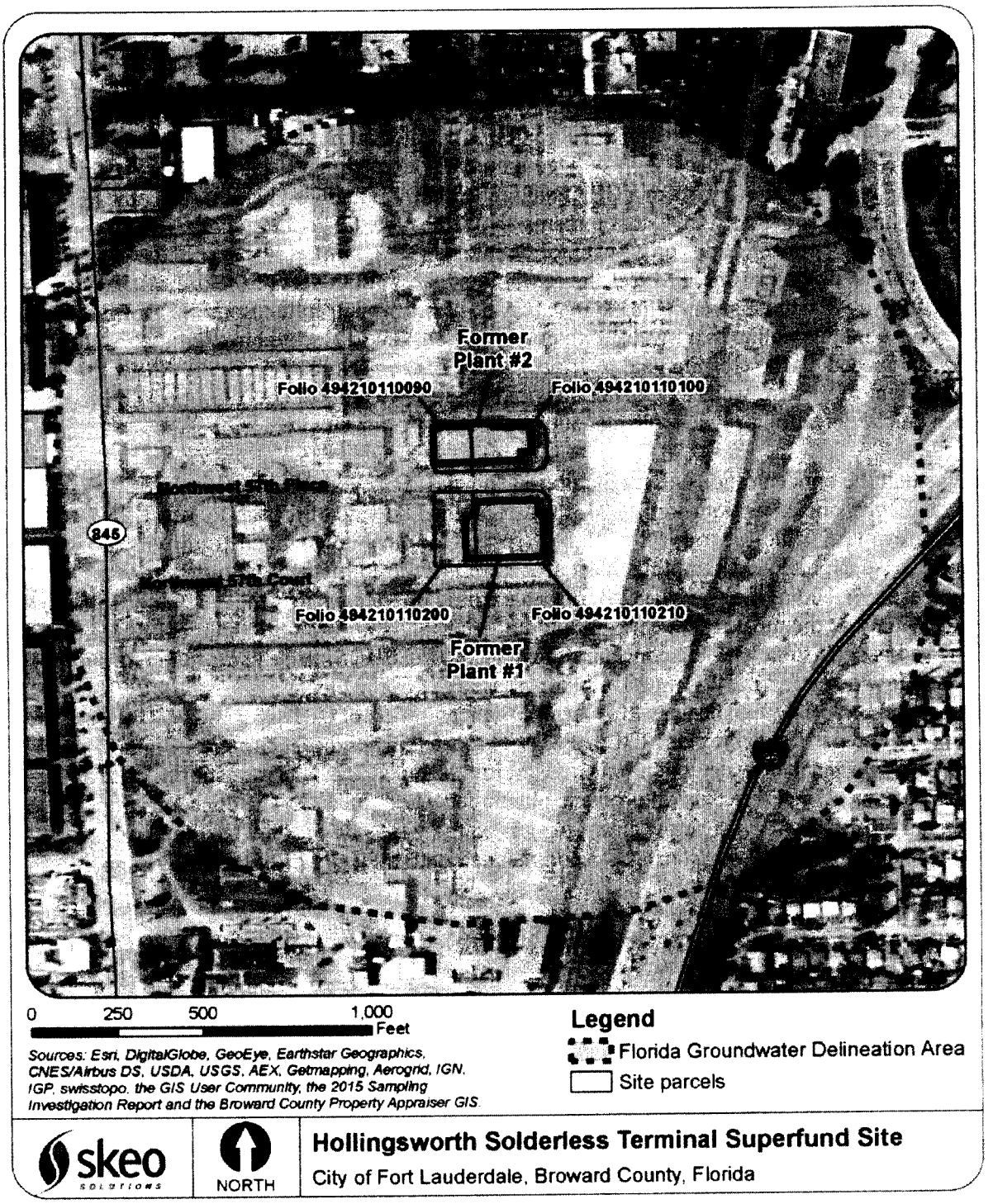
Table 9 lists the institutional controls associated with the Site.

Table 9: Institutional Control (IC) Summary Table

Media	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
Groundwater	Yes	Yes	494210110210 and 494210110200	Prevent exposure to contaminated groundwater	The Site lies within a Florida Groundwater Delineation Area, which restricts well placement.[1] Permitting and construction of new potable wells are prohibited if a potable water supply is available within 500 feet of the property boundary.
Soil	No	No	NA	NA	NA

Notes:
1. Florida's groundwater delineation information is available online at: http://www.dep.state.fl.us/water/groundwater/delineate.htm.
NA – Institutional controls are not needed for soils because the soil cleanup is protective for all uses (see Section 7.2).

Figure 3: Institutional Control Base Map



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

6.4 Data Review

According to the 2008 AROD, the remedy was expected to achieve the groundwater cleanup goals in five years or less. The EPA sampled the site groundwater monitoring wells (Figure 4) in November 2010, January 2012, April 2013, January 2015 and May 2016 in the former South and West Drainfields (Table 10) and from wells underlying Plant #1 (Table 11). A detailed summary of historical data from 2010 to 2016 is presented in Appendix F. The only contaminants exceeding the cleanup goals during the last five years were breakdown products of TCE, including cis12DCE and vinyl chloride. Table 10 shows that vinyl chloride is the only COC that remains above the cleanup goal downgradient of the two drainfields in 2016. The concentrations of vinyl chloride in the West Drainfield have met the cleanup goal of 1 µg/L in all wells except one, PMW-1, located immediately southwest of the drainfield with a concentration of 1.1 µg/L which is very close to meeting the cleanup goal. In the South Drainfield, vinyl chloride exhibits a general decline in all wells with only one well, RW-2 (located immediately southeast of the drainfield), exceeding the cleanup goal of 1 µg/L with a concentration of 45 µg/L. All wells further downgradient of the two wells exceeding the vinyl chloride cleanup in the West and South Drainfields are below detection or below the cleanup goal of 1 µg/L for vinyl chloride.

Table 11 shows that the concentrations of vinyl chloride and cis12DCE exhibit an overall decline over the past five years with one exception, well IW-1, located on the east side of former Plant #1. In 2010, the concentrations of vinyl chloride in IW-1 slightly exceeded the cleanup goal of 1 µg/L with a concentration of 1.1 µg/L; the next sampling event at this well occurred in 2015, where there was a significant increase to 1,100 µg/L. The May 2016 sample from IW-1 shows that the 2015 concentration was likely an anomaly as the most recent concentration of 1.6 µg/L is only slightly above the cleanup goal of 1 µg/L and is consistent with the concentration detected in 2010. Similarly, the concentration of cis12DCE was below detection in IW-1 in 2010 but increased above the cleanup goal of 70 µg/L in 2015 with a concentration of 250 µg/L. The May 2016 sample concentration of 0.31 µg/L at IW-1 is well below the cleanup goal of 70 µg/L for cis12DCE. PMW-6, located in southeast corner of Plant #1 and downgradient of IW-1, was below detection for vinyl chloride and cis12DCE demonstrating that the residual concentrations of TCE breakdown products remain localized to IW-1. The concentrations of vinyl chloride and cis12DCE remain below cleanup goals on the west side of Plant #1 based on the results of well IW-11. Additional monitoring is recommended until all wells meet the ROD cleanup goals in groundwater.

Table 10: Cis12DCE and Vinyl Chloride Groundwater Data in the Drainfields (2010-2016)

Well	Location Description	Sample Date	Vinyl chloride (Cleanup Goal=1 µg/L)	Cis12DCE (Cleanup Goal=70 µg/L)
West Drainfield				
PMW-2	Center of drainfield	November 2010	0.032	<0.50
		January 2012	--	--
		April 2013	--	--
		January 2015	<0.50	<0.50
		May 2016	<0.50	0.69
RW-1	South end of drainfield	November 2010	**3.8**	7.7
		January 2012	--	--
		April 2013	**1.3**	1.0
		January 2015	**1.4**	1.5
		May 2016	0.88	1.5

Well	Location Description	Sample Date	Vinyl chloride (Cleanup Goal=1 µg/L)	Cis12DCE (Cleanup Goal=70 µg/L)
PMW-1	Downgradient and southwest of RW-1	November 2010	**36**	38
		January 2012	**26**	31
		April 2013	**6.8**	7.2
		January 2015	**3.9**	2.2
		May 2016	**1.1**	1.2
IW-14	Downgradient and south of PMW-1	November 2010	0.94	0.20
		January 2012	--	--
		April 2013	--	--
		January 2015	<0.50	<0.50
		May 2016	<0.50	<0.50
PMW-3	Downgradient and southeast of RW-1	November 2010	**8.7**	1.3
		January 2012	**2.4**	0.46
		April 2013	**4.5**	2.7
		January 2015	0.39J	0.20
		May 2016	0.14J	<0.50
IW-12	Downgradient and southeast of PMW-3	May 2016	<0.50	<0.50
South Drainfield				
PMW-5	Center of drainfield	November 2010	0.98	0.63
		January 2012	--	--
		April 2013	--	--
		January 2015	--	--
		May 2016	0.35J	1.0
RW-2	Downgradient and southeast of drainfield	November 2010	**120**	17
		January 2012	**3.9**	2.1
		April 2013	**50**	15
		January 2015	**35**	55
		May 2016	**45**	12
IW-5	Downgradient and south of RW-2	November 2010	0.46	0.25
		January 2012	--	--
		April 2013	--	--
		January 2015	<0.50	<0.50
		May 2016	<0.50	<0.50
PMW-7	Downgradient and southeast of RW-2	November 2010	0.10	0.28
		January 2012	--	--
		April 2013	--	--
		January 2015	<0.50	0.22
		May 2016	<0.50	<0.50

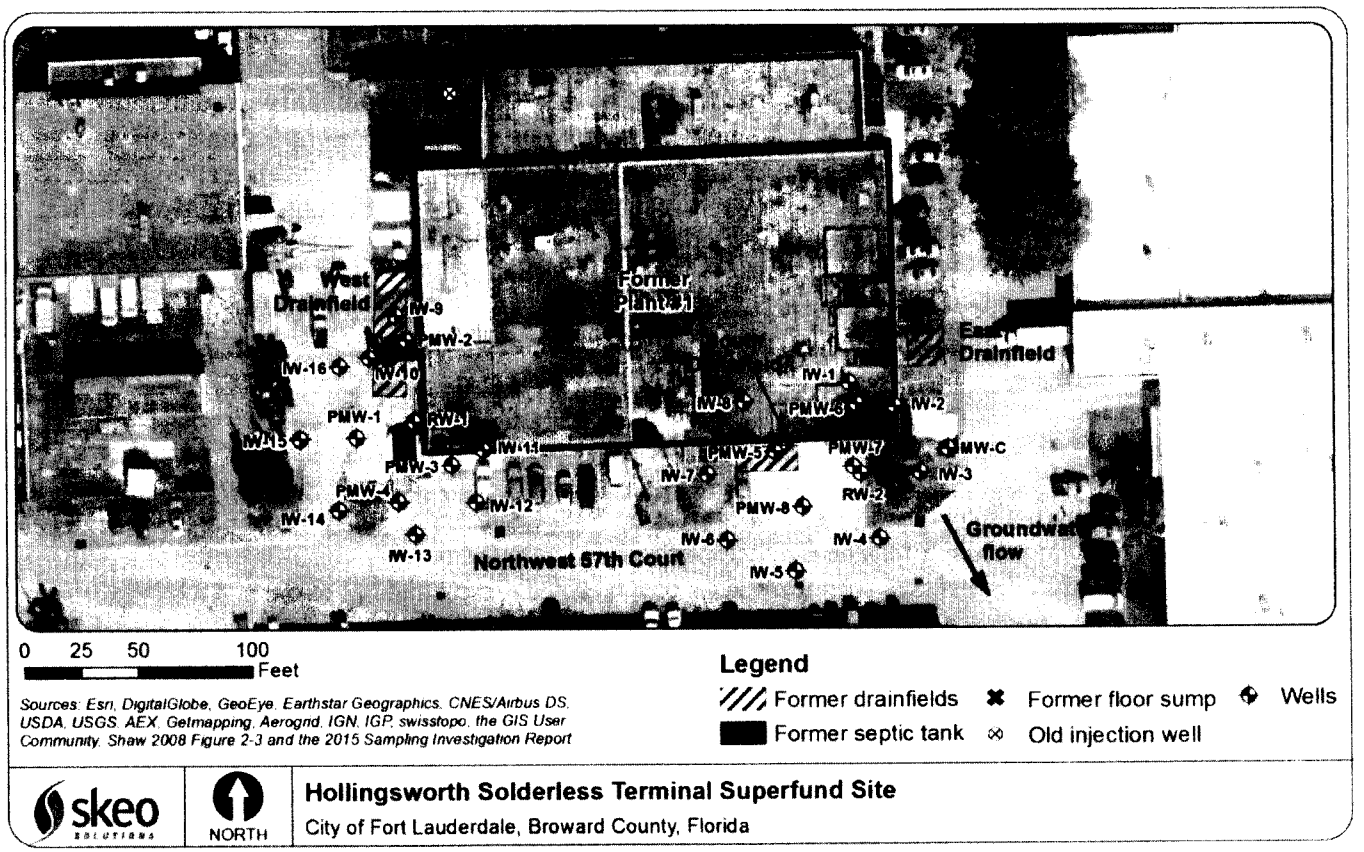
Notes:
-- well not sampled. **Bold** – concentration exceeds cleanup goal.
J – estimated value.

Table 11: Cis12DCE and Vinyl Chloride Groundwater Data Under Plant #1 (2010-2016)

Well	Location Description	Sample Date	Vinyl chloride (Cleanup Goal=1 µg/L)	Cis12DCE (Cleanup Goal=70 µg/L)
Plant #1 West Side				
IW-11	Southwest corner of building	November 2010	0.24	0.39
		January 2012	--	--
		April 2013	--	--
		January 2015	0.74	<0.50
		May 2016	<0.50	<0.50
Plant #1 East Side				
IW-1	Southeast corner of building	November 2010	**1.1**	<0.50
		January 2012	--	--
		April 2013	--	--
		January 2015	**1,100**	**250**
		May 2016	**1.3/1.6 (duplicate)**	0.26J/0.31J (duplicate)
PMW-6	Downgradient of IW-1	November 2010	0.11	<0.50
		January 2012	--	--
		April 2013	--	--
		January 2015	--	--
		May 2016	0.57	<0.50

Notes:
-- well not sampled. **Bold** – concentration exceeds cleanup goal.

Figure 4: Long-term Monitoring Well Locations and Injection Wells



0 25 50 100 Feet

Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, the GIS User Community, Shaw 2008 Figure 2-3 and the 2015 Sampling Investigation Report

Legend

- Former drainfields
- Former septic tank
- Former floor sump
- Old injection well
- Wells

skeo SOLUTIONS

NORTH

Hollingsworth Solderless Terminal Superfund Site

City of Fort Lauderdale, Broward County, Florida

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

6.5 Site Inspection

Site inspection participants met on February 23, 2016, at the Site. The site inspection checklist is located in Appendix D; site inspection photographs are in Appendix E. Participants included Galo Jackson (EPA), L'Tonya Spencer (EPA), Sam Hankinson (FDEP), John Moore (Broward County), Sarah Alfano and Claire Marcussen (Skeo).

The inspection began at the former Plant #1 building, which currently houses several tenants, including a uniform distribution center, a law firm, an international car dealership, a custom woodworking company and a moving company. Participants observed the former West Drainfield area where soil excavation and septic tank removal had occurred; the area is currently covered by an asphalt pad. Participants also viewed a number of injection wells and monitoring wells, some of which were secured with locks; however, several wells were damaged or not secured. The location of the former injection well was observed outside of the northwest corner of former Plant #1. Participants inspected the former South Drainfield and East Drainfield, which are now covered by asphalt pads, and injection wells and monitoring wells in the area. Several wells were not secured. Participants then entered the east side of former Plant #1 and observed several injection wells, which were all secured. Finally, participants observed the former Plant #2 building, which is used for administrative purposes.

Skeo visited the site repository at the Broward County Public Library; all site decision documents were located in hard copy in the library. However, the 2011 FYR was not located in the available documentation.

6.6 Interviews

The FYR process included interviews with parties affected by the Site and regulatory agencies involved in Site activities or aware of the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. All of the interviews took place via email. The interviews are summarized below. Appendix C provides the complete interviews.

John Moore: John Moore is an engineer representing Broward County's Environmental Protection and Growth Management Department. He is aware of the former environmental issues at the Site and feels well-informed regarding site activities, given that the EPA has been very cooperative and responsive to all requests for status updates. Mr. Moore also believes that the EPA has kept surrounding neighbors and involved parties informed of site activities and that the best way to continue to do so is for the EPA to keep responding to requests for status updates. He is not aware of any problems or unusual activities at the Site and is not aware of any changes to local laws that would affect the Site.

Galo Jackson: Galo Jackson is the EPA RPM and believes that the groundwater contaminant concentrations have dramatically decreased following remedy implementation. Mr. Jackson indicated that low residual concentrations of TCE degradation products currently exist at the Site and it will be a challenge to meet the vinyl chloride cleanup goal of 1 microgram per liter (µg/L). Although all but three wells currently meet this goal Mr. Jackson is comfortable with the institutional controls at the Site. He has not received any related complaints from the local community other than nearby owners expressing the desire to have the Site deleted from the NPL because the borrowing costs to these businesses are greater due to the proximity of the Site to the adjacent business owners.

Kelsey Helton: Kelsey Helton is the FDEP Project Manager and provided comments on the Site during the FYR process but did not provide an interview form. Ms. Helton believes the soil remedy remains protective and that the groundwater remedy is protective in the short-term because controls are in place the prevent exposure. Ms. Helton recommends that the scope and frequency of future groundwater monitoring be clearly documented and a regularly scheduled program of monitoring be implemented.

7.0 Technical Assessment

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

The soil remedy is functioning as intended by the original ROD, as modified by the ESD and ultimately the 2008 AROD. Soil contamination has been removed to levels that would not result in leaching to groundwater above cleanup goals. The groundwater remedy is functioning but not within the timeframe expected. The 2008 AROD EPA estimated that groundwater cleanup goals would be met in 5 years or less; however, despite a continued decline in concentrations over the last 5 years following the final in-situ injection of substrate in 2011, three wells exceed the cleanup goal of 1 µg/L for vinyl chloride, a TCE breakdown product. The three wells include IW-1 (1.6 µg/L) located under the eastern side of Plant #1, PMW-1 (1.1 µg/L) located southwest of the West Drainfield and RW-2 (45 µg/L) located southeast of the South Drainfield. These exceedances appear to be localized as the concentrations of vinyl chloride located immediately downgradient of these three wells are below detection or below the cleanup goal of 1 µg/L for vinyl chloride. Based on the results, it is recommended that groundwater monitoring continue until cleanup goals have been met in all wells.

The Site is located within a Florida Groundwater Delineation Area, which restricts construction of new wells within the designated area. The old injection well was properly decommissioned and abandoned by the EPA in October 2006. In addition, the City of Fort Lauderdale's Prospect Well Field, which is located approximately 2 miles west of the Site and supplies water to the city, has not been impacted by the Site. During the February site inspection, several wells were not secured as it appeared the tops of the well casings may have been damaged. All site wells should be secured, since many are located in areas accessible by the general public.

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

The toxicity values for several COCs have changed and in 2014 the EPA has updated default exposure assumptions, however, despite these changes, cleanup levels and RAOs remain valid. The 1986 ROD cleanup goals for soil in the East Drainfield were soil concentrations that did not result in exceedance of the EPA's Extraction Procedure Toxicity Characteristics (EP) toxicity test results for copper, lead and nickel, while a level of 1 mg/kg was established for total VOCs. The EP toxicity criteria have not changed since the 1986 ROD.

There is no total VOC SCTL; however, in the 2001 ESD, the EPA developed chemical-specific soil cleanup goals for three VOCs (trans12DCE, TCE and vinyl chloride) based on leaching to groundwater. This FYR's screening-level risk evaluation of the 2001 soil cleanup goals demonstrates that the goals remain valid because the risk associated with the goals is below 1×10^{-6}, the lower bound of the EPA's risk management range of 1×10^{-6} to 1×10^{-4}, and below the EPA's target noncancer hazard quotient (HQ) of 1.0 for residential exposure. The risks are also below FDEP's target level of 1×10^{-6} (Appendix G). In addition, the groundwater cleanup levels remain valid since the values, which were ARARs, have

not changed since the 2008 AROD and the screening-level health evaluation demonstrated the values remain valid.

VOCs are present in groundwater underlying the Site. Therefore, vapor intrusion exposure is a potential completed exposure pathway for Plant #1, where residual groundwater contamination remains. Soil vapor and indoor air samples have not been collected near Plant #1 therefore the EPA conducted a screening-level vapor intrusion evaluation as part of this FYR using the most recent groundwater results to determine if this potential exposure pathway requires more in-depth analysis. The only COC detected in the May 2016 results above ROD cleanup goals was vinyl chloride. The maximum concentration detected immediately southeast of Plant #1 in RW-2 was used in the EPA's Vapor Intrusion Screening Level Calculator (Appendix G). The screening-level vapor intrusion risk evaluation used default commercial/industrial land use exposure assumptions and indicates that the cancer risks associated with RW-2 are within EPA's risk management range of 1×10^{-6} to 1×10^{-4} and below the noncancer HQ of 1.0. These results indicate the vapor intrusion exposure pathway does not require further evaluation.

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

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

7.4 Technical Assessment Summary

The soil remedy is functioning as intended by the decision documents. The groundwater remedy is functioning but not within the estimated timeframe specified in the 2008 AROD. According to the 2008 AROD, groundwater cleanup goals would be met in 5 years or less; however, despite a continued decline in concentrations over the last 5 years following the final in-situ injection of substrate in 2011, three wells still exceed the cleanup goal of 1 µg/L for vinyl chloride, a TCE breakdown product. A screening-level vapor intrusion risk evaluation was conducted because this exposure pathway had not been evaluated in the past. The results indicate that this exposure pathway does not require further evaluation as the concentrations are within the EPA risk management range and below the noncancer HQ of 1.0. In addition, groundwater is not currently used at the Site and restrictions are in place to prevent installation of potable wells. However, to ensure long-term protectiveness of the remedy several monitoring wells should be repaired and secured.

8.0 Issues, Recommendations and Follow-up Actions

Table 12: Issue and Recommendation Identified in the Five-Year Review

OU(s): 1	Issue Category: Operations and Maintenance			
	Issue: Several monitoring wells are damaged and not secure and not all wells have been monitored on a regular basis.			
	Recommendation: Repair all wells that were damaged and not secured and ensure all relevant wells are monitored on a regular basis.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/State	9/7/2017

The following additional items, though not expected to affect protectiveness, warrant additional follow-up:

- Include copies of this FYR report in the Site repository.
- Ensure all monitoring wells are properly abandoned once groundwater cleanup goals have been achieved and documented in accordance with EPA guidance.
- Evaluate the need to prepare an O&M Plan or a Quality Assurance Project Plan to outline the data necessary to be collected to close-out the Site under CERCLA.

9.0 Protectiveness Statement

Table 13: Protectiveness Statement

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy currently protects human health and the environment because contaminated soils have been removed such that no land use restrictions are needed, groundwater contamination remains on site and institutional controls are in place that restrict the use of groundwater at the Site. In order for the remedy to be protective in the long term, site monitoring wells need to be repaired and monitored on a regular basis.

10.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Information System Site Information accessed online:
http://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0400548

EPA Record of Decision: Hollingsworth Solderless Terminal Company. EPA ID: FLD004119681. Fort Lauderdale, FL. April 10, 1986.

EPA Explanation of Significant Differences: Hollingsworth Solderless Terminal Company Superfund Site. August 6, 2001.

EPA Amended Record of Decision: Hollingsworth Solderless Terminal Company. EPA ID: FLD004119681. Fort Lauderdale, FL. November 24, 2008.

EPA Sampling Investigation Report for the Hollingsworth Solderless Terminal Company Superfund Site. Prepared by EPA's Science and Ecosystem Support Division. February 11, 2015.

EPA Sampling Investigation Report for the Hollingsworth Solderless Terminal Company Superfund Site. Prepared by EPA's Science and Ecosystem Support Division. Project Identification Number: 16-0363. July 7, 2016.

EPA Quality Assurance Project Plan for the Hollingsworth Solderless Terminal Company Superfund Site. Prepared by EPA's Science and Ecosystem Support Division. January 5, 2015.

Operations and Maintenance Plan. Ebasco Environmental. September 22, 1992.

Remedial Action Report for the Hollingsworth Solderless Terminal Company Site. Ebasco Environmental. May 28, 1993.

Remedial Action Report for the Hollingsworth Solderless Terminal Company Site. September 2002.

Fourth Five-Year Review Report for Hollingsworth Solderless Terminal Company Superfund Site, Fort Lauderdale, Broward County, Florida. Prepared by EPA Region 4. September 7, 2011.

Appendix B: Press Notice

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4 ANNOUNCES THE START OF FIVE YEAR REVIEW FOR THE HOLLINGSWORTH SOLDERLESS TERMINAL COMPANY

Section 121 of CERCLA, as amended by SARA, requires that remedial actions of hazardous substances be subject to a five-year review to ensure that the selected remedy continues to protect human health and the environment.

Site Background: The Hollingsworth Site is located at 700 NW 57th Place in the City of Fort Lauderdale, Broward County, Florida. The Site consists of approximately 3.5 acres and is occupied by two buildings separated by NW 57th Place. The Site is bounded by asphalt and dirt alleyways and a mixture of commercial and light industrial properties. The site is located within the 100 year flood plain and is topographically flat.

From 1968 until 1982, the Site manufactured solderless electrical terminals, consisting of a conductive metal portion and a plastic sleeve. The manufacturing process included heat treatment in molten salt baths, de-greasing and electroplating. For approximately eight years, the company disposed of wash water and process wastewater contaminated with trichloroethene and heavy metals into drain fields and an injection well located onsite, resulting in contamination of soil and groundwater.

Cleanup Action: The Record of Decision (ROD) was signed in 1986. The ROD identified the selected remedy to be as follows:

- Proper abandonment of the old injection well and all other PVC wells on site,
- Treatment of VOC contaminated soil on site;
- Treatment of VOC contaminated groundwater on site; and
- Injection of treated groundwater near the site.

In 2001, additional excavation of two additional areas took place. In April 2011, a small-scale bioremediation remedy was implemented. Currently, only very low levels contaminants remain.

Contact Information: If you have any questions, contact information is provided below.

Gale Jackson, Project Manager
404-562-8937 / 1-800-435-9234 (Toll Free)

L'Tonya Spencer,
Community Involvement Coordinator
404-562-8463 / 1-877-718-3752 (Toll Free)

U.S. EPA Region 4 Mailing Address
Waste Division (Mailcode: 4WD-SRTSB)
61 Forsyth Street
Atlanta, Georgia 30303
2/18/2016

Local Document Repository
Broward County Main Library
100 South Andrews Avenue
Ft. Lauderdale, FL 33301

Appendix C: Interview Forms

Hollingsworth Solderless Terminal Superfund Site **Five-Year Review Interview Form**

Site Name: **Hollingsworth Solderless Terminal** **EPA ID No.:** **FLD004119681**

Subject Name: **John Moore** **Affiliation:** **Broward County Environmental Protection and Growth Management**

Time: _____ **Date:** **2016**

Interview Location: _____

Interview Format (circle one): **In Person** **Phone** **Mail** **Other: Email**

Interview Category: **Local Government**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date? *Yes.*

2. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future? *Yes. The EPA has been very cooperative and responsive to all requests for status updates.*

3. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing? *Not to my knowledge.*

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

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

6. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? *Yes, to the best of my knowledge.* How can EPA best provide site-related information in the future? *Continue to respond to requests for status updates as in the past.*

7. Do you have any comments, suggestions or recommendations regarding the project? *Not at this time.*

Hollingsworth Solderless Terminal Superfund Site **Five-Year Review Interview Form**

Site Name: **Hollingsworth Solderless Terminal** **EPA ID No.:** **FLD004119681**
Interviewer Name: _____ **Affiliation:** ____
Subject Name: **Galo Jackson** **Affiliation:** **EPA Region 4**
Subject Contact Information: **(404) 562-8937**
Time: **10:00 AM** **Date:** **4/21/2016**
Interview Location: _____

Interview Format (circle one): **In Person** **Phone** **Mail** **Other: Email**

Interview Category: **EPA Remedial Project Manager**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)? *Since the cleanup started at the Hollingsworth Solderless site, contaminant concentrations in the groundwater have been brought down dramatically. Initially, the groundwater had concentrations of about 226,000 parts per billion total volatile organic compounds, principally trichloroethylene (TCE), before the groundwater recovery and treatment system operated. Currently, there exist generally very low-to-trace concentrations of the degradation products cis-1,2-dichlorethylene (cis-2DCE) and vinyl chlorine (VC), which are degradation products of TCE. No TCE has been detected for some time. The current challenge is to achieve and maintain the ROD's remedial goals for cis-2DCE of 70 parts per billion (ppb) and 1.0 ppb, respectively. It should be noted that Broward County has documented background low (single digit) level concentrations of vinyl chloride. See the Metcalf and Eddy, Inc. October 1999 report.*

   With some periods during which the Site's buildings have been vacant due to reasons unrelated to the cleanup, the Site has been in continuous use.

2. What have been the effects of this Site on the surrounding community, if any? *Over the past year, owners of nearby properties have expressed the desire to have the Site deleted for the National Priorities List, because the borrowing costs to these businesses are greater due to the proximity of the Hollingsworth Solderless Terminal site.*

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup? *The Region has not received any complaints since the last five-year review.*

4. What is your assessment of the current performance of the remedy in place at the Site? *As mentioned in the response to the first question, the challenge is to meet the cleanup goals of 1 part per billion high for vinyl chloride. Although most wells associated with the Site currently are meeting the Florida MCL, on the average about three of them exceed the vinyl chloride goal.*

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues? *The only institutional control in effect, aside from Broward County Ordinance, is that offered by Chapter 62-524 of the Florida Administrative Code, an institutional control in the form of restrictions on the installation of new potable*

water wells. Rules 62-524.550, 62-524-600, 62-524-650 and 62-524-700 impose restrictions on well construction, water quality testing and permitting of groundwater wells located in delineated areas.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details. *No*

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy? *Not applicable.*

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Hollingsworth Solderless Terminal Superfund Site	**Date of Inspection:** 02/23/2016
Location and Region: Fort Lauderdale, FL/Region 4	**EPA ID:** FLD004119681
Agency, Office or Company Leading the Five-Year Review: EPA Region 4	**Weather/Temperature:** Cloudy, 80s

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☒ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Soil excavation, SVE, and in situ bioremediation
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** Galo Jackson (Name) EPA RPM (Title) 4/21/2016 (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: 404-562-8937
   Problems, suggestions ☐ Report attached: _____

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

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

   Agency EPA
   Contact Galo Jackson (Name) EPA RPM (Title) 4/21/2016 (Date) 404-562-8937 (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency FDEP
   Contact Kelsey Helton (Name) Project Manager (Title) 07/22/2016 (Date) 850-245-8969 (Phone No.)
   Problems/suggestions ☐ Report attached: No report attached, comments provided without interview form.

   Agency Broward County
   Contact John Moore (Name) Engineer (Title) 4/1/2016 (Date) 954-519-0307 (Phone No.)
   Problems/suggestions ☐ Report attached: _____

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

   Agency _____

	Contact Name	Title	Date	Phone No.
	Problems/suggestions ☐ Report attached: ____			
4.	**Other Interviews** (optional) ☒ Report attached: ____			
	III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)			
1.	**O&M Documents**			
	☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
	☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
	☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: The groundwater pump and treat system was dismantled in 1994.			
2.	**Site-Specific Health and Safety Plan**	☐ Readily available	☒ Up to date	☐ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☒ Up to date	☐ N/A
	Remarks: ____			
3.	**O&M and OSHA Training Records**	☐ Readily available	☒ Up to date	☐ N/A
	Remarks: ____			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: ____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: ____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: ____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: ____			
7.	**Ground Water Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: ____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: ____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: ____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: ____			
	IV. O&M COSTS			

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☐ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☒ EPA/SESD

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☒ Breakdown attached

Total annual cost by year for review period if available

From: 1/1/2011 Date	To: 12/31/2011 Date	$ 0 Total cost	☐ Breakdown attached
From: 1/1/2012 Date	To: 12/31/2012 Date	$5,988 Total cost	☐ Breakdown attached
From: 1/1/2013 Date	To: 12/31/2013 Date	$7,475 Total cost	☐ Breakdown attached
From: 1/1/2014 Date	To: 12/31/2014 Date	$ 0 Total cost	☐ Breakdown attached
From: 1/1/2015 Date	To: 12/31/2015 Date	$28,000 Total cost	☐ Breakdown attached

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

Describe costs and reasons: The higher cost for 2015 is due to several wells still exceeding cleanup goals requiring additional post-injection monitoring for the Site.

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

A. Fencing

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

Remarks: _____

B. Other Access Restrictions

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

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

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

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ _____ _____

Name Title Date Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: On site groundwater remains onsite and is not used; Site located in a FDEP Groundwater Delineation Area.

D. General

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

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

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

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

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

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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

Arial extent: _____ Depth: _____

Remarks: _____

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

Lengths: _____ Widths: _____ Depths: _____

Remarks: _____

3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable	☐ N/A
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
C. Letdown Channels		☐ Applicable	☐ N/A
	(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill		

cover without creating erosion gullies.)

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

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

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

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

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

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

D. Cover Penetrations ☐ Applicable ☐ N/A

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

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

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

4. **Extraction Wells Leachate**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

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

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

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs maintenance
Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs maintenance
Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs maintenance ☐ N/A
Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks: _____

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

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A
☐ Siltation not evident
Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____
☐ Erosion not evident
Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A
Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement: _____ Vertical displacement: _____
Rotational displacement: _____

Remarks: _____

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

Remarks: _____

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

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

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

Area extent: _____ Depth: _____

Remarks: _____

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

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

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

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

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

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

Remarks: System was dismantled in 1994.

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

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

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

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

☐ Metals removal ☐ Oil/water separation ☒ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

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

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of ground water treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

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

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

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

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

Remarks: _____

4. **Discharge Structure and Appurtenances**

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemicals and equipment properly stored

Remarks: _____

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

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

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

Remarks: Several wells were not secured with locks as they appeared damaged.

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

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

Remarks: _____

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

The remedy was designed to prevent migration of contaminated groundwater into the Biscayne aquifer and to remove the sources of contamination from overlying soil and drainfields. Groundwater contaminant concentrations appeared to be declining across the Site until January 2015 when vinyl chloride and cis-2DCE concentrations were observed significantly above cleanup goals on the west side of former Plant #1 in the vicinity of IW-1 and RW-2. The EPA resampled these wells in May 2016. The May 2016 samples showed that the 2015 concentrations were likely anomalies for vinyl chloride and cis-2DCE. The most recent concentrations of vinyl chloride were only slightly above the cleanup goal of 1 µg/L and were consistent with the concentrations detected in 2010. Similarly, the May 2016 sample concentrations for cis-2DCE were below the cleanup goal of 70 µg/L. Wells downgradient of IW-1 and RW-2 showed concentrations of vinyl chloride and cis-2DCE below cleanup goals.

B. Adequacy of O&M

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

Several wells may have been damaged from traffic where top of casings were damaged and locks broken.

C. Early Indicators of Potential Remedy Problems

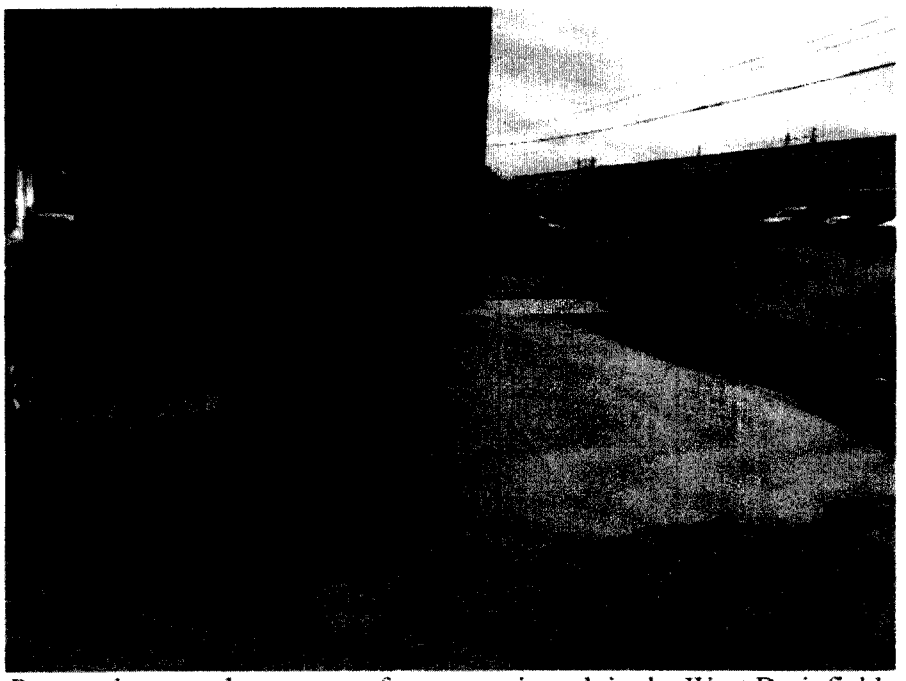
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

O&M costs were higher due to the need for ongoing groundwater monitoring following injections.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The EPA plans to resample several wells on the east side of former Plant #1 to determine if the remedy requires optimization or not.

Appendix E: Photographs from Site Inspection Visit



Removal area and cover over former septic tank in the West Drainfield.

View along the west side of the Site.

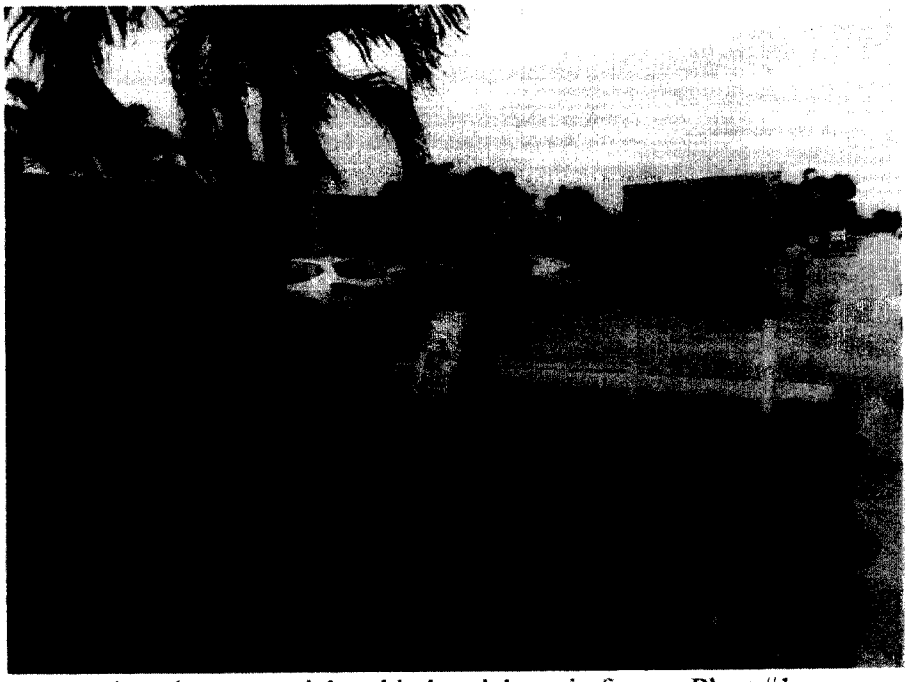
Approximate location of former injection well used for disposal.

Former Plant 2. now used by commercial businesses.

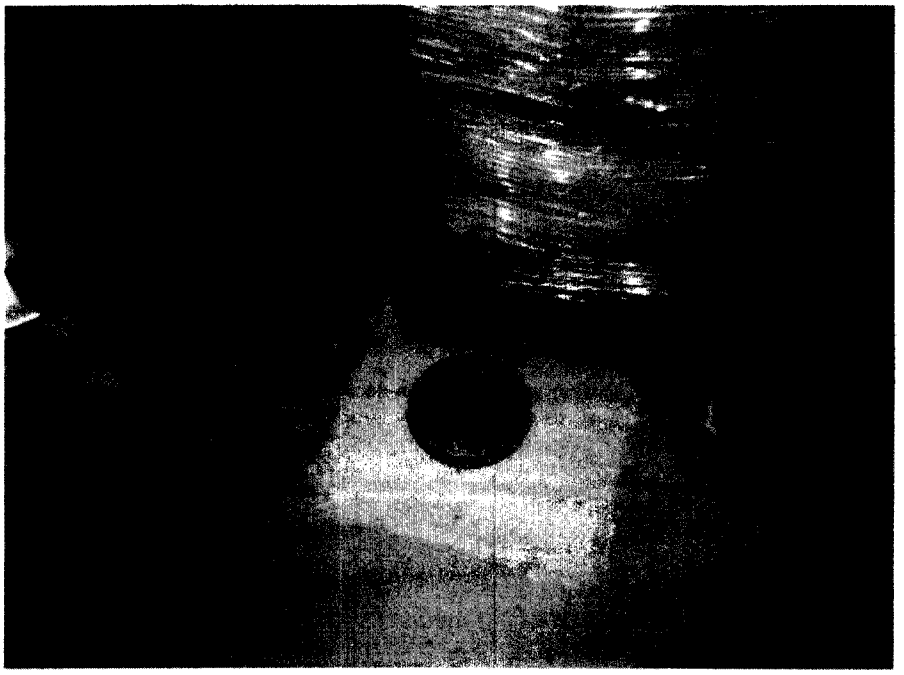
Un-labeled monitoring well.

Site inspection participants observe monitoring well cluster 2.

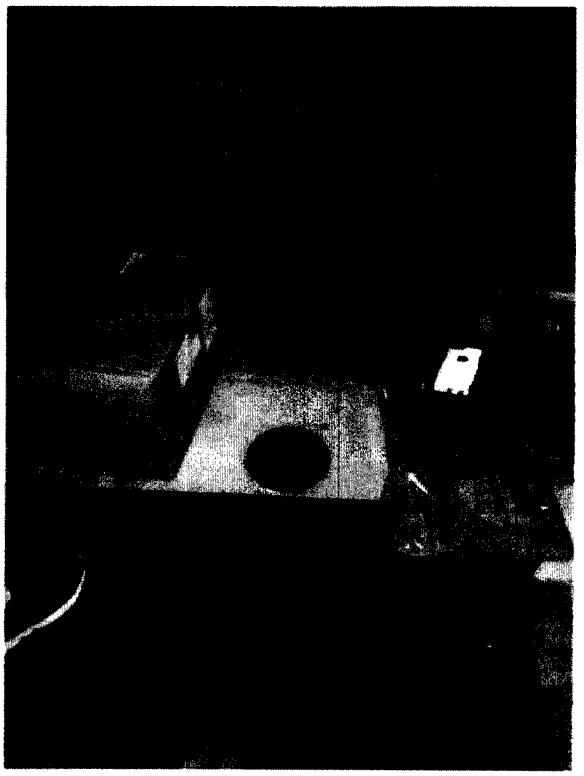
Unsecured monitoring well in the northwest corner of Plant #1.



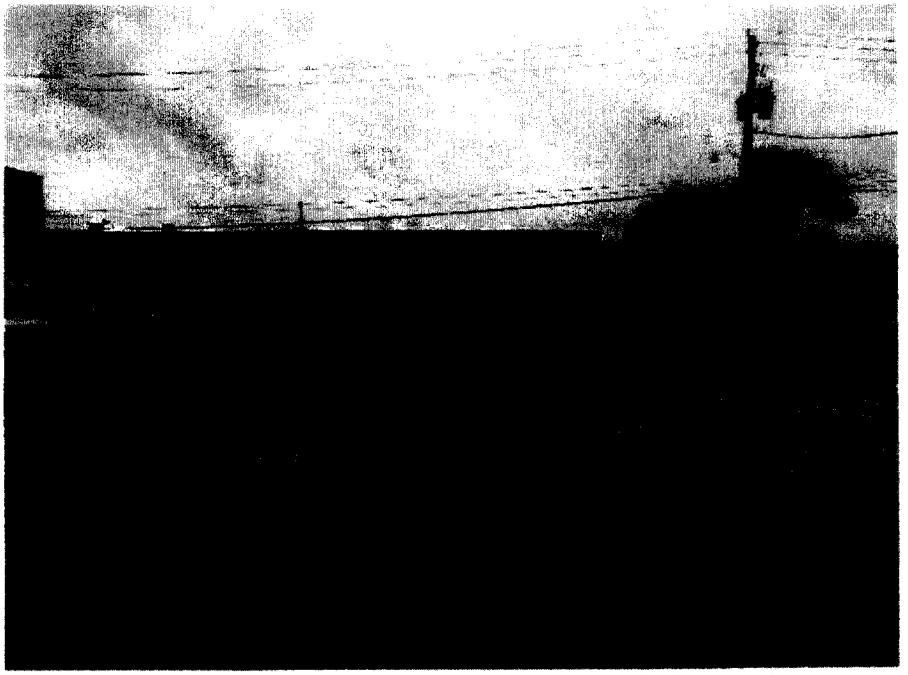
Continued commercial and industrial use in former Plant #1 area.



Secured monitoring well PMW-6 inside a uniform supply facility.



Secured injection well IW-1 inside a uniform manufacturing facility.



A view of the western portion of the Site, facing south.

Appendix F: Supplemental Information Supporting the Data Review

Figure F-1: Monitor Well Location Map

Sampling Investigation Report
Hollingsworth Solderless Terminal Company

Figure 1
Sample Location Map
Hollingsworth Solderless Terminal
Fort Lauderdale, Florida

SESD Project Number 15-0069

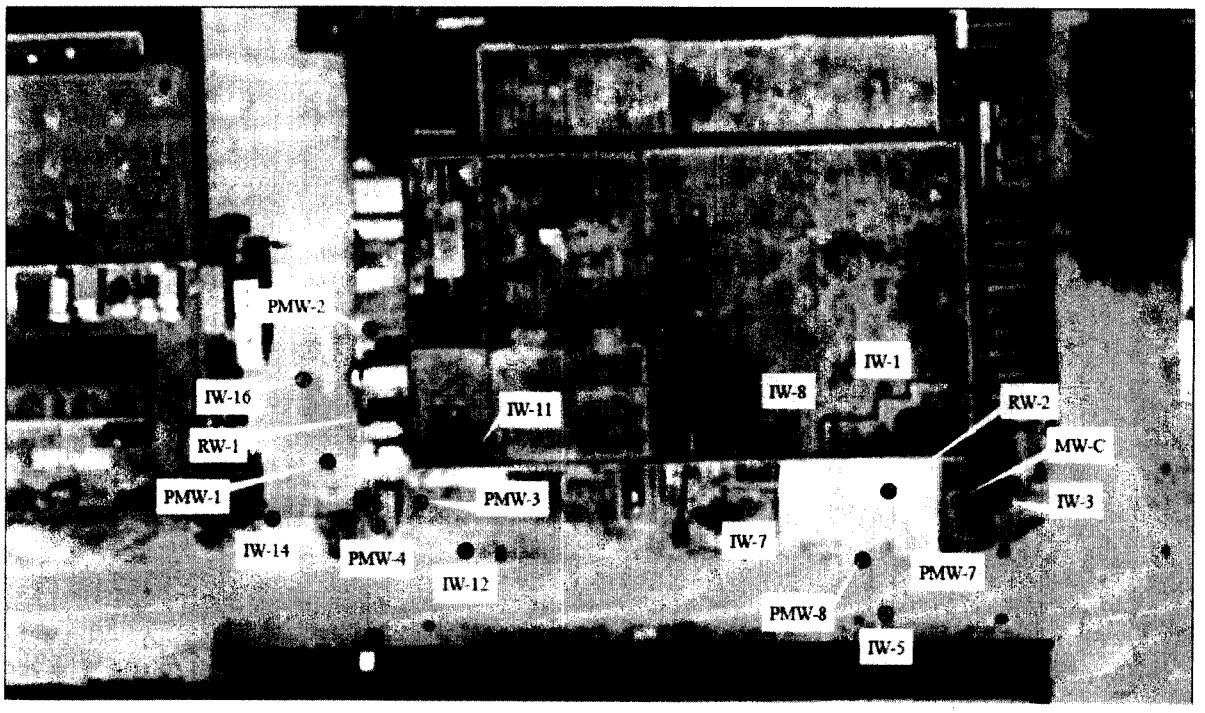


Table F-1: Current and Historical Groundwater Data – 2010 to 2016

	Trichloroethene (µg/L)									
Remedial Target Level	**5.0 µg/L MCL, 3.0 µg/L Clean Up Goal, 300 µg/L FLNADC**									
Station ID	**November 2010**		**January 2012**		**April 2013**		**January 2015**		**May 2016**	
IW-1	0.50 U		--		--		12 U		0.50 U	0.50 U
IW-5	0.50 U		--		--		0.50 U		0.50 U	
IW-11	0.50 U		--		--		0.50 U		0.50 U	
IW-12	0.50 U		--		--		0.50 U		0.50 U	
IW-14	0.50 U,O		--		--		0.50 U		0.50 U	
PMW-1	0.50 U,O	0.50 U,O	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U	
PMW-2	0.50 U		--		--		0.50 U		**0.51**	
PMW-3	0.50 U		0.50 U		0.50 U		0.50 U		0.50 U	
PMW-5	0.50 U,O		--		--		--		0.50 U	
PMW-6	0.50 U		--		--		--		0.50 U	
PMW-7	0.50 U		--		--		0.50 U		0.50 U	
RW-1	**1.4**		--		0.50 U		**0.70**	**0.62**	**0.25 J**	
RW-2	**0.13 J,O**		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		0.50 U	

	Vinyl Chloride (µg/L)									
Remedial Target Level	**2.0 µg/L MCL, 1.0 µg/L Clean Up Goal, 100 µg/L FLNADC**									
Station ID	**November 2010**		**January 2012**		**April 2013**		**January 2015**		**May 2016**	
IW-1	**1.1**		--		--		**1,100**		**1.3**	**1.6**
IW-5	**0.46**		--		--		0.50 U		0.50 U	
IW-11	**0.24**		--		--		**0.74**		0.50 U	
IW-12	**0.022**		--		--		0.50 U		0.50 U	
IW-14	**0.94 O**		--		--		0.50 U		0.50 U	
PMW-1	**36 O**	**34 O**	**26**		**6.8**		**3.9**	**3.8**	**1.1**	
PMW-2	**0.032 O**		--		--		0.50 U		0.50 U	
PMW-3	**8.7 O**		**2.4**		**4.5**		**0.39 J,O**		**0.14 J,O**	
PMW-5	**0.98 O**		--		--		--		**0.35 J,O**	
PMW-6	**0.11**		--		--		--		**0.57**	
PMW-7	**0.10 O**		--		--		0.50 U		0.50 U	
RW-1	**3.8**		--		**1.3**		**1.4**	**1.4**	**0.88**	
RW-2	**120**		**3.9**	**3.9**	**48**	**50**	**35**		**45**	

Detections are bold. Data shaded exceed a Remedial Target Level
U - The analyte was not detected at or above the reporting limit.
J - The identification of the analyte is acceptable: the reported value is an estimate.
O - Additional data qualifier. See Final Analytical Report for qualifier.

Table F-1: Current and Historical Groundwater Data – 2010 to 2016 (continued)

	cis-1,2-Dichloroethene (µg/L)									
Remedial Target Level	**70 µg/L MCL, 70 µg/L Clean Up Goal, 700 µg/L FLNADC**									
Station ID	**November 2010**		**January 2012**		**April 2013**		**January 2015**		**May 2016**	
IW-1	0.50 U		--		--		**250**		**0.26 J,O**	**0.31 J,O**
IW-5	**0.25 J,O**		--		--		0.50 U		0.50 U	
IW-11	**0.39 J,O**		--		--		0.50 U		0.50 U	
IW-12	0.50 U		--		--		0.50 U		0.50 U	
IW-14	**0.20 J,O**		--		--		0.50 U		0.50 U	
PMW-1	**38 O**	**37 O**	**31**		**7.2**		**2.2**	**2.2**	**1.2**	
PMW-2	0.50 U		--		--		0.50 U		**0.69**	
PMW-3	**1.3 O**		**0.46, J,O**		**2.7**		**0.20 J,O**		0.50 U	
PMW-5	**0.63 O**		--		--		--		**1.0**	
PMW-6	0.50 U		--		--		--		0.50 U	
PMW-7	**0.28 J,O**		--		--		**0.22 J,O**		0.50 U	
RW-1	7.7		--		**1.0**		**1.5**	**1.4**	**1.5**	
RW-2	**17**		**2.0**	**2.1**	**14**	**15**	**55**		**12**	

	trans-1,2-Dichloroethene (µg/L)									
Remedial Target Level	**100 µg/L MCL, 100 µg/L Clean Up Goal, 1,000 µg/L FLNADC**									
Station ID	**November 2010**		**January 2012**		**April 2013**		**January 2015**		**May 2016**	
IW-1	0.50 U		--		--		**8.8 J, O**		**0.44 J**	**0.60**
IW-5	0.50 U		--		--		0.50 U		0.50 U	
IW11	0.50 U		--		--		0.50 U		0.50 U	
IW-12	0.50 U		--		--		0.50 U		0.50 U	
IW-14	**1.0 O**		--		--		0.50 U		0.50 U	
PMW-1	**1.8 O**	**1.9 O**	--		--		**0.21 J,O**	**0.19 J,O**	0.50 U	
PMW-2	0.50 U		--		--		0.50 U		0.50 U	
PMW-3	**0.29 J,O**		--		--		0.50 U		0.50 U	
PMW-5	0.50 U		--		--		--		0.50 U	
PMW-6	0.50 U		--		--		--		0.50 U	
PMW-7	0.50 U		--		--		0.50U		0.50 U	
RW-1	**0.47 J,O**		--		--		0.50 U	0.50 U	0.50 U	
RW-2	**2.2**		--		--		**0.46 J,O**		**0.73**	

Detections are bold. Data shaded exceed a Remedial Target Level
U - The analyte was not detected at or above the reporting limit
J - The identification of the analyte is acceptable; the reported value is an estimate.
O - Additional data qualifier. See Final Analytical Report for qualifier

Figure F-2: Summary of Cis-2DCE and Vinyl Chloride 2015 Groundwater Results

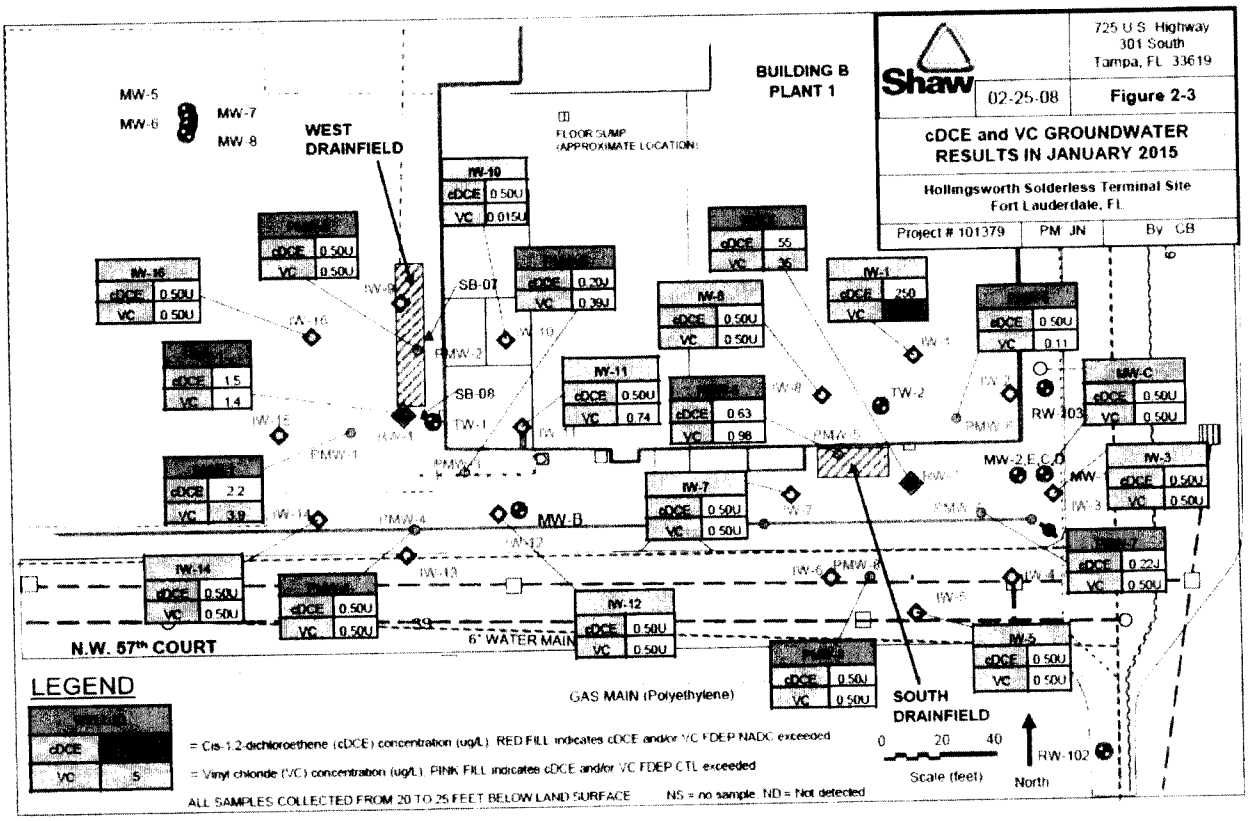
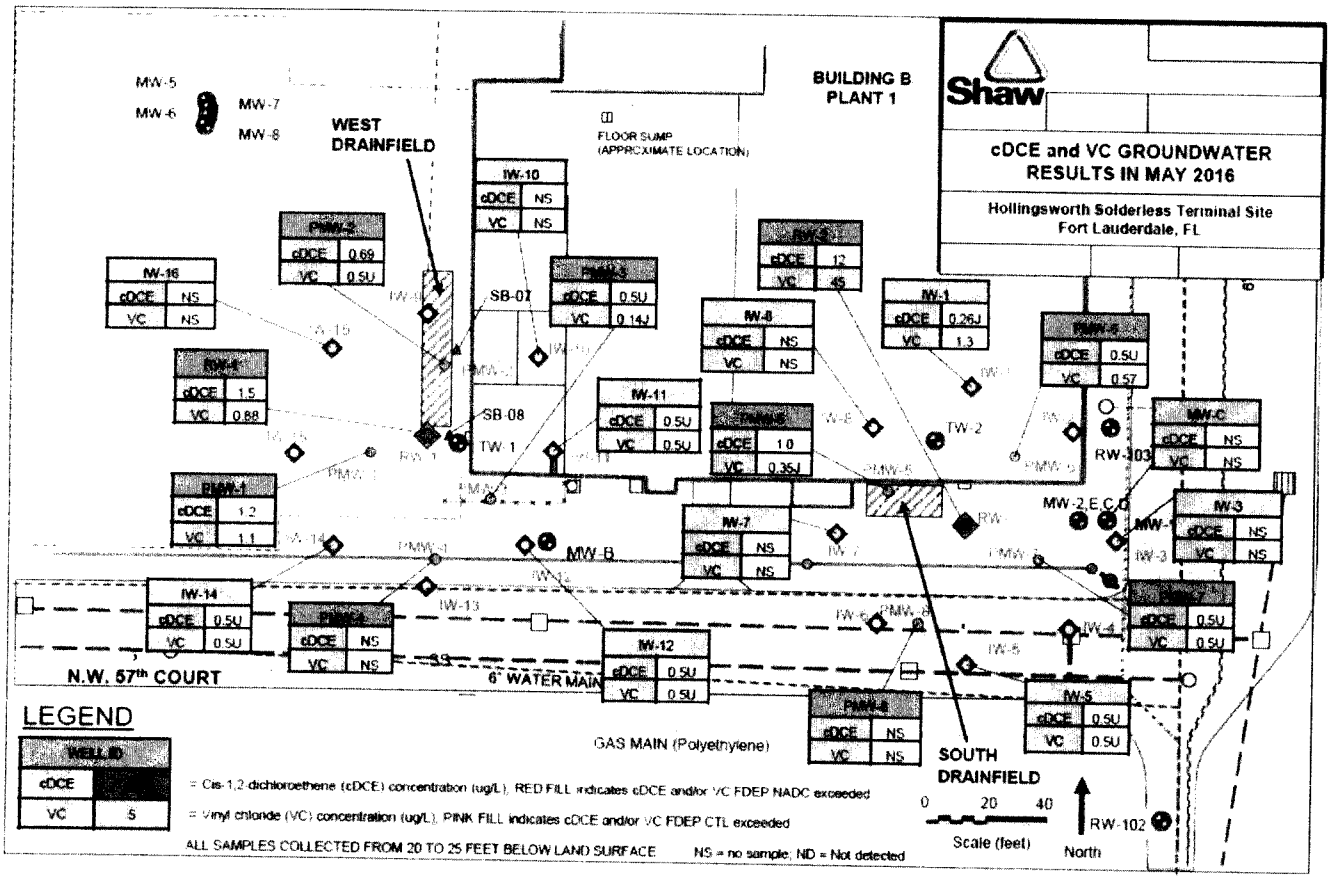


Figure F-3: Summary of Cis-12DCE and Vinyl Chloride 2016 Groundwater Results



Appendix G: Risk Assessment Analysis in Support of Question B

The 1986 ROD cleanup goals for soil in the East Drainfield were soil concentrations that did not result in exceedance of the EPA's Extraction Procedure Toxicity Characteristics (EP) toxicity test results for copper, lead and nickel, while a level of 1 mg/kg was established for total VOCs. The EP toxicity criteria have not changed since the 1986 ROD. The protectiveness of the soil cleanup goal of 1 mg/kg for total VOCs cannot be evaluated because the value is not chemical-specific. However, in the 2001 ESD, the EPA developed chemical-specific soil cleanup goals for three VOCs (trans12DCE, TCE and vinyl chloride) based on leaching to groundwater. To determine if the leachability-based levels are also protective for direct contact, the cleanup levels were compared to the EPA's most current residential-based RSLs for soil as well as the state SCTLs established under FAC Chapter 62-777. As demonstrated in Table G-1, the remedial goals established in the ESD remain valid because the relative risk associated with the goals based on the EPA's RSLs demonstrates that the remediation goals are below 1×10^{-6}, the lower bound of the EPA's risk management range of 1×10^{-6} to 1×10^{-4}, and below the EPA's target noncancer hazard quotient (HQ) of 1.0 for residential exposure. The risks are also below FDEP's target level of 1×10^{-6}.

Table G-1: Evaluation of Soil Cleanup Goals

COC	2001 ESD Cleanup Goals (mg/kg)	State Residential SCTL Direct Contact (mg/kg)	EPA Residential Soil RSLs (mg/kg)[a]		Relative Risk of 2001 ESD Remedial Goal		Cleanup Goal Exceeds State SCTL?
			Cancer Risk 1×10^{-6}	Noncancer HQ = 1	Cancer Risk[b]	Noncancer HQ	
Trans-1,2-dichloroethylene	0.4	53	NA	1,600	--	0.0003	No
Trichloroethylene	0.030	6.4	0.94	4.1	3.2×10^{-8}	0.007	No
Vinyl chloride	0.007	0.2	0.06	70	1.2×10^{-7}	0.0001	No

Notes:

a. The current RSLs are available at http://www.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 12/28/2015).

b. Cancer risks calculated using the following equation:

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

Noncancer HQ = Cleanup level ÷ non-cancer RSL

NA – toxicity value not established for this COC.

In addition, the groundwater cleanup goals were ARARs and remain valid since the values have not changed since the 2008 AROD. However, to evaluate the effect of any changes of toxicity values on the groundwater cleanup goals, a screening-level risk evaluation was conducted. As shown in Table G-2 only the cleanup goal for cis-12DCE results in a noncancer HQ slightly greater than 1.0. The cleanup goal is based on the federal and state MCL of 70 µg/L which remain current. In addition, the EPA reviewed cis-12DCE as part of the Six Year Review and determined that the MCL is still protective of human health.

Table G-2: Evaluation of Groundwater Cleanup Goals

COC	2008 AROD Cleanup Goals (µg/L)	State Residential GCTL (µg/L)	EPA Tap Water RSLs (µg/L)[a]		Relative Risk		Cleanup Goal Exceeds State GCTL?
			Cancer Risk 1×10^{-6}	Noncancer HQ = 1	Cancer Risk[b]	Noncancer HQ	
cis-12DCE	70	70	NA	36	--	1.9	No
trans12DCE	100	100	NA	360	--	0.28	No
TCE	3.0	3	0.49	2.8	6.1×10^{-6}	1	No
Vinyl chloride	1.0	1	0.019	44	5.3×10^{-5}	0.023	No

Notes:

a. The current RSLs are available at http://www.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 7/20/2016).

b. Cancer risks calculated using the following equation:

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

Noncancer HQ = Cleanup level ÷ non-cancer RSL

NA = toxicity value not established for this COC.

VOCs are present in groundwater underlying the Site. Therefore, vapor intrusion exposure is a potential completed exposure pathway for Plant #1 where residual groundwater contamination remains. A screening-level vapor intrusion evaluation was conducted to determine if this potential exposure pathway requires more in-depth analysis. Soil vapor samples have not been collected near Plant #1. Therefore, the most current groundwater data collected in May 2016 from wells located within the building footprint or adjacent to the building were used. Those COCs exceeding the ROD cleanup goals were included. The only COC that exceeded the ROD cleanup goal in the May 2016 data set is vinyl chloride.

The maximum detections of vinyl chloride in the May 2016 sampling event was entered into the EPA's Vapor Intrusion Screening Level (VISL) calculator to evaluate this exposure pathway. As shown in Table G-3, the maximum concentration of VOCs observed in 2016 was in RW-2, resulting in cancer risks within the EPA's risk management range of 1×10^{-6} to 1×10^{-4} and below the EPA's noncancer HQ of 1.0. These results indicate that the vapor intrusion exposure pathway does not require further evaluation as the concentrations continue to decline over time.

Table G-3: Screening-Level Vapor Intrusion Evaluation at the Plant Building #1

COC	Groundwater Concentration Detected in May 2016 (µg/L)[a]	2015 VISL Calculator[b] (Average groundwater temperature 25°C)	
		Industrial Exposure	
		Cancer Risk	Noncancer HQ
Maximum near Plant #1			
Vinyl chloride	45 (RW-2)	1.8×10^{-5}	0.12

Notes:

a. Data obtained from the EPA on June 2, 2016. Samples collected by the EPA's Science and Ecosystem Support Division (SESD) in May 2016.

b. VISL calculator version 3.46 accessed at http://www.epa.gov/vaporintrusion

The U.S. Environmental Protection Agency, Region 4 Announces the Completion of the Fifth Five-Year Review for the Hollingsworth Solderless Terminal Superfund Site, Fort Lauderdale, Broward County, Florida

Purpose/Objective: The Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act of 1986, requires review of remedial actions addressing hazardous substances every five years to make sure the selected remedies remain protective of human health and the environment. In 2016, EPA conducted the fifth Five-Year Review of the remedies for contaminated media (groundwater and soils) associated with the Hollingsworth Solderless Terminal Superfund site (the Site) in Fort Lauderdale, Florida.

Site Background: The 3.5-acre area is located in a commercial and industrial area in Fort Lauderdale. The Hollingsworth Company made solderless electrical connectors on site from 1968 to 1982, when it filed for bankruptcy. In 1982, the company dismantled and sold its plant equipment. The facility was purchased in 2004 and remodeled. Today, several tenants use the area for commercial purposes. Past soldering operations resulted in the contamination of soil and groundwater with solvents and heavy metals. EPA listed the Site on the Superfund program's National Priorities List (NPL) in 1983.

Cleanup Actions: EPA selected the Site's cleanup plan in the Site's 1986 Record of Decision (ROD), 2001 Explanation of Significant Differences (ESD) and 2008 Amended ROD. The plan included treatment of volatile organic compounds (VOCs) in the soil near the former East Drainfield, recovery and treatment of contaminated groundwater, excavation of VOC-contaminated soil, bioremediation of groundwater near the former South Drainfield and septic tank in the West Drainfield, and institutional controls to restrict groundwater use.

Five-Year Review Protectiveness Statement: The remedy currently protects human health and the environment because contaminated soils have been removed such that no land use restrictions are needed, groundwater contamination remains on site and institutional controls are in place that restrict the use of groundwater at the Site. In order for the remedy to be protective in the long term, site monitoring wells need to be repaired and monitored on a regular basis.

Five-Year Review Schedule: EPA completed the fifth Five-Year Review process for the Site in September 2016. The next Five-Year Review for the Site is required within five years of the signature of this Five-Year Review, by September 2021.

Contact Information: Community members who have questions about the Site or the Five-Year Review process are asked to contact:

Galo Jackson, EPA Remedial Project Manager
Phone: (404) 562-8937
Email: jackson.galo@epa.gov

L'Tonya Spencer, EPA Community Involvement Coordinator
Phone: (404) 562-8913 | (800) 564-7577 (toll-free)
Email: spencer.latonya@epa.gov

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

Additional information is available at the Site's local document repository, located at Broward County Public Library, 100 South Andrews Avenue, Level 5, Fort Lauderdale, Florida 33301, and online at: https://cumulis.epa.gov/supercpad/CurSites/csitinfo.cfm?id=0400548&msspp=med.

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Five-Year Review Report

Third Five-Year Review Report
for
Miami Drum Services
FLD076027820

Miami-Dade County, Florida

July 2013

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by: Date: 7/31/13

Franklin E. Hill
Director, Superfund Division

10943832

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
BDL	Below Detection Limit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
DERM	Dade Environmental Resources Management
EPA	United States Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
FOD	Frequency of Detection
FS	Feasibility Study
FYR	Five-Year Review
GCTL	Ground Water Cleanup Target Level
IC	Institutional Control
MCL	Maximum Contaminant Level
mg/kg	Milligrams per Kilogram
N/A	Standard Not Specified or Not Applicable
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SFWMD	South Florida Water Management District
TBC	To-Be-Considered
THMs	Trihalomethanes
TTHM	Total Trihalomethanes
µg/L	Micrograms per Liter
VOCs	Volatile Organic Compounds
VISL	Vapor Intrusion Screening Level
WASD	Miami-Dade Water and Sewer Department
WTP	Water Treatment Plant

Executive Summary

Introduction

The Miami Drum Services Superfund Site (the Site) is located in an unincorporated area of Miami-Dade County (formerly Dade County). Part of the Site lies within an 82-acre property owned by the Miami-Dade County Transit Authority (Transit Authority). The Transit Authority property has operated as an operation and maintenance center for the County's light rail system since January 1982.

The Site has two operable units (OUs). The 1.2-acre OU1 addresses soil contamination resulting from the former drum recycling activities and is located within the 82-acre Transit Authority property. The Transit Authority property is partially covered by either dirt with sparse vegetation, asphalt or gravel roads, and is bisected by train car storage tracks. Miami-Dade County anticipates that the Transit Authority property, and thus OU1, will remain in industrial use for the foreseeable future. The Transit Authority has near-term plans to reconfigure existing tracks and construct additional light rail tracks on the property. OU2 addresses ground water contamination at the Site. The Site and two nearby Superfund sites, Varsol Spill and Northwest 58th Street Landfill, compose the Biscayne Aquifer Sites. Ground water contamination from the Site has commingled with ground water contamination from the other Biscayne Aquifer Sites resulting in low, dispersed levels of contamination throughout the 82-acre study area of the Biscayne Aquifer. The Biscayne Aquifer serves as the drinking water supply for Miami-Dade County.

The triggering action for this Five-Year Review (FYR) was the signing of the previous FYR on May 1, 2008.

Remedial Action Objectives

The remedial action objectives (RAOs) established to address human health and environmental concerns for the Site addressed both soil and ground water. The EPA signed the Record of Decision (ROD) for the Site's OU1 on September 13, 1982, which concluded that the remedial action provided an adequate level of cleanup to effectively mitigate and minimize damage to, and provided adequate protection of, public health, welfare and the environment, and that the action was consistent with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program requirements. As described in the 1982 OU1 ROD, the OU1 RAO for soil was to control source contamination at OU1 and to remove contaminated soil that could leach hazardous substances into the Biscayne Aquifer. The OU1 RAO was accomplished through the OU1 soil removal actions. The EPA signed the Biscayne Aquifer Sites ROD on September 16, 1985, selecting a remedy to address ground water contamination through installation of air stripping towers at the Preston and Hialeah Water Treatment Plants (WTPs). The OU2 RAO, set forth in the Biscayne Aquifer Sites ROD, was to provide uncontaminated drinking water to the public.

Technical Assessment

According to the review of site documents, data, ARARs and the site inspection, the selected remedies at the Site are currently functioning as intended by the Site's decision documents.

WASD will continue to operate the air stripping towers at the Preston and Hialeah WTPs. However, concentrations of vinyl chloride have exceeded the MCL and VISL. The EPA conducted a vapor intrusion evaluation in May 2013, considering multiple lines of evidence. The EPA determined that there is no complete vapor intrusion pathway. Ground water well installation and ground water use in the study area are controlled by county regulations, which are designed to ensure that ground water intended for individual and public consumption meets MCLs. The county regulations were in place at the time of the signing of the Biscayne Aquifer Sites ROD as a form of institutional controls. These institutional controls remain in place. However, the Biscayne Aquifer Sites ROD did not require institutional controls as part of the OU2 remedy. Soil removal actions left 3,900 cubic yards of soil with mercury levels in excess of 10 times minimum criteria for ground water in place at OU1. Institutional controls for soil will be required to ensure the long-term protectiveness of the OU1 remedy. The site inspection and interviews confirmed that industrial land use at OU1 is expected to continue and construction plans for the Transit Authority property were identified. Prior to any construction at the Transit Authority property, the County should conduct sampling, as appropriate, prior to any construction within the boundaries of OU1 to ensure that the necessary precautions are taken regarding excavation of any remaining contaminated subsurface soil.

Conclusion

The remedy at OU1 currently protects human health and the environment because the County's removal actions addressed exposure pathways at OU1, including direct contact with contaminated drums and soils, as well as leaching of contamination into the drinking water supply aquifer. However, in order for the remedy to be protective in the long term, institutional controls should be implemented to ensure the long-term protectiveness of the OU1 remedy.

The remedy at OU2 currently protects human health and the environment because ground water treatment is effectively removing VOCs, finished drinking water from the Preston and Hialeah WTPs continues to meet all state and federal drinking water standards prior to being supplied to the public, and there is no complete vapor intrusion pathway for OU1 or the Biscayne Aquifer Sites associated with OU2. Existing county regulations that govern well permitting and use serve as institutional controls to restrict ground water usage in the study area. However, in order for the remedy to be protective in the long term, the need for institutional controls should be documented in a site decision document.

The remedy at the Site currently protects human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are under control. However, to ensure protectiveness in the long term, institutional controls should be designed and implemented as part of the OU1 remedy, and the need for institutional controls at OU2 should be documented in a site decision document.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Miami Drum Services		
EPA ID: FLD076027820		
Region: 4	**State:** FL	**City/County:** Miami-Dade County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" selected above, enter Agency name:** Click here to enter text.
Author name: Lynette Wysocki and Treat Suomi (Reviewed by EPA)
Author affiliation: Skeo Solutions
Review period: October 2012 – May 2013
Date of site inspection: October 30, 2012
Type of review: Policy
Review number: 3
Triggering action date: May 1, 2008
Due date ***(five years after triggering action date)***: May 1, 2013

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	Issue Category: Institutional Controls			
	Issue: Institutional controls for the soil remedy at OU1 were not called for in the Site's decision documents and have not been implemented.			
	Recommendation: Identify OU1's boundaries and design and implement institutional controls for the OU1 soil remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Other-Miami-Dade County	EPA/State	5/1/2015
OU(s): 2	Issue Category: Institutional Controls			
	Issue: County regulations governing well permitting and use are in place but not required by the Biscayne Aquifer Sites ROD.			
	Recommendation: Document the need for institutional controls at OU2 in a site decision document.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	5/1/2015

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
1	Short-term Protective	Click here to enter date.

Protectiveness Statement:
The remedy at OU1 currently protects human health and the environment because the County's removal actions addressed exposure pathways at OU1, including direct contact with contaminated drums and soils, as well as leaching of contamination into the drinking water supply aquifer. However, in order for the remedy to be protective in the long term, institutional controls should be implemented to ensure the long-term protectiveness of the OU1 remedy.

Operable Unit: 2	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):* Click here to enter date.

Protectiveness Statement:
The remedy at OU2 currently protects human health and the environment because ground water treatment is effectively removing VOCs, finished drinking water from the Preston and Hialeah WTPs continues to meet all state and federal drinking water standards prior to being supplied to the public, and there is no complete vapor intrusion pathway for OU1 or the Biscayne Aquifer Sites associated with OU2. Existing county regulations that govern well permitting and use serve as institutional controls to restrict ground water usage in the study area. However, in order for the remedy to be protective in the long term, the need for institutional controls should be documented in a site decision document.

Sitewide Protectiveness Statement (if applicable)

Protectiveness Determination: Short-term Protective	*Addendum Due Date (if applicable):* Click here to enter date.

Protectiveness Statement:
The remedy at the Site currently protects human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are under control. However, to ensure protectiveness in the long term, institutional controls should be designed and implemented as part of the OU1 remedy, and the need for institutional controls at OU2 should be documented in a site decision document.

Five-Year Review Summary Form (continued)

Environmental Indicators
- Current human exposures at the Site are under control. - Current ground water migration is under control.

Are Necessary Institutional Controls in Place?
☐ All ☒ Some ☐ None Institutional controls for the OU1 soil remedy are not called for in the decision documents and have not been implemented but will be required to ensure the long-term protectiveness of the remedy. Existing county regulations, which govern well permitting and use, serve as institutional controls for the OU2 remedy to restrict ground water usage. The need for institutional controls at OU2 should be documented in a site decision document.

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

Has the Site Been Put into Reuse?
☒ Yes ☐ No (Continued use as Miami-Dade County's light rail system operation and maintenance center)

Third Five-Year Review Report
for
Miami Drum Services Superfund Site

1.0 Introduction

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

The United States Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Miami Drum Services Superfund site (the Site) in unincorporated Miami-Dade County, Florida. The EPA's contractor conducted this FYR from October 2012 to May 2013. The EPA is the lead agency for developing and implementing the remedy for the Superfund-financed cleanup at the Site. The Florida Department of Environmental Protection (FDEP; formerly Florida Department of Environmental Regulation (FDER)), as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the third FYR for the Site. The triggering action for this policy review is the previous FYR. The FYR is required due to the fact that hazardous substances, pollutants or contaminants

remain at the Site above levels that allow for unlimited use and unrestricted exposure. This FYR includes a review of the Site's two operable units (OUs). OU1 covers the soil contamination at the Site. OU2 covers ground water contamination from the Biscayne Aquifer Sites, which include the Site, the Varsol Spill Superfund Site and Northwest 58th Street Landfill Superfund Site.

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
Miami Drum Services began operation	1966
Contamination discovered at the Site	November 1979
Miami-Dade County (formerly Dade County) required Miami Drum Services to cease operation through a court order	June 1981
Miami Drum Services ended operations and abandoned the property The EPA and Miami-Dade County conducted feasibility studies at the Site	1981
Dade Environmental Resources Management (DERM) (formerly the Dade County Department of Environmental Quality) began remedial action at the Site's OU1	December 1981
Florida Department of Environmental Protection (FDEP; formerly Florida Department of Environmental Regulation (FDER)) conducted a remedial investigation of the Biscayne Aquifer	1982-1983
DERM completed remedial action at the Site's OU1	January 1982
Action Memorandum approved CERCLA funds	June 1982
The EPA Region 4 concurred with removal actions at the Site's OU1	August 1982
FDEP concurred with removal actions at the Site's OU1 The EPA signed the Site's OU1 Record of Decision	September 13, 1982
Phase I Report – Protection of Biscayne Aquifer issued	October 1982
The EPA proposed the Site to the National Priorities List (NPL)	December 30, 1982
Dade County Wellfield Protection Ordinance adopted	September 1983
The EPA finalized the Site on the NPL	September 8, 1983
Phase II Report – Protection of Biscayne Aquifer issued	February 1984
Phase III Report – Protection of Biscayne Aquifer issued (Feasibility Study completed)	May 1985
Remedial Investigation / Feasibility Study for Biscayne Aquifer Sites (Site's OU2) completed The EPA signed Biscayne Aquifer Sites (Site's OU2) Record of Decision	September 16, 1985
The EPA created the Biscayne Aquifer Protection Plan	1985
Consent Decree finalized	February 25, 1987
Remedial Design for Biscayne Aquifer Sites (Site's OU2) began	September 1, 1987
Remedial Design for Biscayne Aquifer Sites (Site's OU2) completed	September 30, 1987
The EPA executed Cooperative Agreement for Biscayne Aquifer Sites (Site's OU2)	September 30, 1988
Construction of air stripping towers at the Preston and Hialeah Water Treatment Plants (WTP) began	1989
The EPA completed the removal assessment	August 25, 1992
Long-term response action began	September 1, 1992
The EPA conducted the pre-final inspection at the Site	October 29, 1992
Construction of air stripping towers at the Preston and Hialeah WTPs completed and operation of the towers began	1992
Site achieved Construction Completion Preliminary Close Out Report signed	April 28, 1993
The EPA finalized Close Out Report for the Site	June 21, 1993

Event	Date
FDEP issued Initial Title V Air Operation Permit	June 29, 2000
The EPA concluded funding of long-term response action at the Site	September 30, 2002
The EPA signed first FYR for the Site	May 2, 2003
FDEP received Application for a Title V Air Operation Permit Renewal	December 30, 2004
FDEP issued Final Title V Air Operation Permit 0250281-010-AV	January 30, 2006
The EPA signed second FYR for the Site	May 1, 2008
FDEP received Application for a Title V Air Operation Permit Renewal	June 2, 2010
FDEP issued Final Title V Air Operation Permit 0250281-013-AV	September 26, 2010

3.0 Background

3.1 Physical Characteristics

The Site is located in Miami-Dade County, Florida (Figure 1). The Site's 1.2-acre OU1 is located within Miami-Dade County Parcel 30-3014-031-0010, an 82-acre property owned by the Miami-Dade County Transit Authority (Transit Authority). The Transit Authority operates the property as the Metrorail William Lehman Operation and Maintenance Center. Because OU1 is now part of the larger Transit Authority property, the current site address is 6601 NW 72nd Avenue. The Transit Authority property includes the Metrorail William Lehman Operation and Maintenance Center building, as well as maintenance, storage and repair facilities, and train car storage tracks. The exact boundaries of OU1 within the Transit Authority property are unknown. The approximate location of OU1 is shown in Figure 2. The general area is known to be located in the northwestern portion of the Transit Authority property. This area is partially covered by either dirt with sparse vegetation, asphalt or gravel roads, and is bisected by train car storage tracks. According to the 1982 *Evaluation of the Clean-up Activities Already Undertaken at the Miami Drum Services Hazardous Waste Site*, OU1 is 242 feet on its north-south axis by 230 feet on its east-west axis and is situated 750 feet west of the Medley Wellfield.

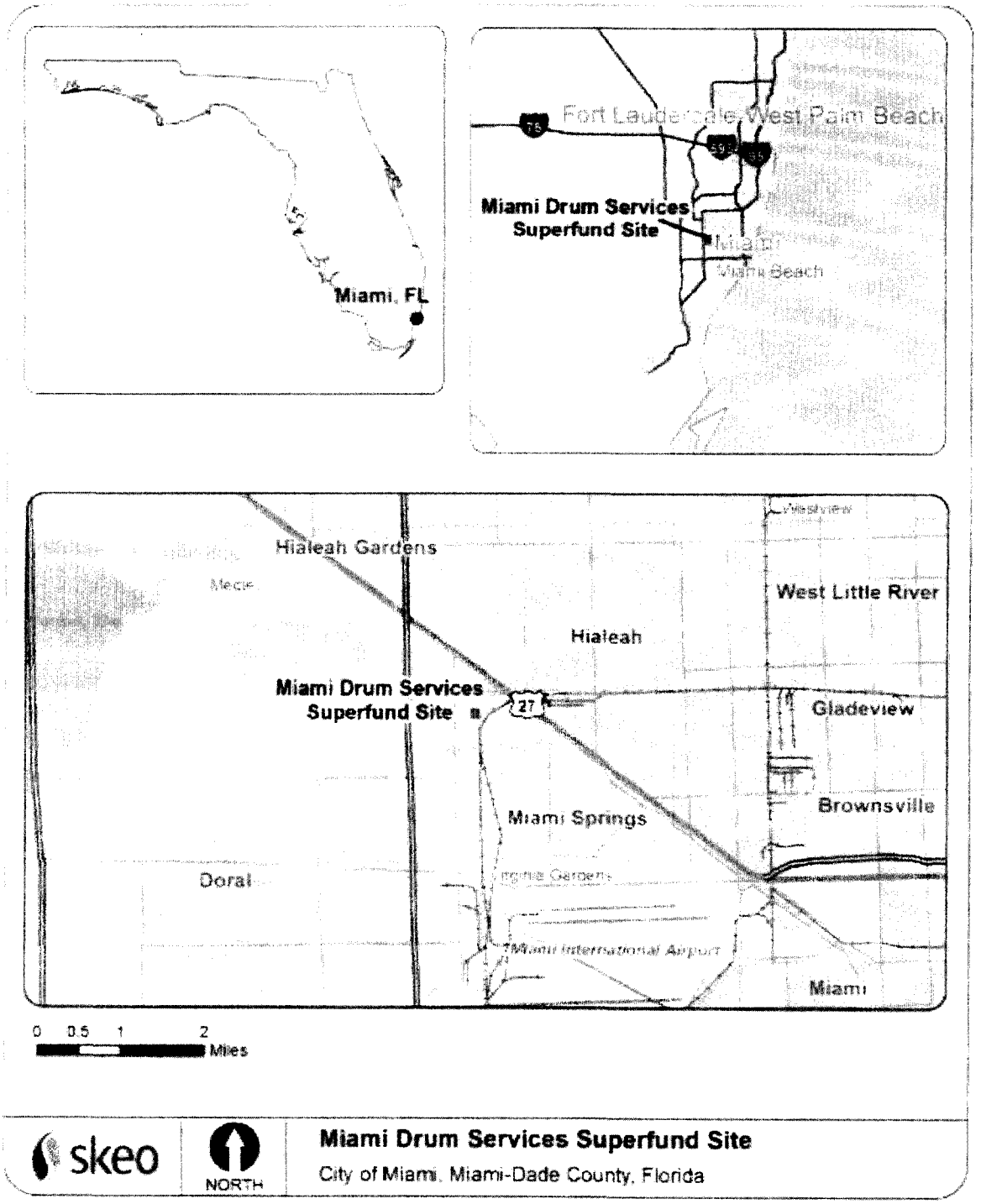
The Site and two nearby Superfund sites: Varsol Spill and Northwest 58th Street Landfill together compose the Biscayne Aquifer Sites. The Biscayne Aquifer Sites encompass approximately 80 square miles. The Varsol Spill Superfund Site occupies an area within the boundaries of the Miami International Airport, located three miles south of the Site. The Northwest 58th Street Landfill Superfund Site is located three miles west of the Site. Land uses immediately surrounding the Site are primarily industrial and commercial. Residential communities of Miami Springs, Medley, Hialeah Gardens and Hialeah occupy areas north and west of the Site and within the Biscayne Aquifer Sites area. According to the 2010 census, the population within two miles of the Site is 67,609 and within four miles the population is 273,805.

Former drum recycling operations at OU1 resulted in contamination of soil at OU1 with phenols, heavy metals, oil and grease, and pesticides, which contributed to contamination of ground water in the Biscayne Aquifer. The Biscayne Aquifer is located in geologic formations of limestone and sand to a depth of about 80 feet, at which point it is confined by a layer of relatively impermeable silt and clay. The Preston and Hialeah Water Treatment Plants (WTPs) use wellfields in the area to tap the aquifer for potable water supplies. The South Florida Water Management District (SFWMD) maintains canals within the county to control and transport excess surface water. The variable pumping rates at the wellfields and the effects of seasonal operation of the canals (alternately operated to lower ground water levels during the rainy season and to recharge the aquifer during the dry season) influence the aquifer's regional flow direction on a local scale. The canals are highly controlled water bodies and do not include environmentally sensitive habitats. Seasonal fluctuations raise the ground water table to within three feet of the surface. Pamlico Sand covers the water producing zones of the Biscayne Aquifer and outcrops at the surface of the Site. The Biscayne Aquifer Sites area receives an

average annual rainfall of approximately 60 inches and nearly 80 percent of this rainfall takes place during the rainy season from June to September.

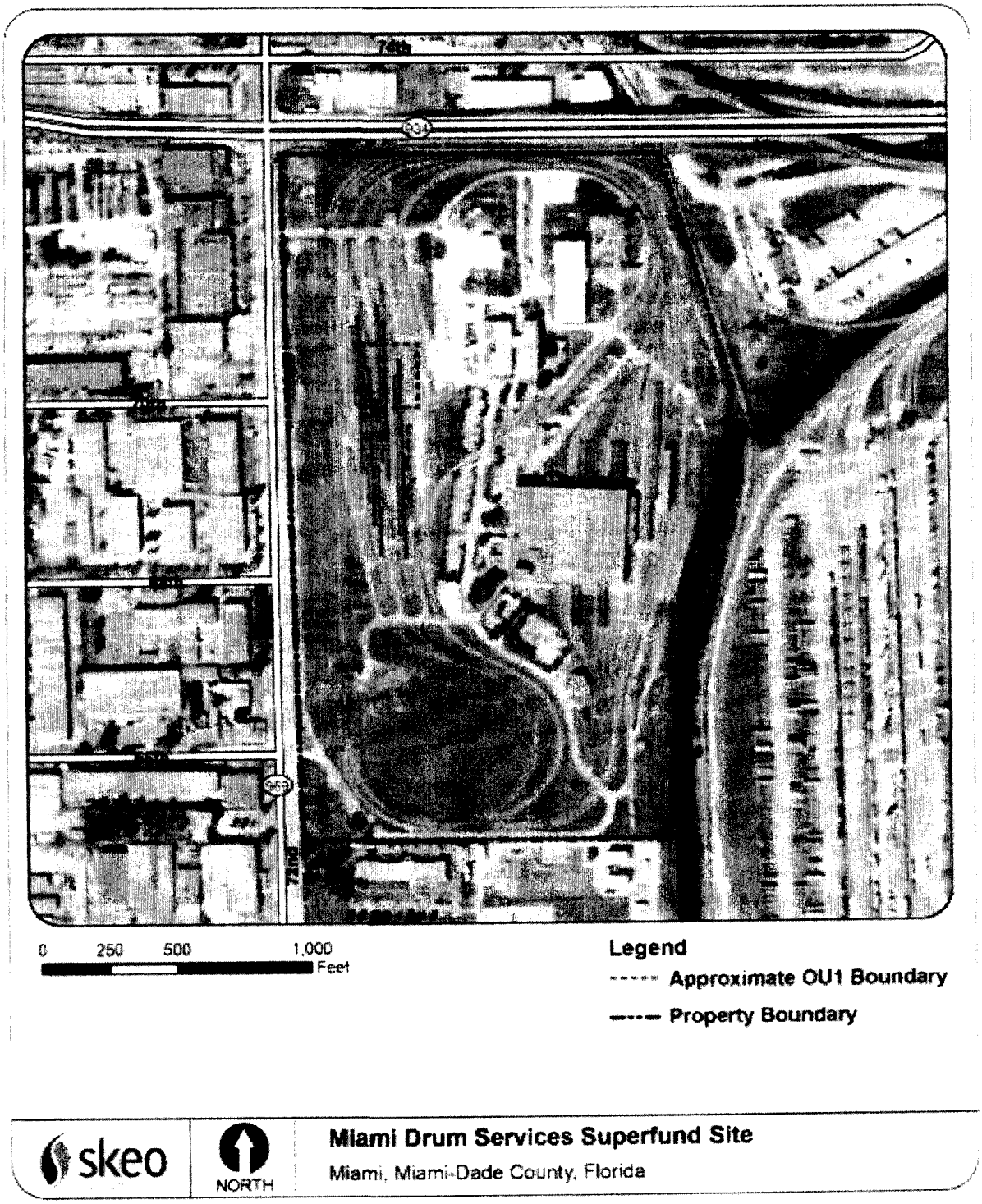
Each of the Biscayne Aquifer Sites was a source of ground water contamination; the contamination commingled and negatively impacted the overall water quality of the Biscayne Aquifer. The EPA decided to address ground water contamination at the Biscayne Aquifer Sites as a single management unit because all three sites affected the same 82-acre study area of the Biscayne Aquifer and contamination could not be solely attributed to any individual site. Numerous other possible contributors of ground water contamination also exist in the area.

Figure 1: Site Location Map



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

Figure 2: Detailed OU1 Map



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

3.2 Land and Resource Use

Land use in the area immediately surrounding OU1 is industrial and commercial. However, several cities and unincorporated areas also exist within the area. The surrounding mix of industrial, commercial and residential uses is likely to remain similar in the future. Since Miami Drum Services began operations in 1966, OU1 and the immediately surrounding area have remained in industrial and commercial use. Miami Drum Services conducted drum cleaning and recycling activities at the Site's OU1 until 1981 when Miami-Dade County (formerly Dade County) forced the company to cease operations due to violations of operating permits. The company abandoned the property in mid-1981. The County acquired the OU1 area through eminent domain proceedings on behalf of the Transit Authority as part of the Dade County Rapid Rail Transit Project. The County constructed a rail yard and the Metrorail William Lehman Operation and Maintenance Center on the property. The center serves as a major train repair facility for the County's electric rail system, providing maintenance and storage services. The Transit Authority continues to operate the property. OU1 has remained in industrial use since the time of the remedy selection and no plans exist that would change this land use. However, future plans for the Transit Authority's property, discussed during the FYR site inspection, include construction of additional testing tracks on the southeastern portion of the property, as well as repositioning existing storage tracks and construction of additional electrified storage tracks in the northwestern portion of the property.

The Safe Drinking Water Act of 1974 designated the Biscayne Aquifer, which lies below the Biscayne Aquifer Sites, as the sole-source drinking water aquifer for the residents of southeastern Florida. Municipal wells near the Site are located within three major wellfields: the Medley Wellfield, Miami Springs Wellfield and Preston Wellfield. These wellfields draw water from the Biscayne Aquifer and provide source water for the Hialeah and Preston WTPs. As of 2011, the Preston and Hialeah WTPs accept raw water from 49 wells within the Biscayne Aquifer and treat it to meet drinking water standards. The treatment process at the WTPs includes lime softening with sodium silicate activated chlorine, recarbonation, chlorination, fluoridation, filtration and air stripping.

3.3 History of Contamination

Miami Drum Services operated a drum cleaning and recycling facility at the Site's OU1 from 1966 until 1981. During this time, facility operators washed drums with a caustic cleaning solution. Facility operators disposed of spent cleaning solution as well as drum residues containing industrial solvents, phenols, acids and heavy metals in open, unlined pits at OU1. These waste disposal practices resulted in contamination of soil and ground water. As many as 5,000 drums of various chemical wastes were stored at OU1 during the facility's operation. Following violations of operating permits, Miami-Dade County forced the facility to cease operations. Miami Drum Services abandoned the property in 1981.

Due to the proximity of the Miami Drum Services facility to the existing rail line, Miami-Dade County acquired the Site's OU1 on behalf of the Transit Authority for construction

of a rail yard. When construction began, county officials discovered wastes left by Miami Drum Services. Investigations identified contaminated soil at the Site's OU1. The County ceased construction activities and began working with FDEP and the EPA to address contamination at OU1. Contamination posed an immediate threat to human health and the environment due to several factors: contaminated drums left at OU1, absence of an effective drainage control system, amount and form of contaminated substances at OU1, leachable properties of contaminated substances, risk of contamination of county drinking water supplies, hydrogeology that helps accelerate migration of contamination, prevailing rainfall conditions, and absence of natural or man-made barriers at OU1 to contain contamination.

Miami-Dade County also worked with FDEP and the EPA to address ground water contamination. FDEP contracted with Technos, Inc. to determine the extent of ground water contamination at the Site. Initial investigations identified a contaminant plume in ground water under OU1, indicating that contamination at OU1 significantly contributed to contamination of the Biscayne Aquifer. However, additional studies in 1982 and 1983 identified low, dispersed levels of ground water contamination throughout the Biscayne Aquifer Sites area.

3.4 Initial Response

In November 1981, Miami-Dade County began negotiations with the State of Florida and the EPA for a Cooperative Agreement for OU1. The State submitted a Cooperative Agreement and a request to allow for payment of pre-award costs upon final award in order to move forward with investigation and cleanup activities. In December 1981, the County completed a Feasibility Study (FS) for contaminated soil at OU1, which identified the area of contaminated soil as extending beyond the property boundaries of the Miami Drum Services facility. At the time of the investigations, the Site's OU1 contained more than 400 55-gallon drums. The County's FS recommended excavation and relocation of contaminated soil.

Dade Environmental Resources Management (DERM) (formerly the Dade County Department of Environmental Quality) conducted investigations, which included extensive soil borings at OU1 and analysis of core samples from up to 10 feet deep for contaminants. Analytical results of the borings, reported in June 1981, indicated high concentrations of phenols, heavy metals, oil and grease, and pesticides in soil at OU1.

Between December 1981 and January 1982, DERM conducted removal actions at OU1. Although the removal actions had not officially been approved for CERCLA funding prior to their implementation, the County requested guidance from the EPA and the state, and complied with CERCLA requirements and conditions outlined by the State during the removal actions. This allowed the EPA to later refund the majority of the County's cleanup costs. An Action Memorandum in June 1982 approved CERCLA funds for the pre-award costs and the County's FS. Concurrent with the County's removal actions, the EPA also completed an FS for the contaminated soil and debris at OU1. The EPA's study concurred with the County's FS in its recommendation of the excavation and off-site

disposal of contaminated soil at OU1. Removal actions at OU1 included excavating and disposing of contaminated soil and removing contaminated wastes and debris. The County sought advice from the EPA and FDEP to determine the appropriate cleanup levels. DERM conducted excavation based on engineering and scientific judgment and also followed a series of cleanup criteria to address contamination at OU1:

1. Remove and appropriately dispose of all surface structures and debris from OU1.
2. Excavate all visibly contaminated soils and transport them to an authorized hazardous waste disposal facility.
3. Perform total heavy metal analyses on soil boring samples obtained from an 8 meter grid across OU1 to determine the extent and locations of elevated concentrations of hazardous materials. Conduct intensive soil sampling at locations where large quantities of drums were known to have been stored or in areas known to have received and collected the runoff from drum washing operations.
4. After all grossly contaminated surface soils are removed, the depth of removal of additional soil will be determined based on the analyses of 50 cores of the Site. A bulk analysis of the cores will be performed on subsamples taken at one foot intervals on the cores. If the bulk analysis yields any of the substances listed in Florida's criteria for discharges to Class G-1 ground water at levels suspected of exceeding ten times those specified in that rule, then the Extraction Procedure toxicity test will be employed with appropriate modifications for organic contamination if necessary, to further define contamination. The subsurface material will be removed to an elevation corresponding to those values generated by the Extraction Procedure toxicity test that are equal to or less than ten times the values specified in Florida's criteria for discharges to Class G-1 ground water for the parameter of interest. (Table 2 lists these criteria.)
5. Perform final excavations at OU1 based on the results of 3 and 4 above, and remove all soils where Extraction Procedure metal values exceeded the 10 times minimum criteria for ground water.
6. Treat and discharge to the Biscayne Aquifer ground water encountered during the excavation activities.

Table 2: Criteria Used for Soil Excavation

Contaminant	State of Florida's Minimum Criteria for Ground Water (micrograms per liter (µg/L))	Excavation Criteria Concentration (10 Times the State of Florida's Minimum Criteria for Ground Water) (µg/L)
Arsenic	0	0
Barium	1,000	10,000
Cadmium	10	100
Chromium	50	500
Lead	50	500
Mercury	0.14	1.4
Silver	50	500
Selenium	10	100

Removal actions included the removal and off-site disposal of approximately 15,000 tons of contaminated soil at OU1. Prior to final excavations, mercury levels in Extraction Procedure analyses showed values slightly higher than the 1.4 micrograms per liter (μg/L) minimum criteria. Visual observations of core samples did not indicate that soils contained oily deposits or color exhibited by contaminated soils from areas of OU1. It was determined that soil contamination would not result in increased contamination to the underlying aquifer and removal of the soil would require extensive excavation. Based upon this information, removal actions left soils containing slightly higher than minimum criteria mercury values in place. In total, removal actions left 3,900 cubic yards of soil with mercury levels in excess of 10 times minimum criteria for ground water in place at OU1.

Excavation activities also involved treating approximately 550,000 gallons of associated ground water and discharging the ground water back into the Biscayne Aquifer. Immediately following excavation activities, the County backfilled the areas with clean fill. Removal actions also included removal of the above ground structures, drums and debris. The County contracted with O.H. Materials Company to dispose of contaminated soil and debris removed from OU1 at an approved hazardous waste facility in Emelle, Alabama.

Soil borings that DERM took during the removal actions indicated contaminated ground water existed below OU1. FDEP contracted with Technos Inc. to determine the extent of ground water contamination. Data collected provided evidence of a contaminant plume in ground water below OU1, indicating that contamination at the OU1 could be contributing to ground water contamination. Thus, the EPA proposed the Site to the National Priorities List (NPL) on December 30, 1982, and finalized the Site on the NPL on September 8, 1983.

3.5 Basis for Taking Action

The EPA designated OU1 as contaminated soil and debris at the Site, which the County addressed through its removal actions. Further investigations by Miami-Dade County, FDEP and the EPA identified ground water contamination at the Site and throughout the Biscayne Aquifer. This led to the EPA's designation of the Biscayne Aquifer Sites management unit. This management unit represents OU2.

<u>OU1</u>
County officials discovered wastes left by Miami Drum Services when initial construction of the rail yard began. Investigations and soil borings conducted at OU1 indicated soil contamination. Exposure pathways of concern included direct contact with drums or contaminated soils, leaching of hazardous substances into the drinking water supply aquifer, and ingestion of contaminated ground water. The County conducted immediate removal actions as discussed in Section 3.4.

OU2

Data collected in 1981 provided evidence of a contaminant plume in ground water below OU1, indicating that contamination at OU1 significantly contributed to contamination of the Biscayne Aquifer. However, a separate Remedial Investigation (RI) conducted by FDEP in 1982 and 1983 found no evidence of an independent, concentrated contaminant plume associated with the Site's OU1. The RI as well as investigations at the Varsol Spill and Northwest 58th Street Landfill sites identified ground water contamination throughout the Biscayne Aquifer Sites area. The high transmissivity of the Biscayne Aquifer, widespread interaction of ground water with surface water bodies, and the high, continuous pumping of ground water at several municipal wellfields caused the ground water plumes from the Biscayne Aquifer Sites to blend together and become indistinguishable from the generally poor quality of the ground water.

Despite the lack of a concentrated plume, data indicated volatile organic compound (VOC) contamination in ground water throughout the Biscayne Aquifer Sites area, in the nearby wellfields and in finished water from the Preston and Hialeah WTPs prior to installation of the air strippers. Data showed sporadic detections of heavy metals, although maximum concentrations in the wellfields and WTPs remained below the primary drinking water maximum contaminant levels (MCLs). Data indicated similar detections of priority pollutant base/neutral and acid extractable organic compounds, but no detections occurred in the wellfields or WTPs. In general, ground water from the municipal production wells contained higher contaminant levels than water from the other monitoring wells. This was likely due to continuous pumping of the production wells drawing contaminants to the surface from within and around the wellfield cones of influence. VOC contamination in the Biscayne Aquifer Sites area occurred in all three of the aquifer's vertical levels (upper, middle and deep). Contamination in the middle and bottom zones existed at levels two to three times higher than those of the upper zone. Pumping of the production wells in the two lower zones, which would draw contaminants from the upper zone to the lower zones, likely caused this difference. Vinyl chloride and trans-1,2-dichloroethane were the most common VOCs identified in ground water. Vinyl chloride is known to contribute to an increased risk of cancer, and trans-1,2-dichloroethane is known to interfere with liver function.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the EPA selected the final remedies for OU1 and OU2. The EPA used the 1982 OU1 Record of Decision (ROD) to approve the removal actions previously conducted at OU1. The decision to approve the removal actions as the final remedy for OU1 was based on the fact that the action was cost-effective and it effectively and reliably mitigated, minimized damage to, and provided adequate protection of public health, welfare and the environment. A number of remedial alternatives were considered for OU2, and final remedy selection within the 1985 Biscayne Aquifer Sites ROD was made based on cost-effectiveness, effects of the alternative, acceptable engineering practices and ability to provide protection of public health, welfare and the environment.

4.1 Remedy Selection

The EPA selected the remedy for the Site through two RODs. In 1982, the EPA signed a ROD to address soil contamination at OU1. In 1985, the EPA signed the Biscayne Aquifer Sites ROD, which served as the OU2 ROD for the Site, and addressed ground water contamination.

OU1

On September 13, 1982, the EPA signed the OU1 ROD to address soil contamination at the Site. The OU1 ROD described the remedial action objectives (RAOs), which were to control source contamination at the OU1 and to remove contaminated soil that could leach hazardous substances into the Biscayne Aquifer, the drinking water supply for the County. The OU1 ROD contained the EPA's determination that the remedial action provided an adequate level of cleanup to effectively mitigate and minimize damage to, and provided adequate protection of, public health, welfare and the environment, and that the action was completed in accordance with CERCLA program requirements and met the conditions outlined by the State for authorization of retroactive funding. These removal actions included excavation and removal of contaminated soil at OU1. However, removal actions left 3,900 cubic yards of soil with mercury levels in excess of 10 times minimum criteria for ground water in place at OU1. The OU1 ROD did not discuss institutional controls as a necessary component of the remedy.

OU2

On September 16, 1985, the EPA signed the Biscayne Aquifer Sites ROD, which served as the OU2 ROD, to address ground water contamination at the Site. The EPA conducted an extensive community involvement process during the design of the selected remedy. The Biscayne Aquifer Sites ROD RAO was to provide uncontaminated drinking water to the public. The selected remedy included the following components:

- Use of existing wells in the Miami Springs and Preston Wellfields as recovery wells.
- Treatment of contaminated ground water via air stripping either before or after existing conventional treatment at the WTPs.
- Monitoring of water at both the Hialeah and Preston WTPs.

The Biscayne Aquifer Sites ROD noted that the existing county regulations governing well permitting and use acted as a form of existing institutional controls to restrict ground water usage in the 82-acre study area of the Biscayne Aquifer. In addition, the selected remedy recommended a preventative action program administered at the county level to address pollution caused by small quantity generators and industrial facilities not connected to the sanitary sewer system.

In most cases, the Biscayne Aquifer Sites ROD used MCLs to establish cleanup goals for ground water. In the case of vinyl chloride, the State of Florida's drinking water standard, based on a $1x10^{-6}$ cancer risk level, served as the cleanup goal and required a standard of 1.0 µg/L instead of the 2.0 µg/L federal MCL standard. If standards did not exist for a specific contaminant, then cleanup goals reflected health-based standards designed to reduce the human health risk to within the EPA's acceptable risk range. Sources used to establish health-based standards included the Centers for Disease Control, EPA Cancer Assessment Group recommendations and the National Academy of Sciences. Table 3 includes the priority pollutants and their cleanup goals as provided in the Biscayne Aquifer Sites ROD.

Table 3: Ground Water Priority Pollutant Cleanup Goals

Contaminant	Cleanup Goals from Biscayne Aquifer Sites ROD[1] (µg/L)
Inorganics	
Arsenic	50
Cadmium	10
Chromium	50
Lead	50
Mercury	2
Selenium	10
Volatile Organics	
Vinyl Chloride	1
1,1,2,2-Tetrachloroethane	0.2
Benzene	0.7
Methylene Chloride (or Dichloromethane)	0.2
1,1-Dichloroethane	0.9
1,1-Dichloroethene	0.04
Acrylonitrile	0.34
Chlorobenzene (or Monochlorobenzene)	488
Cis-1,2-Dichloroethene	270
Trans-1,2-Dichloroethene	270
Toluene	340
Xylenes (total)	620
Trichloroethene (or Trichloroethylene)	28
Ethylbenzene	1,400
Tetrachloroethene (or Tetrachloroethylene)	9

Contaminant	Cleanup Goals from Biscayne Aquifer Sites ROD[1] (µg/L)
Chloroform	100
Bromodichloromethane	100
1,1,1-Trichloroethane	22
Styrene	1,330
Chlorotoluene	3,450
Carbon Disulfide	830
Tetrahydrofuran	57
Chloromethane	N/A
Chloroethane	N/A
Base/Neutral and Acid Extractable Organic Compounds	
Chrysene	0.2
Anthracene	0.2
Benzo(a)anthracene	0.2
Benzo(b)fluoranthene	0.2
Benzo(k)fluoranthene	0.2
Benzo(a)pyrene	0.2
Benzo(ghi)perylene	0.2
Phenanthrene	0.2
Pyrene	0.2
Fluoranthene	0.2
Indeno(1,2,3-cd)pyrene	0.2
2,4-Dimethylphenol	400
2,4-Dinitrophenol	70
4-Nitrophenol	70
Pentachlorophenol	30
Phenol	3,500
Bis(2-ethylhexyl)phthalate (or Di(2-ethylhexyl)phthalate)	6,000
1,4-Dioxane	570
2,4,5-Trichlorophenol	2,600
Benzyl Butyl Phthalate	N/A
Pesticides and PCBs	
PCB (total)	0.00008
4,4'-DDT	0.00002
2,4-D (or Dichlorophenoxy acetic acid, 2,4-)	100
Silvex (2,4,5-TP)	10
Endosulfan sulfate	N/A

1. Based on the Biscayne Aquifer Sites ROD, pages 12-14, Table 11.
N/A = cleanup goal not specified in the Biscayne Aquifer Sites ROD.

The Biscayne Aquifer Sites ROD discusses that of the priority pollutants identified during the RI, VOCs were the most prevalent contaminants found throughout the study area, in the wellfields and in finished water from the Preston and Hialeah WTPs prior to installation of the air strippers. Sporadic detections of base/neutral and acid extractable organic compounds occurred within the study area, but were not detected in the wellfields

or WTPs. Pesticides and polychlorinated biphenyls (PCBs) were also found in a few instances in the study area, but were not detected in the wellfields or the WTPs. Detections of heavy metals, primarily lead, occurred sporadically in the study area, and maximum concentrations in the wellfields and WTPs did not exceed the primary drinking water MCLs. The Biscayne Aquifer Sites ROD states that even if the maximum lead concentrations found in the study area entered the wellfields, the existing treatment process would reduce the concentrations to levels below the primary drinking water standard. The Biscayne Aquifer Sites ROD also states that the types of organic compounds present, including the maximum VOC concentrations, in the ground water of the wellfields could be effectively removed by aeration alone. Granular activated carbon treatment was not necessary because it was determined that there was no need to treat the low or non-existent concentrations of base/neutral and acid extractable organic compounds. Because of the low or nonexistent concentrations of contaminants other than VOCs, the ability of the existing water treatment process to reduce metal concentrations to below MCLs, the presence of institutional controls to limit exposure to contaminated ground water, and the highly immobile nature of the base/neutral and acid extractable organic compounds, it was determined that ground water treatment using air stripping towers would remove VOCs.

4.2 Remedy Implementation

OU1

The EPA's selected remedy in the OU1 ROD did not require implementation of any additional actions beyond the County's removal actions. The OU1 ROD contained the EPA's determination that removal actions previously conducted by the County were completed in accordance with CERCLA program requirements and that the cleanup met the conditions outlined by the State for authorization of retroactive funding. The EPA reimbursed Miami-Dade County for 90 percent of DERM's expenses with funds that the Agency recovered from Miami Drum Services and more than 60 other potentially responsible parties (PRPs) that had contributed to OU1 contamination. The EPA completed a removal assessment of the remedial actions at the OU1 in August 1992. The Site reached the Construction Completion designation on April 28, 1993.

OU2

The Biscayne Aquifer Sites ROD selected a remedy to treat contaminated ground water using air stripping towers. While contamination from the Biscayne Aquifer Sites significantly contributed to contamination of the Biscayne Aquifer, other smaller entities had also contributed to the widespread contamination. Therefore, the Biscayne Aquifer Sites ROD also recommended implementation of a preventative action program at the county level to address small quantity generators and industrial facilities contributing to ground water pollution in the Biscayne Aquifer Sites area. In 1985, the EPA created the Biscayne Aquifer Protection Plan to address the need for supplementary preventative actions. Appendix F includes the Biscayne Aquifer Protection Plan's 20 recommendations. The Biscayne Aquifer Sites ROD also noted that existing county regulations, Sections 24-43.2 and 24-43.3 of the Miami-Dade County Code of

Ordinances, regulate well permitting and use of wells within the 82-acre study area of the Biscayne Aquifer.

In 1987, the EPA conducted the remedial design for the remedy selected in the Biscayne Aquifer Sites ROD. The remedial design determined the most effective type of air stripping tower and packing for addressing VOC contamination in the Biscayne Aquifer. It also concluded that aeration treatment of contaminated ground water using air stripping towers at the Preston and Hialeah WTPs as centralized locations was preferable to treatment of ground water at each individual supply well. In 1988, the EPA signed a Cooperative Agreement for the Biscayne Aquifer Sites remedy with Miami-Dade Water and Sewer Department (WASD) and remedial action began. The Cooperative Agreement required the EPA to provide approximately $19.1 million or 41 percent of the eligible construction costs. Construction began in mid-1989 under the inspection of WASD's Engineering Division. Upon discovery of contamination, operation of the Medley, Hialeah, Miami Springs and Preston Wellfields ceased until WASD constructed and began operation of the air stripping towers at the Hialeah and Preston WTPs. Operation of the 64 air stripping towers and initiation of the long-term response action for OU2 began on September 1, 1992. The Hialeah WTP operates 20 air stripping towers and the Preston WTP operates 43 and one original prototype air stripping tower. The air stripping towers have been in continuous operation since 1992; however, individual units have shut down temporarily for maintenance issues. United States Army Corps of Engineers provided oversight on behalf of the EPA throughout the construction of the air stripping towers. The EPA conducted the pre-final inspection at the Site on October 29, 1992. Following the inspection, the EPA and FDEP determined that a final inspection was not necessary because the basic construction activity was complete at the time of the pre-final inspection. Remedial actions at the Site will continue until wellfield water meets or exceeds the cleanup goals.

The Biscayne Aquifer Sites ROD required WASD to conduct the necessary water quality monitoring activities at the supply wells and WTPs at its own expense. WASD initiated monitoring activities in 1968. Monitoring is ongoing; however, frequency has changed since its implementation.

4.3 Operation and Maintenance (O&M)

The OU1 ROD did not include operation and maintenance (O&M) requirements. However, the Transit Authority maintains access controls to the Metrorail William Lehman Operation and Maintenance Center, which includes OU1. Access controls include fencing, a security gate and security personnel. The selected remedy for OU2 included O&M activities related to the air stripping towers at the Preston and Hialeah WTPs. The 1985 Biscayne Aquifer Sites ROD projected annual O&M costs of $334,400 for the life of the project (until untreated water attains ground water cleanup goals listed in the Biscayne Aquifer Sites ROD). O&M therefore requires monitoring of water quality at both WTPs. When the EPA signed the Biscayne Aquifer Sites ROD, monitoring of all VOC priority pollutants (Table 3) took place annually by both WASD and DERM. The Biscayne Aquifer Sites ROD stated that this monitoring was sufficient and required it to

continue until FDEP determined that ground water had attained cleanup goals. The EPA supported the construction and operation of the air stripping towers, providing 47.8 percent of the cost of construction and $1 million per year for the first 10 years of operation. Now the County holds responsibility for funding the O&M of the air stripping towers at the Preston and Hialeah WTPs. The air stripping towers have been in continuous operation since 1992; however, individual units have shut down temporarily for maintenance issues. All O&M costs pertain to the operation of the air stripping towers including labor, energy, materials and supplies and equipment replacement. The cost of the electricity used to continuously operate the air stripping towers is the main operational expense. The annual O&M costs from 2008 to 2012 are presented in Table 4.

Table 4: Annual O&M Costs (2008-2012)

Year	Total Cost *(rounded to the nearest $1,000)*
2008	$1,746,000
2009	$1,746,000
2010	$1,746,000
2011	$1,746,000
2012	$1,746,000

The monitoring schedule at the WTPs has changed since the signing of the Biscayne Aquifer Sites ROD. WASD monitored VOC contamination in the Hialeah, Upper and Lower Miami Springs, and John E. Preston Wellfield supply wells quarterly from 1988 to 1992. From 1993 to the present, WASD conducts annual water quality monitoring at the WTPs as part of O&M and to report to the public. WASD distributes these "Typical Average Analyses" as well as current MCLs set by the EPA and drinking water standards set by FDEP and Miami-Dade County to consumers in the form of an annual consumer confidence report. WASD conducts water quality analysis throughout the year for internal purposes and to meet federal, DERM and Department of Health requirements for public water supplies. The drinking water from the Preston and Hialeah WTPs must meet all state and federal drinking water standards prior to distribution to the public as drinking water. These water quality analyses include sampling for metals, anions, physical and chemical properties, microbes, organics and VOCs. WASD also monitors individual trihalomethanes (THMs), including chloroform, bromoform, bromodichloromethane, dibromochloromethane, 1,1-dichloroethane and m-dichlorobenzene.

Every four years, WASD must apply to FDEP for a Title V Air Operation permit for the air emissions associated with the air stripping towers. WASD submitted the Application for a Title V Air Operation Permit Renewal on June 2, 2010. FDEP issued the renewed Title V Air Operation Permit, which became effective on September 26, 2010. The final permit number is 0250281-013-AV. The permit covers the emissions of VOCs and particulates from the 64 air stripping towers associated with the Biscayne Aquifer Sites remedy, the seven diesel engine generators used as a backup power supply for the air stripping towers, and a rotary lime kiln used in the water treatment process. Each tower is equipped with a blower that reduces concentrations of VOCs and THMs in the water. The Title V Air Operation permit requires annual statements of compliance, and statements

must be submitted to both FDEP and the EPA within 60 days of the end of each calendar year. Compliance is measured by three separate determinations of the total air pollutant emissions rate through the test section of the tower. WASD is required to submit an application for permit renewal by January 18, 2015.

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2008 FYR for the Site stated the following:

"The selected remedy at OU1 is protective of human health and the environment in the short term and exposure pathways that could result in unacceptable risks are under control. Based on the site inspection, access controls are well maintained and public access to the Site is restricted. The Site is in industrial reuse and the site owner intends for this use to continue in the long term. Clean fill was placed over the excavated portions of the Site and the cover has been maintained. ICs for soil will be required prior to site deletion in order to ensure the long-term protectiveness of the soil remedy.

The selected remedy at OU2 is protective of human health and the environment and exposure pathways that could result in unacceptable risks are under control. Based on the site inspection and ground water sampling data from the last five years, the Site's remedy is effectively treating the ground water contamination. Ground water monitoring results from the Preston and Hialeah wells have shown a decreasing trend in total VOCs over the last five years. Air emissions associated with the air stripping towers are well below permitted limits. The air stripping treatment continues to be effective at removing VOCs and finished drinking water from the Preston and Hialeah WTPs must meet all state and federal standards prior to being supplied as drinking water to the public. WASD plans to continue using the air strippers to treat the ground water from the Biscayne Aquifer in the long term. Institutional controls restricting the use of ground water are currently in place.

Because the remedial actions at OU1 and OU2 are protective, the Site is protective of human health and the environment. The actions described above ensure the continued protectiveness of the selected remedies."

The 2008 FYR included three issues and recommendations. Table 5 summarizes each recommendation and its current status.

Table 5: Progress on Recommendations from the 2008 FYR

Section	Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
5.1	Design and implement institutional controls for the soil remedy.	Miami-Dade County	9/30/2010	Ongoing. Institutional controls have not been implemented.	N/A
5.2	Apply for air permit renewal by July 6, 2010.	WASD	7/6/2010	Complete. Permit renewed.	9/26/2010
5.3	Consider combining FYRs for the constituent sites addressed by the Biscayne Aquifer Sites ROD.	EPA	9/30/2010	Considered and not implemented	9/29/2010

5.1 Design and Implement Institutional Controls

Design and implementation of institutional controls necessary for the long-term protectiveness of the soil remedy are ongoing. Currently, Miami-Dade County designates OU1 as located within the "industrial districts, unlimited manufacturing" zoning area. However, there are no restrictions in place to ensure that the land use remains industrial and that necessary precautions are taken regarding soil excavation at OU1. Institutional controls setting forth these restrictions may therefore be needed. In response to the Site's 2008 FYR, FDEP has stated that in order to implement institutional controls at OU1, the area of the Site related to soil contamination (i.e. OU1) will need to be professionally surveyed and the survey incorporated into the institutional control. FDEP has also stated that it might be necessary to conduct additional soil sampling at OU1 to adequately delineate those soils requiring restricted use, prior to finalizing institutional controls. The EPA, FDEP, DERM and Miami-Dade County continue to coordinate the implementation of institutional controls at OU1.

5.2 Permit Renewal

WASD renewed the Title V air permit for the WTPs in 2010. WASD submitted the Application for a Title V Air Operation Permit Renewal on June 2, 2010. FDEP issued the Final Title V Air Operation Permit 0250281-013-AV, which became effective on September 26, 2010.

5.3 Consider Combining FYRs

The EPA considered combining the FYR schedules for the Biscayne Aquifer Sites but decided to keep each site on its individual FYR schedule.

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in October 2012 and scheduled its completion for May 2013. EPA remedial project manager (RPM) James Hou led the EPA site review team, which also included EPA community involvement coordinator (CIC) L'Tonya Spencer and contractor support provided to the EPA by Skeo Solutions. In November 2012, the EPA held a scoping call with the review team to discuss the Site and items of interest as they relate to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

6.2 Community Involvement

In November 2012, the EPA published a public notice in the Miami New Times newspaper announcing the commencement of the FYR process for the Site, providing contact information for RPM James Hou and CIC L'Tonya Spencer and inviting community participation. The press notice is available in Appendix B. No one contacted the EPA as a result of the advertisement.

The EPA will make the final FYR Report available to the public. The EPA will place copies of the document in the designated site repository: Miami-Dade County Public Library, 101 W. Flagler, Miami, Florida 33128. Upon completion of the FYR, the EPA will place a public notice in the Miami New Times newspaper to announce the availability of the final FYR Report in the Site's document repository.

6.3 Document Review

ARARs Review

This FYR included a review of relevant, site-related documents including the ROD, remedial action reports, and recent monitoring data. A complete list of the documents reviewed can be found in Appendix A.

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. 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, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are more stringent than federal requirements may be applicable or relevant and appropriate. To-Be-Considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, TBCs may be particularly useful in determining health-based levels where no Applicable or Relevant and Appropriate Requirements (ARARs) exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include MCLs under the federal Safe Drinking Water Act and ambient water quality criteria enumerated under the federal Clean Water Act.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated ground water or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the chemical-specific ARARs identified in the ROD. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

Ground Water ARARs

According to the 1985 Biscayne Aquifer ROD, the Site's OU2 cleanup goals for ground water priority pollutants were based on federal and state ground water standards. In the absence of chemical-specific ARARs, the EPA developed cleanup goals based on TBCs and risk calculations. ARARs from the 1985 ROD were compared to current federal and state standards to identify any changes (Table 6). New standards have been promulgated for 12 priority pollutants, and standards are now more stringent for eight priority pollutants.

Table 6: ARAR Review for Ground Water Priority Pollutants

Contaminant	ARARs Listed in 1985 Biscayne Aquifer Sites ROD (µg/L)	Current ARARs (µg/L)[1]	ARAR Change
Inorganics			
Arsenic	50	10	More stringent
Cadmium	10	5	More stringent
Chromium	50	100	Less stringent
Lead	50	15	More stringent
Mercury	2	2	None
Selenium	10	50	Less stringent
Volatile Organics			
Vinyl Chloride	1	1	None
1,1,2,2-Tetrachloroethane	N/A	N/A	None
Benzene	0.7	1	Less stringent
Methylene Chloride (or Dichloromethane)	N/A	5	New standard
1,1-Dichloroethane	N/A	N/A	None
1,1-Dichloroethene (or 1,1-Dichloroethylene)	N/A	7	New standard
Acrylonitrile	N/A	N/A	None
Chlorobenzene (or Monochlorobenzene)	N/A	100	New standard
Cis-1,2-Dichloroethene	270	70	More stringent
Trans-1,2-Dichloroethene	270	100	More stringent
Toluene	340	1,000	Less stringent
Xylenes (total)	620	10,000	Less stringent
Trichloroethene (or Trichloroethylene)	N/A	3	New standard
Ethylbenzene	N/A	700	New standard
Tetrachloroethene (or Tetrachloroethylene)	N/A	3	New standard
Chloroform	100	80[2]	More stringent
Bromodichloromethane	100	80[2]	More stringent
1,1,1-Trichloroethane	N/A	200	New standard
Styrene	N/A	100	New standard
Chlorotoluene	N/A	N/A	None
Carbon Disulfide	N/A	N/A	None
Tetrahydrofuran	N/A	N/A	None
Chloromethane	N/A	N/A	None
Chloroethane	N/A	N/A	None
Base/Neutral and Acid Extractable Organic Compounds			
Chrysene	N/A	N/A	None
Anthracene	N/A	N/A	None
Benzo(a)anthracene	N/A	N/A	None
Benzo(b)fluoranthene	N/A	N/A	None

Contaminant	ARARs Listed in 1985 Biscayne Aquifer Sites ROD (µg/L)	Current ARARs (µg/L)[1]	ARAR Change
Benzo(k)fluoranthene	N/A	N/A	None
Benzo(a)pyrene	N/A	0.2	New standard
Benzo(ghi)perylene	N/A	N/A	None
Phenanthrene	N/A	N/A	None
Pyrene	N/A	N/A	None
Fluoranthene	N/A	N/A	None
Indeno(1,2,3-cd)pyrene	N/A	N/A	None
2,4-Dimethylphenol	N/A	N/A	None
2,4-Dinitrophenol	N/A	N/A	None
4-Nitrophenol	N/A	N/A	None
Pentachlorophenol	N/A	1	New standard
Phenol	N/A	N/A	None
Bis(2-ethylhexyl)phthalate (or Di(2-ethylhexyl)phthalate)	N/A	6	New standard
1,4-Dioxane	N/A	N/A	None
2,4,5-Trichlorophenol	N/A	N/A	None
Benzyl butyl phthalate	N/A	N/A	None
Pesticides and PCBs			
PCBs (total)	N/A	0.5	New standard
4,4'-DDT	N/A	N/A	None
2,4-D (or Dichlorophenoxy acetic acid, 2,4-)	100	70	More stringent
Silvex (2,4,5-TP)	10	50	Less stringent
Endosulfan sulfate	N/A	N/A	None

1. Based on EPA and Florida drinking water standards. Based on the lower of the National Drinking Water MCLs as of 2012 (40 CFR 141), which are available at http://www.epa.gov/safewater/contaminants/index.html#primary (accessed on 12/13/2012) and the Florida Drinking Water Standards as of 2012, which are available at http://www.dep.state.fl.us/legal/Rules/drinkingwater/62-550.pdf (accessed on 12/13/2012).
2. Florida MCL for Total Trihalomethanes (TTHM)

N/A = standard not specified

Institutional Controls Review

Miami-Dade County designates OU1 as located within the "industrial districts, unlimited manufacturing" zoning area (Figure 3). However, there are no restrictions in place for OU1 to ensure that the land use remains industrial, that exposure to subsurface soil contamination does not occur, or that the soil cover is maintained.

The Biscayne Aquifer Sites ROD indicated that at the time of the signing of the ROD, the Dade County Code served as an existing institutional control to control the installation of wells throughout the county. Dade County Code 24-45 regulated construction and operation of wells in all of Dade County. Construction and/or operation of a new or existing well required a permit from DERM. Following county restructuring, the county codes have been updated. Currently, Sections 24-43.2 and 24-43.3 of the Miami-Dade

County Code of Ordinances regulate well permitting and use of wells in Miami-Dade County. Sections 24-43.2 and 24-43.3 require written approval in the form of a permit from DERM to construct, maintain or operate a new or existing well. To obtain a permit, several qualifications must be met, including a requirement that the ground water does not need treatment to meet drinking water standards. Sections 24-43.2 and 24-43.3 of the Miami-Dade County Code of Ordinances serve as institutional controls for OU2 (Figure 4). However, the Biscayne Aquifer Sites ROD did not require institutional controls as part of the OU2 remedy.

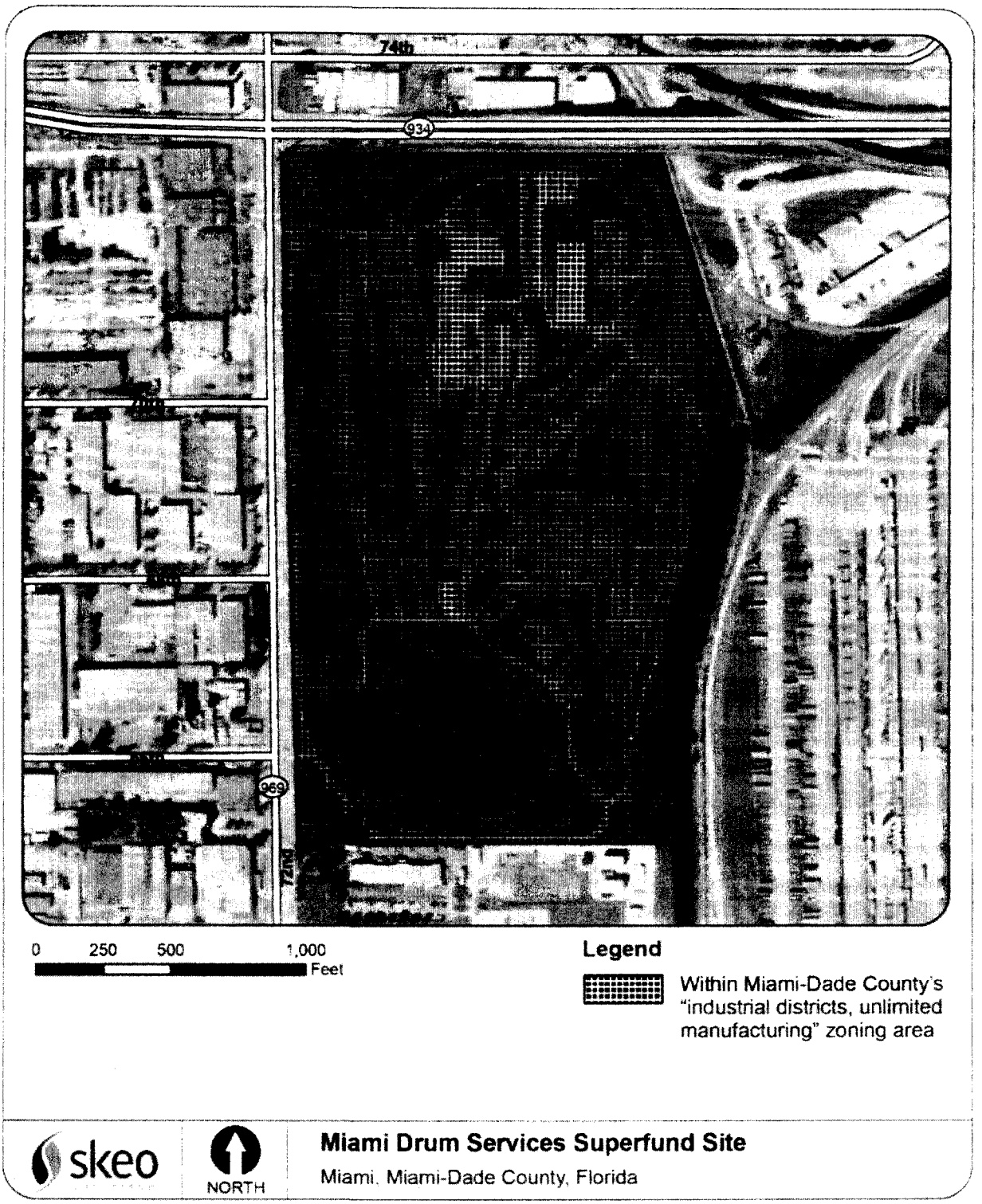
Tables 7 lists the institutional controls associated with the Site.

Table 7: Institutional Control (IC) Summary Table

Media	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
Soil	Yes	No	30-3014-031-0010	Ensure that the land use remains industrial, that exposure to mercury-contaminated soils does not occur, or that the soil cover is maintained.	Miami-Dade County designates OU1 as located within the "industrial districts, unlimited manufacturing" zoning area. However, there are no restrictions in place for OU1 to ensure that the land use remains industrial, that exposure to subsurface soil contamination does not occur, or that the soil cover is maintained
Ground Water	Yes	No[1]	30-3014-031-0010	Restrict the use of ground water at the Biscayne Aquifer Sites/the Site's OU2.	Sections 24-43.2 and 24-43.3 of the Miami-Dade County Code of Ordinances regulate well permitting and use of wells in Miami-Dade County.

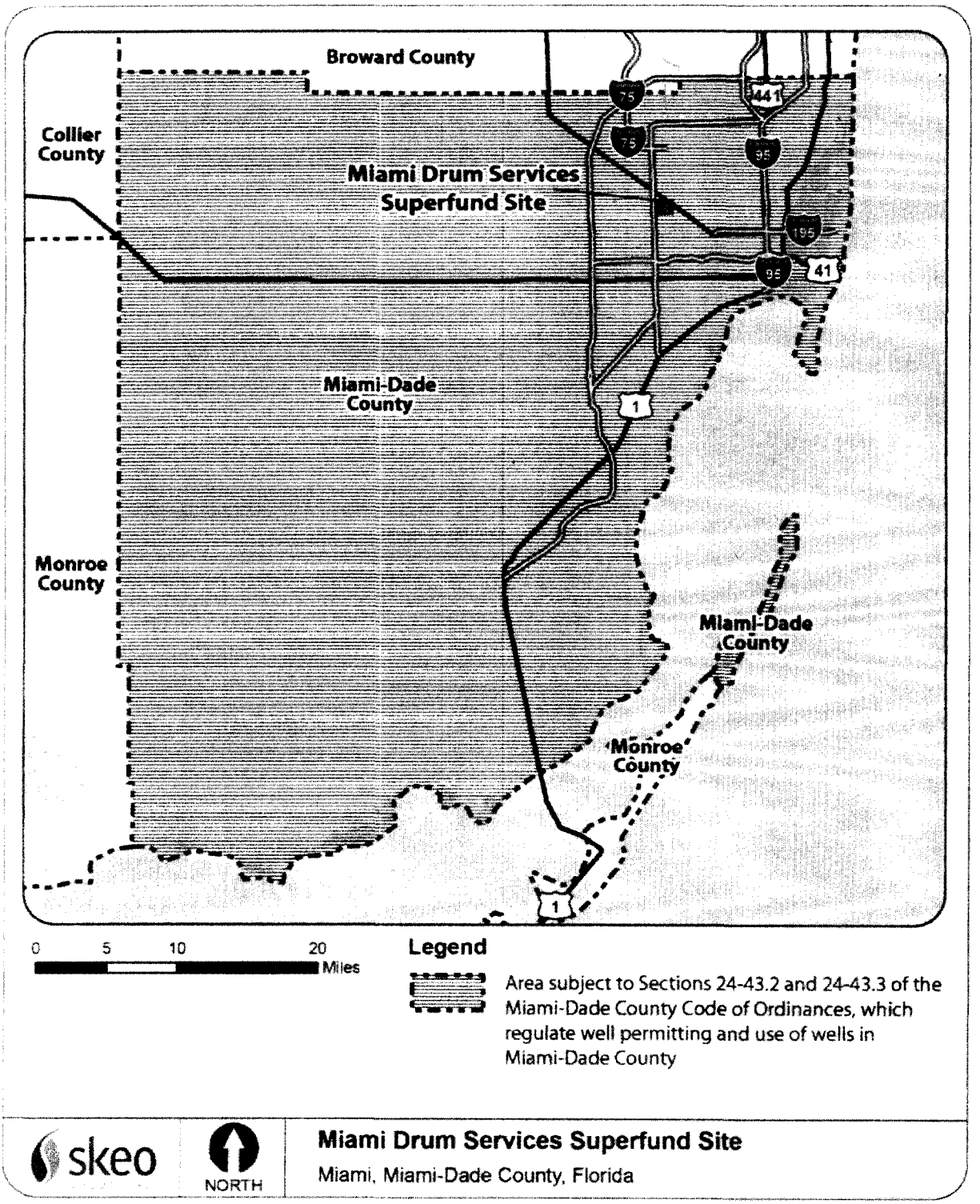
1. The Biscayne Aquifer Sites ROD stated that existing county regulations were in place at the time of the signing of the ROD. The Biscayne Aquifer Sites ROD did not require ICs as part of the OU2 remedy.

Figure 3: Institutional Control Base Map (Soil/Land Use)



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

Figure 4: Institutional Control Base Map (Ground Water)



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

6.4 Data Review

Air

The air stripping towers at the Preston and Hialeah WTPs are subject to a federally enforceable limit on total and individual hazardous air pollutant emissions as well as the limits imposed by the state through its Title V Air Operations permit. Based on the amount of emissions approved in the air permit, the permit describes the WTPs as a major source of hazardous air pollutants. Emissions data are collected from the towers on a monthly basis and summed for the 12-month period from January to December of each calendar year. These 12-month totals are reported to demonstrate compliance with the terms of the air emission permit. WASD is currently operating the air stripping towers at the WTPs under Title V Air Operation Permit 0250281-013-AV. This permit is valid until September 25, 2015.

Ground Water

The Biscayne Aquifer Sites ROD stated that ground water monitoring for all VOC priority pollutants would take place annually by both WASD and DERM at the Preston and Hialeah WTPs. The Biscayne Aquifer Sites ROD stated that this monitoring was sufficient and that it should continue until FDEP determined that ground water cleanup goals listed in the Biscayne Aquifer Sites ROD had been met. Ground water monitoring has taken place at 23 of the Hialeah production wells and seven of the Preston production wells since the installation of the air stripping towers in 1992. According to the first FYR for the Site in 2003, WASD had monitored VOC contamination in the Hialeah wellfield and the Preston wellfield on a quarterly basis from 1988 to 1992 and an annual basis from 1993 to 2003. The reduction in monitoring frequency resulted from a change in the regulations for monitoring at the supply wells since WASD monitors the raw water influent, the air stripper tower influent, and the finished water effluent a minimum of four times per month.

Table 8 summarizes WASD's ground water sampling data for the previous FYR period, which includes data from 2004 to 2007, as well as the sampling data from the current FYR in order to observe trends over time. Sampling data from the current FYR includes data collected from November 2008 to April 2012. Data from both the previous and current FYR periods indicate that sampling has detected a subset of VOCs in various production wells. The VOCs detected include 1,1-dichloroethane; vinyl chloride; 1,2-dichlorobenzene; toluene; chlorobenzene; and cis-1,2-dichloroethene. In addition, WASD also provided the aggregate of these results as total VOCs. The 1985 Biscayne Aquifer Sites ROD established ground water cleanup goals. Cleanup goals used EPA primary drinking water standards and in the absence of a primary drinking water standard, the EPA included values based on the most current toxicological information available at that time. Since 1985, the EPA and FDEP have established new primary drinking standards. Additionally, toxicity information has changed. Thus, in order to provide values for evaluating the ground water monitoring data, the lowest of the EPA and FDEP primary drinking water standards was used to be consistent with the decision criteria used in the Biscayne Aquifer Sites ROD. Sampling detected 1,1-dichloroethane, which does not have an established drinking water standard. Therefore, the EPA Regional Tap Water

Screening Level was used because this value is lower than the FDEP ground water cleanup target level (GCTL) established for this compound.

As shown in Table 8, since the installation of the air stripping towers in 1993, all contaminants except for vinyl chloride are well below the cleanup levels established in the Biscayne Aquifer Sites ROD, as well as the most current ARARs and guidance values for the Hialeah and Preston production wells. Although vinyl chloride concentrations have decreased over time, it remains the only VOC that still exceeds the cleanup goal in several Hialeah and Preston production wells. During the previous FYR period, six Hialeah production wells (H-2, H-8, H-9, H-20, H-21 and H-23) exceeded the MCL for vinyl chloride (Figure 5). Data collected from 2008 to 2012 for the current FYR period indicate that only three Hialeah production wells exceed the MCL for vinyl chloride (H-9, H-22 and H-23). In 2010, production wells H-9 and H-23 exceeded the MCL for vinyl chloride with concentrations of 1.42 µg/L and 1.5 µg/L, respectively (Figure 6). Sampling data indicate similar trends in the Preston production wells. During the previous FYR period, data collected from 2004 to 2007 showed three of the seven production wells as exceeding the MCL for vinyl chloride (Figure 7). These well were P-3, P-5, and P-6. None of the wells exceeded the MCL in 2007. During the current FYR period, production well P-3 exceeded the MCL for vinyl chloride in 2008 and 2009 (Figure 8). In 2010 and 2012, none of the seven Preston production wells exceeded the MCL for vinyl chloride. Appendix G shows total VOCs (the aggregate of all VOC concentrations) plotted over time for the Hialeah production wells. As shown, total VOC concentrations have decreased from above 40 µg/L in a number of Hialeah production wells prior to the air stripping tower installation to less than 2 µg/L in all production wells since 2010. A similar trend is observed in the Preston production wells. A comparison of historical and current data illustrates that air stripping has reduced VOCs significantly since the installation of the air stripping towers.

Table 8. Summary of Monitoring Data Results from Production Wells for the Hialeah and Preston WTPs (µg/L)

	Cleanup Goals (µg/L)		Hialeah Production Wells				Preston Production Wells			
	Biscayne Aquifer Sites ROD[1]	Current[2]	2004-2007		2008-2012		2004-2007		2008-2012	
Contaminant			FOD	Range	FOD	Range	FOD	Range	FOD	Range
Chlorobenzene	488	100	8/90	BDL - 0.92	0/104	BDL	0/26	BDL	0/35	BDL
Dichlorobenzene, 1,2-	ND	600	1/90	BDL - 0.32	0/104	BDL	0/26	BDL	0/35	BDL
Dichloroethane, 1,1-	0.9	2.4[3]/70[4]	0/90	BDL	0/104	BDL	0/27	BDL	0/35	BDL
Dichloroethene,cis-1,2-	270	70	2/90	BDL - 0.28	0/104	BDL	0/26	BDL	0/35	BDL
Toluene	340	1000	0/90	BDL	0/104	BDL	0/26	BDL	0/35	BDL
Vinyl chloride	1	1	45/90	BDL - 2.56	21/104	BDL - 2.06	16/26	BDL - 2.12	11/35	BDL - 1.77

1. Based on the Biscayne Aquifer Sites ROD, pages 12-14, Table 11.
2. Based on current ARARs which are the lower of the National Drinking Water MCLs as of 2012 (40 CFR 141), which are available at http://water.epa.gov/drink/contaminants/index.cfm#primary (accessed on 12/13/2012) and the Florida Drinking Water Standards as of 2012, which are available at http://www.dep.state.fl.us/legal/Rules/drinkingwater/62-550.pdf (accessed on 12/13/2012).
3. EPA Regional Screening Level for tap water available at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
4. FDEP GCTL based on noncancer effects available at: http://www.dep.state.fl.us/waste/quick_topics/publications/wc/FinalGuidanceDocumentsFlowCharts_April2005/TechnicalReport2FinalFeb2005(Final3-28-05).pdf

BDL = Below detection limit.

FOD = Frequency of detection.

ND = Not specified as a priority pollutant in the Biscayne Aquifer Sites ROD but has been detected by WASD in the production wells.

Figure 5. Vinyl Chloride in Hialeah Production Wells (2004-2007)

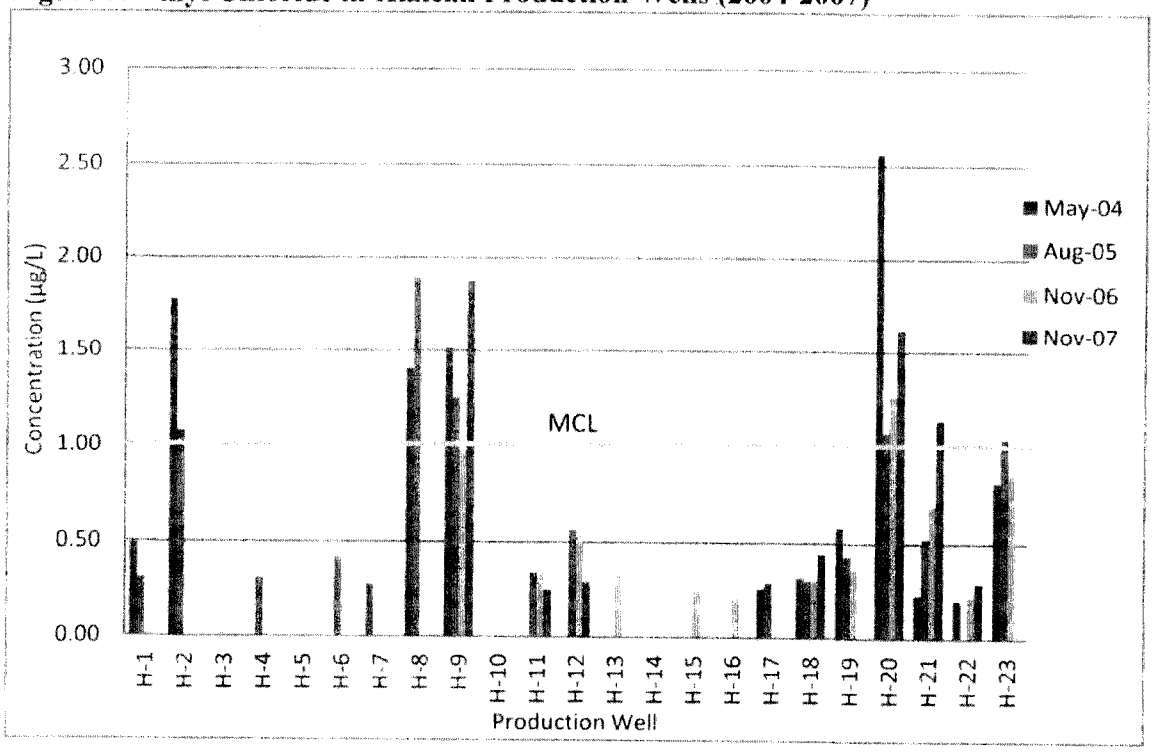


Figure 6. Vinyl Chloride in Hialeah Production Wells (2008-2012)

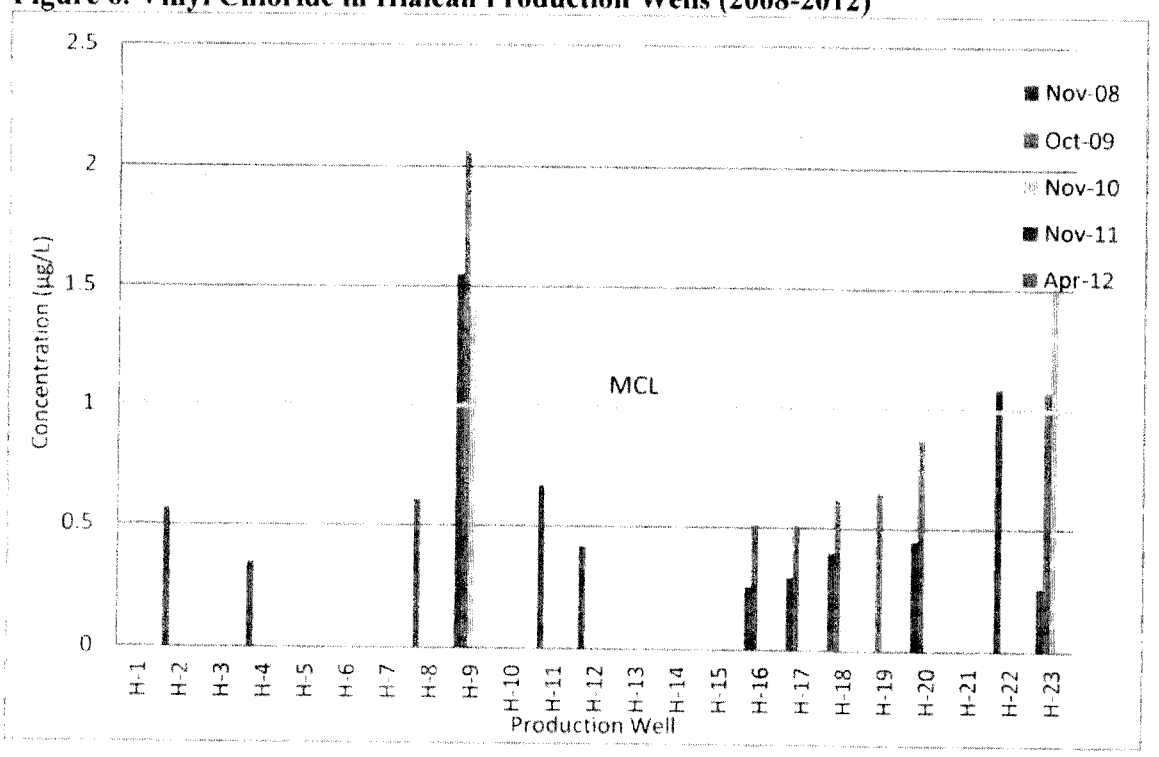


Figure 7. Vinyl Chloride in Preston Production Wells (2004-2007)

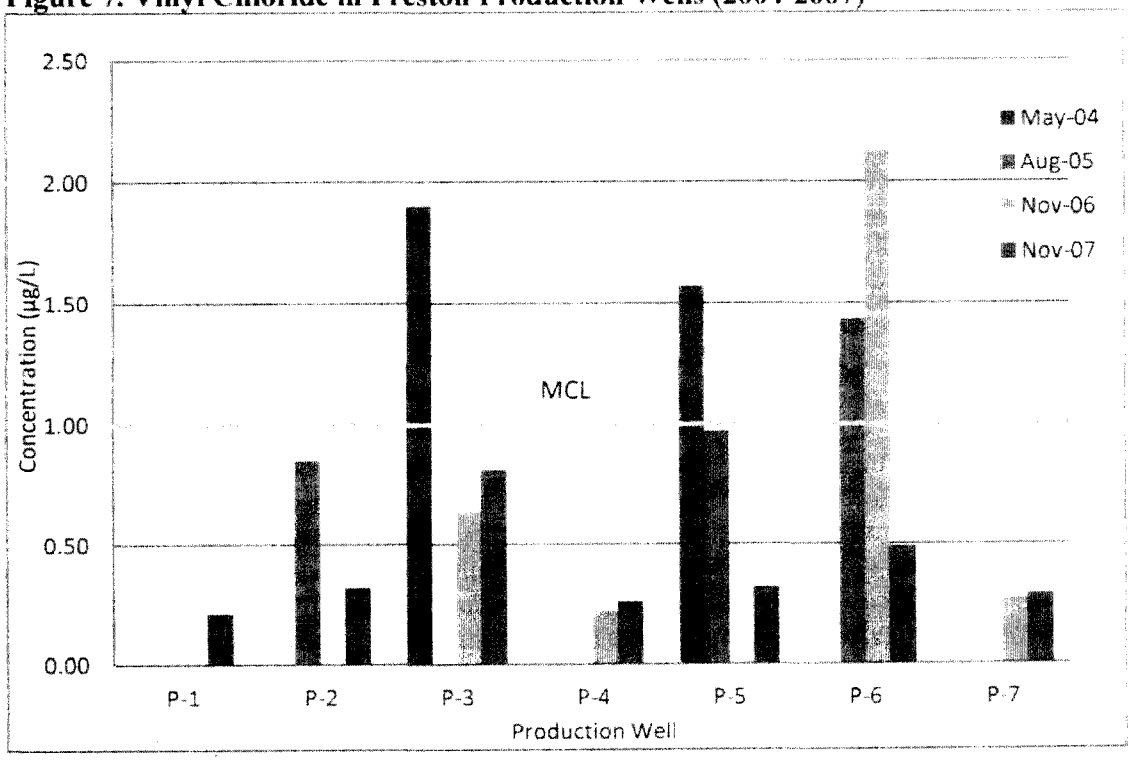
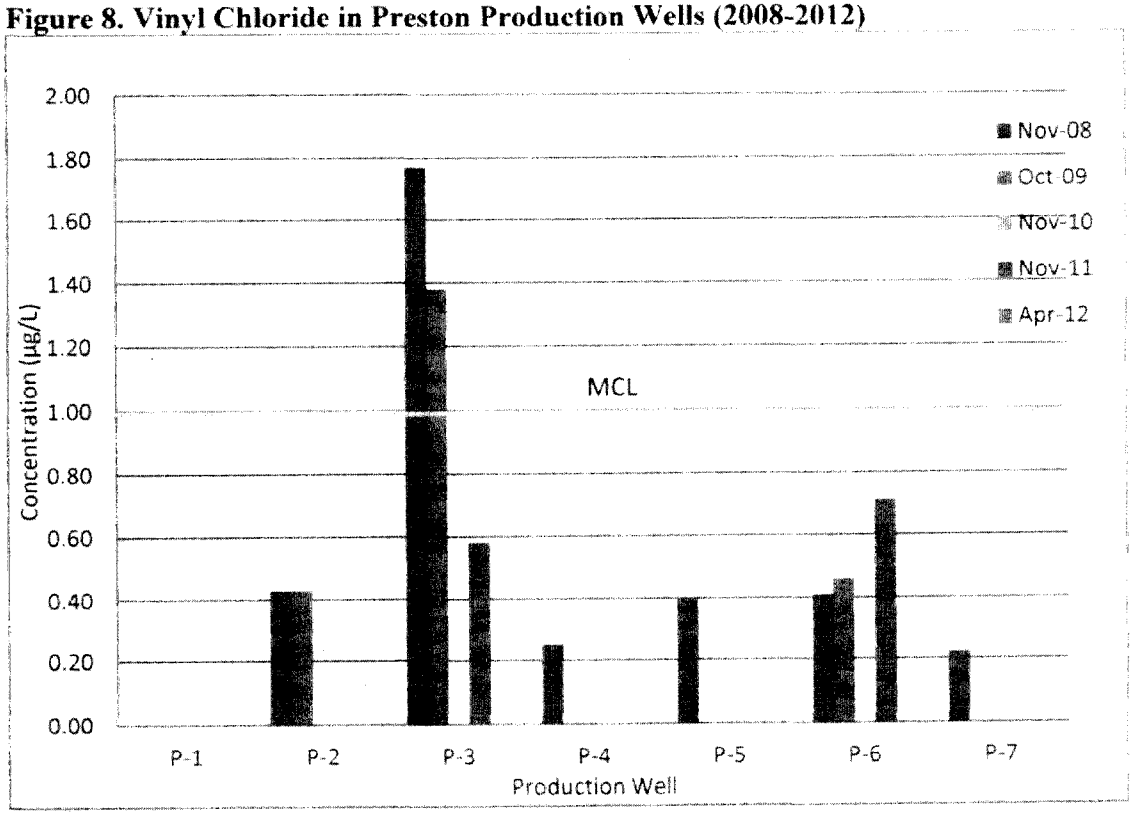


Figure 8. Vinyl Chloride in Preston Production Wells (2008-2012)



6.5 Site Inspection

On October 30, 2012, James Hou (EPA), Treat Suomi (Skeo Solutions), Lynette Wysocki (Skeo Solutions), and Bill Nelson (Miami-Dade Transit) met at the Miami Drum Services Superfund site located at the Miami-Dade Transit Authority Operations and Maintenance property at 6601 NW 72nd Avenue, Miami-Dade County, Florida, to perform the site inspection. The site inspection participants met in the Operations and Maintenance facility lobby and discussed the recent activities at the Transit Authority property. The Transit Authority property is gated and secured by security personnel. Bill Nelson (Miami-Dade Transit) gave a tour of the Transit Authority property and the general area of OU1. The group toured the northwest portion of the Transit Authority property where the OU1 soil removal actions took place. Mr. Nelson was not aware of the exact location of OU1. The group observed the condition of the general area, which now includes a mix of rail tracks, pavement and gravel. The gravel areas are used for equipment storage and the rail track are used for train parking. Other observations and discussions during the tour included current activities such as the planned construction of new train parking tracks on the northwestern portion of the Transit Authority property near the OU1 removal actions area. Bill Nelson explained the process for constructing new tracks, which includes digging down four to five feet, installing concrete structures, running electrical wires underground for the electric trains and laying new tracks. Mr. Nelson also informed the group of a recently dug 5-feet wide by 5-feet deep hole on the southwestern portion of Transit Authority property near the Operations and Maintenance building's parking lot. Mr. Nelson was not aware of the purpose of the hole. The group toured the area and noted standing water and vegetation growth in the hole.

Following the tour of the Transit Authority property and general area of OU1, the EPA and Skeo Solutions met with Adien Toledo from Miami-Dade County in the Operations and Maintenance facility lobby. The group discussed the location of OU1 and the extent of the OU1 removal actions. The group concluded that DERM may have the best available records regarding OU1's boundaries. The group also discussed the planned construction of the train parking tracks on the northwestern portion of the Transit Authority's property. Mr. Toledo also discussed the plans for the construction of test tracks on the southeastern portion of the Transit Authority property as well as the building permitting process and DERM's review of construction and activities at the facility.

After the site inspection, the EPA and Skeo Solutions traveled to the Preston WTP located at 1100 W. 2nd Avenue, Miami, Florida to inspect the air strippers at the plant. The group met with Marcial Moreno from WASD. Mr. Moreno gave the group a tour of the treatment plant and explained the operation and maintenance procedures for the air strippers at the Preston and Hialeah WTPs. Mr. Moreno explained that the air strippers operate 24 hours/day and 7 days/week. The units have been in continuous operation for 15 years and no more than three or four units have been shut off at one time. There are 64 air strippers total between the Preston and Hialeah WTPs which are capable of treating 120 million gallons/day. Mr. Moreno showed the group a portion of the inside of the unit which contains the belts and bearings. Operation and maintenance activities for the air

strippers includes monthly replacement of filters, maintenance of the belts and bearings every two to three months, pressure cleaning and grease removal.

Skeo Solutions took photographs of the general OU1 removal area, the Transit Authority property, the Operations and Maintenance building, and the air strippers at the Preston WTP. A completed site inspection checklist can be found in Appendix D and site photographs in Appendix E.

On October 30, 2012, Skeo Solutions visited the information repository for the Site at Miami-Dade County Public Library located at 101 W Flagler, Miami, Florida 33128. Site information was not available for review because the librarian that manages the materials was unavailable. Skeo Solutions staff followed up with the librarian by telephone regarding the status of the materials at the library. The librarian stated that the library does not have current site information. The library retains EPA materials for other sites in the area and would like to receive the information related to the Site. The librarian stated that electronic copies of the information would be useful in order to conserve space at the library.

Skeo Solutions conducted research at the Miami-Dade County Public Records Office and found the deed information pertaining to the Site listed in Table 9. The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) address for the Miami Drum Services Site is listed as 7049 NW 70th Street, while the Miami-Dade public records list the Site's address as 7020 NW 72nd Ave. The Miami-Dade Transit Authority has subsumed the Site's OU1 within the Transit Authority's rail maintenance yard, which has an address of 6601 NW 72nd Ave. All the items listed in Table 9 correspond to the Site's original address, 7020 NW 72nd Ave., as recorded by Miami-Dade County, or the Site's current address, 6601 NW 72nd Ave. No deed information was found for the Site's CERCLIS address, 7049 NW 70th Street.

Table 9: Deed Documents from Miami-Dade County Public Records Office

Date	Type of Document	Description	Book #	Page #
1982	Satisfaction of Judgment	Satisfaction by Miami Drum Services to Dade County of $1,407.	11393	261
1987	Judgment	Judgment for the EPA and against Miami Drum Services as well as other PRPs for response costs in the amount of $2,298,100.	13371	1959
1999	Lien	Lien in the amount of $9,063.64 by Calissi Properties against Parcel 30-3014-010-0500, located at 7020 NW 72nd Ave. for unpaid environmental engineering and testing services.	18494	2485
2000	Covenant of Construction	Dolores Boyd grants right to install and covenants to maintain three temporary soil borings on Parcel 30-3014-010-0500, located at 7020 NW 72nd Ave.	19257	1995
2002	Lien	A lien in the amount of $11,524 unpaid to Florida Environmental Engineering Inc. for soil cleanup/testing at Parcel 30-3014-010-0500, located at 7020 NW 72nd Ave.	20821	1456
2005	Warranty Deed	Describes restructuring of ownership of Parcel 30-3014-010-0500, located at 7020 NW 72nd Ave.	23276	3488

6.6 Interviews

The FYR process included interviews with parties affected by the Site, including the current landowners and regulatory agencies involved in site activities or aware of the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. One interview took place during the site inspection on October 30, 2012. The interview is summarized below. Other parties were provided the opportunity to respond to interview questions; these parties have not participated. Appendix C provides the complete interview form.

James Hou: Mr. James Hou is the EPA RPM for the site. Mr. Hou believes that the Site has progressed well though the Superfund process. He stated that the OU2 remedy does a good job of managing the risk of contaminated ground water because of the water treatment and institutional controls in place. Mr. Hou explained that there needs to be a better depiction of the location of the OU1 contamination within the Transit Authority property. Mr. Hou noted that the remedy is currently performing as designed but the issues related to implementation of institutional controls at OU1 and the area of remaining potentially contaminated soils need to be address. He would like to see more comprehensive controls regarding the excavation of potentially contaminated soils at OU1. Mr. Hou stated that the contamination at both OU1 and OU2 has had minimal effect on the surrounding community. Mr. Hou is not aware of any complaints or inquiries about the Site.

Adien Toledo: Mr. Adien Toledo is a representative from Miami-Dade County. Mr. Toledo is aware of the environmental issues at the Site. He is confident that most of the details about the Site are known. However, Mr. Toledo suggested that the EPA keep a better record of the Site so that information, such as the boundaries of OU1, is available. Mr. Toledo is not aware of any unusual activities at OU1 or any changes to state laws or local regulations that would affect the Site. He explained that DERM usually monitors new regulations that would affect the Site and that FDEP and DERM conduct regular inspections of the Transit Authority property. Mr. Toledo stated that the Transit Authority has plans to build test tracks on the southeastern portion of the Transit Authority property. He was unaware of the plans to reposition and build additional storage tracks on the northwestern portion of the Transit Authority property. He stated that he would need to find out more information about the plans. He explained that any building permits would go through DERM and that DERM will issue public notices for the construction activities.

Kelsey Helton: Ms. Kelsey Helton is the representative from FDEP for the Site. Ms. Helton stated that FDEP is pleased with the continued reuse of the Site and that access to the Transit Authority property continues to be controlled. She stated that the establishment of institutional controls and the identification and delineation of the OU1 contamination need to be completed. Ms. Helton explained that it is unknown if the OU1 remedy meets current soil cleanup target levels. She recommended that identification of the OU1 boundaries and sampling to determine remaining soil contamination levels take place. Ms. Helton also stated that institutional controls need to be put in place to limit current and future use of OU1 and ensure that contaminated soils remaining on the property are managed appropriately. She believes that the OU2 ground water remedy appears to be progressing. She stated that FDEP recommends that ground water and soil cleanup target levels in Chapter 62-777 be considered in evaluating continued protectiveness of the remedy. Ms. Helton has not received any complaints or inquires related to the Site.

7.0 Technical Assessment

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

The review of site documents, ARARs and the site inspection indicate that the OU1 remedy is functioning as intended by the site decision documents. DERM completed removal actions at OU1 in January 1982 to address exposure pathways. Since the completion of the removal actions, OU1 has remained in industrial use as part of the Transit Authority's property. Currently, the Transit Authority enforces access controls at the property but institutional controls must be implemented to ensure that the land use at OU1 remains industrial, that exposure to -contaminated subsurface soils does not occur, and that the soil cover is maintained. Institutional controls need to be implemented to ensure the long-term protectiveness of the soil remedy. However, the OU1 ROD did not discuss institutional controls as a component of the remedy. In light of the planned construction at the Transit Authority property and remaining contamination in subsurface soils, the County should conduct sampling, as appropriate, prior to any construction within the boundaries of OU1 to ensure that the necessary precautions are taken regarding excavation of any remaining contaminated subsurface soil.

The review of site documents, ARARs and the site inspection indicate that the OU2 remedy is functioning as intended by the site decision documents. The recovery wells and air stripping towers have continuously operated since 1992 to remove VOCs and meet federal drinking water standards for the public drinking water supply. Levels of VOC contaminants in the Biscayne Aquifer have decreased over time and the air stripping towers remove the VOCs that remain. Ground water in the Biscayne Aquifer continues to exceed the MCL and Vapor Intrusion Screening Level (VISL) for vinyl chloride. Therefore, operation of the air stripping towers to treat VOC contamination in ground water is needed to continue to achieve the OU2 RAO of providing clean drinking water. The Biscayne Aquifer Sites ROD states that existing county regulations governing well permitting and use were in place at the time of the signing of the Biscayne Aquifer Sites ROD as a form of institutional controls to restrict ground water usage within the study area. These institutional controls remain in place. However, the Biscayne Aquifer Sites ROD did not require institutional controls as part of the OU2 remedy.

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

The extent of soil excavation during the OU1 removal actions was based on 10 times minimum criteria for ground water, as well as engineering and scientific judgment. However, it is unknown whether the soil excavation criteria used left subsurface soil contaminants in place above current soil cleanup target levels. Excavation left 3,900 cubic yards of subsurface soil with mercury levels in excess of 10 times minimum criteria for ground water in place at OU1. Extraction Procedure analyses showed mercury levels slightly higher than the 1.4 μg/L 10 times minimum criteria for ground water. Visual observations of core samples did not indicate that soils contained oily deposits or color exhibited by contaminated soils from areas of OU1. Therefore, it was determined that soil

would not result in an increased degree of contamination to the underlying aquifer. Clean fill was placed over the excavated areas where contaminated soils remained, ensuring there is not a completed exposure pathway for on-site workers. Institutional controls should be implemented requiring property owners to conduct soil sampling, as appropriate, prior to disturbing soil within the boundaries of OU1. The exposure assumptions for the OU1 ROD that assumed future industrial use of OU1 remain valid. The current toxicity values for priority pollutants are presented in Appendix H.

The Biscayne Aquifer Sites ROD assumed exposure to ground water through ingestion of drinking water and established cleanup goals that were protective for consumption of ground water. These exposure assumptions remain valid. ARARs for several of the ground water priority pollutants are now more stringent than those in the Biscayne Aquifer Sites ROD (see Table 6). Therefore, the cleanup goals for these priority pollutants are no longer valid. However, the WTPs monitor the water to ensure that the drinking water from the Preston and Hialeah wells meets all current state and federal drinking water standards prior to being supplied as drinking water to the public. Additionally, concentrations of contaminants in the Biscayne Aquifer are decreasing over time.

No vapor intrusion assessment had been conducted in support of remedy selection for the Site. Since the publishing of the ROD, risk assessment methodology has become available to evaluate this exposure pathway. The EPA conducted a vapor intrusion evaluation in support of this FYR in May 2013 by using the VISL calculator available at the EPA's vapor intrusion website[1] and the most recent ground water data. The complete findings are presented in the Vapor Intrusion Evaluation in Support of the 3rd Five Year Review Memorandum (Appendix I). Although there are currently no occupiable buildings that exist in the rail yard comprising OU1, the VISL was used as a conservative screening tool to address this exposure pathway. The EPA used conservative estimates of exposure by using the maximum detections from 1981 and pre-cleanup 1983 ground water data under the hypothesis that concentrations would only be lower following remedial action. The EPA also calculated risks associated with exposures using post 1983 remedial action ground water data. In addition, the EPA estimated vapor intrusion risks to both future residents and commercial workers. The pre-remedial vapor intrusion risks exceeded the upper bound of the EPA's risk management range of 1×10^{-6} to 1×10^{-4} as well as the noncancer hazard index of 1.0. However, post remedial risks declined to acceptable risk levels and below the noncancer hazard index of 1.0. Based on the VISL calculator, the EPA concluded that there are no unacceptable risks or hazards using the most current ground water data. Under current site conditions, there is no complete vapor intrusion pathway for OU1 or the Biscayne Aquifer Sites associated with OU2.

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

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

[1] http://www.epa.gov/oswer/vaporintrusion/guidance.html

7.4 Technical Assessment Summary

According to the review of site documents, data, ARARs and the site inspection, the selected remedies at the Site are currently functioning as intended by the Site's decision documents. WASD will continue to operate the air stripping towers at the Preston and Hialeah WTPs. However, concentrations of vinyl chloride have exceeded the MCL and VISL. The EPA conducted a vapor intrusion evaluation in May 2013, considering multiple lines of evidence. The EPA determined that there is no complete vapor intrusion pathway. Ground water well installation and ground water use in the study area are controlled by county regulations, which are designed to ensure that ground water intended for individual and public consumption meets MCLs. The county regulations were in place at the time of the signing of the Biscayne Aquifer Sites ROD as a form of institutional controls. These institutional controls remain in place. However, the Biscayne Aquifer Sites ROD did not require institutional controls as part of the OU2 remedy. Soil removal actions left 3,900 cubic yards of soil with mercury levels in excess of 10 times minimum criteria for ground water in place at OU1. Institutional controls for soil will be required to ensure the long-term protectiveness of the OU1 remedy. The site inspection and interviews confirmed that industrial land use at OU1 is expected to continue and construction plans for the Transit Authority property were identified. Prior to any construction at the Transit Authority property, the County should conduct sampling, as appropriate, prior to any construction within the boundaries of OU1 to ensure that the necessary precautions are taken regarding excavation of any remaining contaminated subsurface soil.

8.0 Issues

Table 10 summarizes the current site issues.

Table 10: Current Site Issues

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
Institutional controls for the soil remedy at OU1 were not called for in the Site's decision documents and have not been implemented.	No	Yes
County regulations governing well permitting and use are in place but not required by the Biscayne Aquifer Sites ROD.	No	Yes

9.0 Recommendations and Follow-up Actions

Table 11 provides recommendations to address the current site issues.

Table 11: Recommendations to Address Current Site Issues

Issue	Recommendation / Follow-Up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Institutional controls for the soil remedy at OU1 were not called for in the Site's decision documents and have not been implemented.	Identify OU1's boundaries and design and implement institutional controls for the OU1 soil remedy.	Miami-Dade County	EPA/FDEP	5/1/2015	No	Yes
County regulations governing well permitting and use are in place but not required by the Biscayne Aquifer Sites ROD.	Document the need for institutional controls at OU2 in a site decision document.	EPA	EPA	5/1/2015	No	Yes

10.0 Protectiveness Statements

The remedy at OU1 currently protects human health and the environment because the County's removal actions addressed exposure pathways at OU1, including direct contact with contaminated drums and soils, as well as leaching of contamination into the drinking water supply aquifer. However, in order for the remedy to be protective in the long term, institutional controls should be implemented to ensure the long-term protectiveness of the OU1 remedy.

The remedy at OU2 currently protects human health and the environment because ground water treatment is effectively removing VOCs, finished drinking water from the Preston and Hialeah WTPs continues to meet all state and federal drinking water standards prior to being supplied to the public, and there is no complete vapor intrusion pathway for OU1 or the Biscayne Aquifer Sites associated with OU2. Existing county regulations that govern well permitting and use serve as institutional controls to restrict ground water usage in the study area. However, in order for the remedy to be protective in the long term, the need for institutional controls should be documented in a site decision document.

The remedy at the Site currently protects human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are under control. However, to ensure protectiveness in the long term, institutional controls should be designed and implemented as part of the OU1 remedy, and the need for institutional controls at OU2 should be documented in a site decision document.

11.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

2011 Annual Water Loss Reduction Plan Implementation Status Report. Prepared by Malcolm Pirnie, Inc. Prepared for Miami-Dade County, Miami Dade Water and Sewer Department. March 2012.

Consent Decree for Miami Drum Site. January 7, 1985.

Evaluation of the Clean-Up Activities Already Undertaken at the Miami Drum Services Hazardous Waste Site. Draft Report, Volume I, Biscayne Aquifer/Dade County (Parts 1 & 2). Dade County, Florida. September 1, 1982.

Field Investigations of Uncontrolled Hazardous Waste Sites. Fit Project task report to EPA on the feasibility of abating the source of ground-water pollution at Miami Drum Services Dade County, Florida. Prepared by Clemons, Aton, Harman, and Scott-Simpson of Ecology and Environment, Inc. December 8, 1981.

Five-Year Review Report for Miami Drums Services, Miami, Dade County, Florida. Prepared by the U.S. Army Corps of Engineers. Prepared for EPA Region 4. May 2, 2003.

Five-Year Review Report for Miami Drum Services, Miami-Dade County, Florida. Prepared by E^2 Inc. Prepared for EPA Region 4. May 1, 2008.

Memo: Final 5 Year Review dated September 2002 and submitted by the US Army Corps of Engineers for the Miami Drums Superfund Site. Prepared by DERM. October 28, 2002.

Memo: Final 5 Year Review dated September 2002 and submitted by the US Army Corps of Engineers for the Miami Drums Superfund Site. Prepared by DERM. January 22, 2004.

Memo. RE: Miami Drum Services Superfund site Five Year Review. From Kelsey Helton, FDEP. To Julie Santiago-Ocasio, EPA Region 4. April 29, 2008.

Memorandum. Vapor Intrusion Evaluation in Support of the 3rd Five year Review, Miami Drum Services, Miami, FL. From Ben Bentkowski, P.G., Hydrologist, EPA. To James Hou, Remedial Project Manager, EPA. May 8, 2013.

Miami-Dade County Code of Ordinances, Sections 24-43.2 and 24-43.3
http://www.municode.com/resources/gateway.asp?pid=10620&sid=9

Miami-Dade County, Water Supply Facilities Work Plan Support Data, Revised March 2008. CDM Project No. 6430-57901-061.

Miami Drum Remedial Action Report. Air Stripping Facilities at the Hialeah and John E. Preston Water Treatment Plants. Approved. June 15, 1993.

Phase II—Sampling, Analytical, and Investigative Program for the Protection of the Biscayne Aquifer and Environment in North Dade County, Florida. Final Report. Volume I. Prepared by CH2M Hill. February 1984.

Phase II—Sampling, Analytical, and Investigative Program for the Protection of the Biscayne Aquifer and Environment in North Dade County, Florida. Final Report. Volume II Appendix. Prepared by CH2M Hill. February 1984.

Phase III—Feasibility of Remedial Actions for the Protection of the Biscayne Aquifer in Dade County, Florida. Final Report. Prepared by CH2M Hill. May 1985.

Recommendations to Clean Up and Protect the Biscayne Aquifer in Southeast Florida: An Overview of a four year study by the EPA of selected hazardous waste sites and their effect on the Biscayne Aquifer. Prepared by Meridian Communications, Rifkin and Associates and CH2M Hill. Prepared for EPA. November 1985.

Record of Decision: Miami Drum Services OU. Miami, Florida. September 13, 1982.

Record of Decision: Varsol Spill, Miami Drum Services, and Northwest 58th Street Landfill. September 16, 1985.

Remedial Investigation for Miami Drum Services Site, Florida. Prepared by Vernon B. Myers, Ph.D., Florida Department of Environmental Regulation. November 1983.

Superfund Preliminary Close Out Report. Miami Drum/Biscayne Aquifer Remedial Action. Dade County, Florida. April 28, 1993.

Title V Air Operation Permit Renewal, FINAL Permit Project No.: 0250281-013-AV. Miami-Dade Water and Sewer Department, Hialeah Preston Water Treatment Plant, Facility ID No.: 0250281. Miami-Dade County. Florida Department of Environmental Protection, Southeast District Office, Air Program. Effective Date: September 26, 2010.

Appendix B: Press Notice

The U. S. Environmental Protection Agency, Region 4
Announces a Five-Year Review for
the Miami Drum Services Superfund Site,
Hialeah, Dade County, Florida

Purpose/Objective: The U.S. Environmental Protection Agency (EPA) is conducting a Five-Year Review of the remedy for the Miami Drum Services Superfund site (the Site) in Hialeah, Florida. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect human health and the environment.

Site Background: The 7-Acre Site is located within a larger 62-acre property owned by the Miami-Dade County Transit Authority in Hialeah, Dade County, Florida, approximately two miles north of Miami International Airport. Land uses surrounding the Site are primarily industrial. There are several municipal well fields in the area. Between 1966 and 1967, Miami Drum Services cleaned and recycled drums at the Site. Operations included washing drums with a cleaning solution. Site operators disposed of the cleaning solution, along with drum residues containing industrial solvents, pesticides, acids and heavy metals, in open unlined pits at the Site. Poor waste handling practices resulted in contamination of site soil with metals, pesticides and volatile solvents and ground water, including the Biscayne Aquifer, with volatile organic compounds (VOCs). EPA placed the Site on the National Priorities List (NPL) in 1983. Primary contaminants of concern at the Site include phenols, mercury, lead, cadmium, chromium, arsenic, nickel, oil and grease, dieldrin, and benzene in site soil, and VOCs, including vinyl chloride and trans-1,2-dichloroethylene, in ground water.

Cleanup Actions: EPA designated two operable units (OUs) to address the Site's contamination. EPA selected a remedy to treat soil contamination in the Site's September 1982 OU1 Record of Decision (ROD). Major parts of the OU1 remedy included removal and proper disposal of approximately 15,000 tons of contaminated soil and treatment of approximately 65,000 gallons of contaminated ground water directly beneath the Site. EPA selected a remedy to address ground water contamination in the Site's September 1985 OU2 ROD. The remedy addresses cleanup of ground water contamination from the Site, in conjunction with the cleanup of two other Superfund sites in Miami, the Varsol Spill and Northwest 58th Street Landfill sites. Though there are no concentrated contaminant plumes migrating off of the three sites, contamination from the sites has commingled and affected the Biscayne Aquifer. EPA selected the OU2 remedy for all three sites to protect the regional water supply. The remedy selected for OU2 included use of existing wells or local well fields as recovery wells, and treatment of contaminated ground water through aeration or stripping towers and/or activated carbon treatment plants.

Five-Year Review Schedule: The National Contingency Plan requires the review of remedial actions that result in any hazardous substances, pollutants or contaminants remaining at a site above levels that allow for unlimited use and unrestricted exposure (UU/UE) to ensure the protection of human health and the environment. The third Five-Year Review for the Site will be completed by May 2013.

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

Lorna Jones, EPA Remedial Project Manager
Phone: (404) 562-8669
Email: lorna.jones@epa.gov

Laura Spencer, EPA Community Involvement Coordinator
Phone: (404) 562-8283 or (800) 435-9233 (toll free)
Email: spencer.laura@epa.gov

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

Additional site information is available at the Site's local document repository, located at Miami-Dade County Public Library, 160 West Flagler Street, Miami, Florida 33130, and online at www.epa.gov/region4/superfund/sites/rpl/florida/miadrl.htm

Appendix C: Interview Forms

Miami Drum Services Superfund Site **Five-Year Review Interview Form**

Site Name: **Miami Drum Services** **EPA ID No.:** **FLD076027820**

Interviewer Name: **Affiliation:**
Subject Name: **James Hou** **Affiliation:** **U.S. EPA**
Subject Contact Information: **hou.james@epa.gov**
404-562-8965
Time: **NA** **Date:** **04/01/13**
Interview Location: **Atlanta, GA**

Interview Format (circle one): **In Person** **Phone** **Mail** **Other: Email**

Interview Category: **EPA Remedial Project Manager**

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

   The Miami Drum site has been around for a long while, and has progressed well through the Superfund process. The remedy does a good job of managing the risk associated with the OU2 ground water component of the remedy, as the water is treated for site related contaminants at the Miami Dade Water and Sewer Department. Additionally, the contaminated area of the Biscayne Aquifer is captured in a delineated zone by the water management district, restricting installation of wells in the contaminated aquifer. In visiting the site for the first time, it is apparent that there needs to be a better depiction of where the contaminated parcel lays, as it has now been aggregated into a rail yard.

2. What have been the effects of this Site on the surrounding community, if any?

   The effects on the surrounding community have been minimal, as water is provided by the Miami-Dade Water and Sewer Department, but could have some impacts, as there are restrictions on the installation of private wells. Soil contamination has not had an impact on the surrounding community since it is wholly contained within the rail yard.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?

   I am not aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup.

4. What is your assessment of the current performance of the remedy in place at the Site?

   The remedy is currently performing as designed, but the implementation of institutional controls on the contaminated parcel, regarding the excavation of potentially contaminated soils needs to be addressed.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   I would like to see more comprehensive institutional controls regarding the excavation of potentially contaminated soils, related to the OU1 remedy for the Miami Drum site.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.

   I am not aware of any community concerns regarding the Site or the operation and management of its remedy.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   I have no further comments or suggestions regarding the management or operation of the Site's remedy.

Site Name: Miami Drum Services **EPA ID No.:** FLD076027820

Interviewer Name: L'Tonya Spencer/Lynette Wysocki **Affiliation:** EPA/Skeo Solutions

Subject Name: Adien Toledo **Affiliation:** Miami-Dade County

Subject Contact Information: toleda@miamidade.gov 786-469-5274

Time: 9:45AM **Date:** 10/30/2012

Interview Location: Miami-Dade County Transit Authority Operations and Maintenance building

Interview Format : In Person **Phone** **Mail** **Other:**

Interview Category: **Local Government (Miami Dade County)**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

Yes.

2. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might the EPA convey site-related information in the future?

I am confident that most details are known. I suggest that the EPA keep a better record of the site so that information such as site boundaries is available.

3. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

None that I am aware of.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

None recently that I am aware of. DERM usually monitors new regulations that would affect the site. FDEP and DERM inspections occur regularly at the transit facility.

5. Are you aware of any changes in projected land use(s) at the Site?

Yes. There are plans to build test tracks on the southeast portion of the transit facility property. I will need to find out more about the plans to build storage tracks on the northwest portion of the property. Any building permits have to go through DERM.

6. Has the EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can the EPA best provide site-related information in the future?

Yes. There have been public notices issued. DERM also issues public notices for construction activities such as building the new tracks at the facility.

7. Do you have any comments, suggestions or recommendations regarding the project?

No. As I stated before, there are site boundary and record keeping issues related to the site. Akbar Sharfi (akr@miamidade.gov) works in the environmental department at Miami-Dade

County and may be able to provide additional documents.

Miami Drum Services Superfund Site | **Five-Year Review Interview Form**

Site Name: Miami Drum Services | **EPA ID No.:** FLD076027820

Interviewer Name: | **Affiliation:**
Subject Name: Kelsey Helton | **Affiliation:** FDEP
Subject Contact Information: 850-245-8969
Time: | **Date:** 3/29/2013
Interview Location: Tallahassee, FL

Interview Format (circle one): In Person Phone Mail Other: email

Interview Category: State Agency

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)? *We are pleased that the property continues to be in reuse and that access to the Transit Authority property is controlled. The OU-2 groundwater remedy appears to be progressing. Recommendations contained in the 2008 FYR including establishment of Institutional Controls (ICs) and identification and delineation of the OU-1 area need to be implemented.*

2. What is your assessment of the current performance of the remedy in place at the Site? *The OU-2 Groundwater remedy appears to be progressing with continued improvements in area groundwater quality for site related contaminants based on results of influent monitoring at the well fields. It is unknown if the OU-1 remedy meets current soil cleanup target levels based on commercial /industrial use, particularly for mercury, as the ROD criteria was based on EP Toxicity results. Review of existing soil data , identification of the OU-1 boundaries, and sampling to determine remaining soil contaminant levels (in mg/kg) are recommended (prior to further proposed construction in the OU-1 area) to ensure the long term protectiveness of the OU-1 soil remedy. This data will also be needed to evaluate potential worker exposure and appropriate personal protection required during construction and to plan for appropriate excavation soil handling and disposal.*

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

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

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy? *DEP recommends that groundwater and soil cleanup target levels in Chapter 62-777 be considered in evaluating continued protectiveness of the remedy.*

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues? *Institutional controls (IC) need to be put in place to limit current and future OU-1 site use to commercial/industrial and to ensure that contaminated soils remaining on the property are managed appropriately if activities bring these soils to*

the surface.

7. Are you aware of any changes in projected land use(s) at the Site? *No. We understand that land use will remain industrial into the future and includes construction of tracks in the OU-1 area.*

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy? *See above.*

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST	
I. SITE INFORMATION	
Site Name: Miami Drum Services	**Date of Inspection: October 30, 2012**
Location and Region: Miami-Dade County, Florida, Region 4	**EPA ID: FLD076027820**
Agency, Office or Company Leading the Five-Year Review: EPA Region 4	**Weather/Temperature: Sunny, 60s**
Remedy Includes: (Check all that apply) ☒ Landfill cover/containment ☐ Access controls ☒ Institutional controls ☒ Ground water pump and treatment ☐ Surface water collection and treatment ☐ Other:	☐ Monitored natural attenuation ☐ Ground water containment ☐ Vertical barrier walls
Attachments: ☐ Inspection team roster attached	☐ Site map attached
II. INTERVIEWS (check all that apply)	
1. **O&M Site Manager** ____ Name ____ Title mm/dd/yyyy Date Interviewed ☐ at site ☐ at office ☐ by phone Phone: ____ Problems, suggestions ☐ Report attached: ____	
2. **O&M Staff** ____ Name ____ Title mm/dd/yyyy Date Interviewed ☐ at site ☐ at office ☐ by phone Phone: ____ Problems/suggestions ☐ Report attached: ____	

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

Agency Miami-Dade County

Contact	Adien Toledo	Engineer	October 30, 2012	786-469-5274
	Name	Title	Date	Phone No.

Problems/suggestions ☒ Report attached: Yes

Agency _____

Contact	_____Name	_____	_____	_____
		Title	Date	Phone No.

Problems/suggestions ☐ Report attached:_____

Agency _____

Contact	_____	_____	_____	_____
	Name	Title	Date	Phone No.

Problems/suggestions ☐ Report attached:_____

Agency _____

Contact	_____	_____	_____	_____
	Name	Title	Date	Phone No.

Problems/suggestions ☐ Report attached: _____

Agency _____

Contact	_____	_____	_____	_____
	Name	Title	Date	Phone No.

Problems/suggestions ☐ Report attached:_____

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

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

1. **O&M Documents**

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

Remarks: _____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

3.	**O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
4.	**Permits and Service Agreements**			
	☒ Air discharge permit	☒ Readily available	☒ Up to date	☐ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Ground Water Monitoring Records**	☐ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: Access is controlled to the Transit Authority property by a security gate and fencing.			

IV. O&M COSTS

1.	**O&M Organization**	
	☐ State in-house	☐ Contractor for state
	☐ PRP in-house	☐ Contractor for PRP
	☐ Federal facility in-house	☐ Contractor for Federal facility
	☒ Miami-Dade County funds the operation and maintenance of the air strippers that treat ground water as part of the OU2 remedy.	

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☒ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: $334,400 (January 1984 dollars) ☐ Breakdown attached

Total annual cost by year for review period if available

From: 01/01/2008	To: 12/31/2008	$1,746,000	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01/2009	To: 12/31/2009	$1,746,000	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01/2010	To: 12/31/2010	$1,746,000	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01/2011	To: 12/31/2011	$1,746,000	☐ Breakdown attached
Date	Date	Total cost	
From: 01/01/2012	To: 12/31/2012	$1,746,000	☐ Breakdown attached
Date	Date	Total cost	

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks: The water treatment plants and OU1 within the Transit Authority property have fencing and access controls. Security personnel monitor the entrances and provide access.

B. Other Access Restrictions

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

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

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

Frequency: _____

Responsible party/agency: Miami-Dade County

Contact	_____	_____	mm/dd/yyyy	_____
	Name	Title	Date	Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: ICs relating to ground water are in place. No ICs are in place for the soil remedy at this time. Site conditions imply that ICs are necessary as construction is being planned for several portions of the Transit Authority property.

D. General

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

Remarks: _____

2. **Land Use Changes On Site** ☐ N/A

Remarks: Construction is being planned for the northwestern and southeastern portions of the Transit Authority property for train parking rails and test rails.

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

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

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

Remarks: Roads run throughout the Transit Authority property and the general OU1 area. Road have been maintained and are in good condition.

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface			
1.	**Settlement** (low spots) Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Settlement not evident Depth: _____
2.	**Cracks** Lengths: _____ Remarks: _____	☐ Location shown on site map Widths: _____	☐ Cracking not evident Depths: _____
3.	**Erosion** Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Erosion not evident Depth: _____
4.	**Holes** Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Holes not evident Depth: _____
5.	**Vegetative Cover** ☐ No signs of stress Remarks: _____	☐ Grass ☐ Trees/shrubs (indicate size and locations on a diagram)	☐ Cover properly established
6.	**Alternative Cover** (e.g., armored rock, concrete) Remarks: _____		☐ N/A
7.	**Bulges** Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Bulges not evident Height: _____
8.	**Wet Areas/Water Damage** ☐ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks: _____	☐ Wet areas/water damage not evident ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map	 Arial extent: _____ Arial extent: _____ Arial extent: _____ Arial extent: _____
9.	**Slope Instability** ☐ No evidence of slope instability Arial extent: _____ Remarks: _____	☐ Slides	☐ Location shown on site map

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1.	**Settlement** (Low spots)	☐ Location shown on site map	☐ No evidence of settlement
	Arial extent: _____		Depth: _____
	Remarks: _____		
2.	**Material Degradation**	☐ Location shown on site map	☐ No evidence of degradation
	Material type:_____		Arial extent: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ No evidence of erosion
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Undercutting**	☐ Location shown on site map	☐ No evidence of undercutting
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Obstructions**	Type: _____	☐ No obstructions
	☐ Location shown on site map	Arial extent: _____	
	Size: _____		
	Remarks: _____		

6. **Excessive Vegetative Growth** Type: _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Arial extent: _____

Remarks: _____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive

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

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

Remarks: _____

2. **Gas Monitoring Probes**

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

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

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

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

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

Remarks: _____

4. **Extraction Wells Leachate**

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

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

Remarks: _____

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

Remarks: _____

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

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

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

Remarks: _____

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

Remarks: _____

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

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

☐ Siltation not evident

Remarks: _____

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

☐ Erosion not evident

Remarks: _____

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

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

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

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

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

Remarks: _____

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

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

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

Area extent: _____ Depth: _____

Remarks: _____

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

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

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

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

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

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

Remarks: Miami Water and Sewer Department operates and maintains the supply wells as part of the water treatment process.

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

☒ Good condition ☐ Needs maintenance

Remarks: Miami Water and Sewer Department operates and maintains the equipment as part of the water treatment process.

3. **Spare Parts and Equipment**

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

Remarks: Miami Water and Sewer Department conducts operation and maintenance of the air stripping towers continuously.

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

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

   ☐ Good condition ☐ Needs maintenance

   Remarks: _____

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

   ☐ Good condition ☐ Needs maintenance

   Remarks: _____

3. **Spare Parts and Equipment**

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

   Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

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

   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

   ☒ Air stripping ☐ Carbon adsorbers

   ☐ Filters: _____

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

   ☐ Others: _____

   ☐ Good condition ☐ Needs maintenance

   ☐ Sampling ports properly marked and functional

   ☐ Sampling/maintenance log displayed and up to date

   ☐ Equipment properly identified

   ☒ Quantity of ground water treated annually: capable of 120 million gallons/day

   ☐ Quantity of surface water treated annually: _____

   Remarks: The 64 air strippers have been in continuous operation for 15 years and have not experienced any major problems.

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

   ☐ N/A ☒ Good condition ☐ Needs maintenance

   Remarks: _____

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

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

   Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemicals and equipment properly stored

Remarks: _____

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

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

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

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

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

Remarks: _____

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

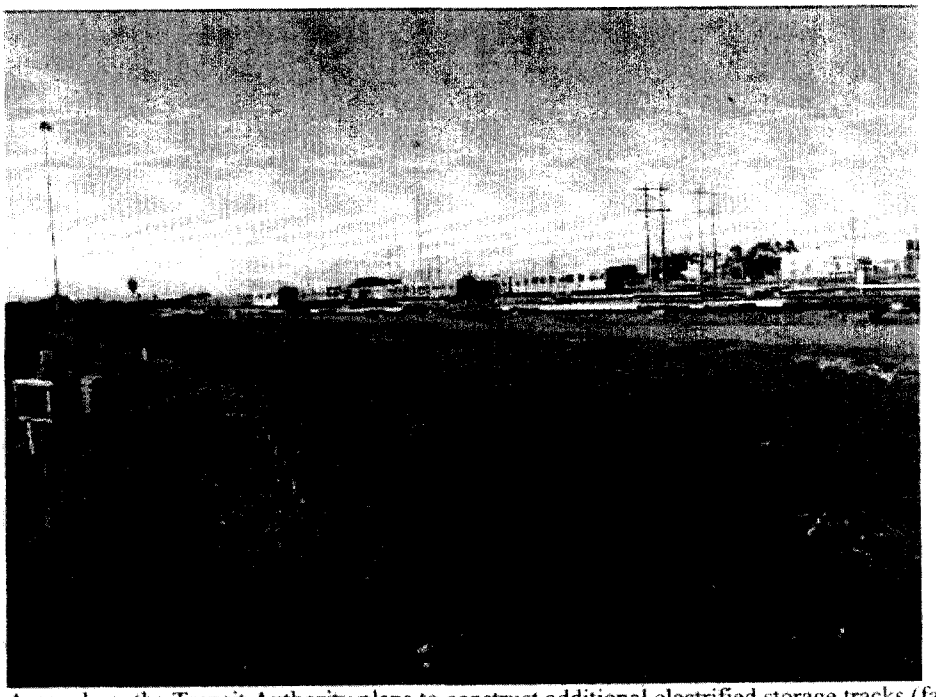
The remedy was designed to clean up the soil contamination to industrial standards through removal actions and to treat ground water from the Biscayne Aquifer through air stripping. The ground water treatment at the Preston and Hialeah Water Treatment Plants has continuously operated for 15 years without any major issues. OU1 is part of the Transit Authority's Operation and Maintenance Facility property, which is used for industrial purposes. Although access controls were not required as part of the remedy, the property, and thus the Site, is gated and secured. There are no ICs in place in regards to the soil remedy. Due to planned construction on the Facility property, ICs are likely necessary.

B. Adequacy of O&M

	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. Miami-Dade County is responsible for the operations and maintenace of the air stripping towers at the two water treatment plants. The tour of the water treatment plant indicated that operation and maintenace activities at the plants are performed on schedule.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. There were no indications of potential problems regarding the operation and maintenance of the air strippers.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. No opportunities were evident.

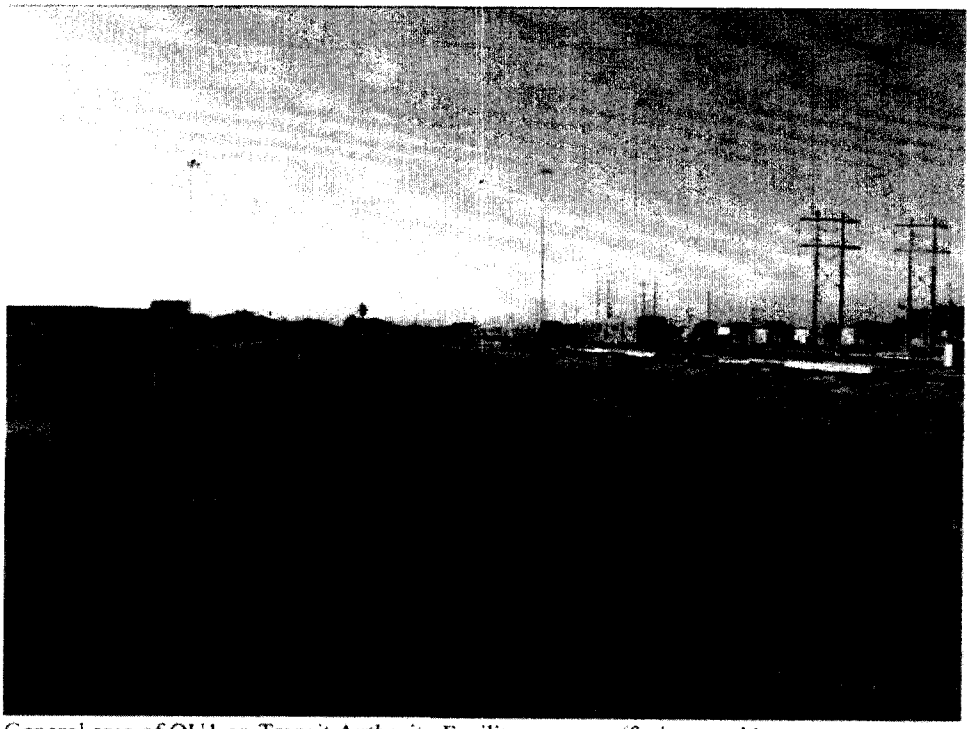
Site Inspection Participants:
Treat Suomi, Skeo Solutions
Lynette Wysocki, Skeo Solutions
James Hou, EPA
L'Tonya Spencer, EPA
Bill Nelson, Miami-Dade Transit
Adien Toledo, Miami-Dade County
Marcial Moreno, Miami Water and Sewer Department

Appendix E: Photographs from Site Inspection Visit

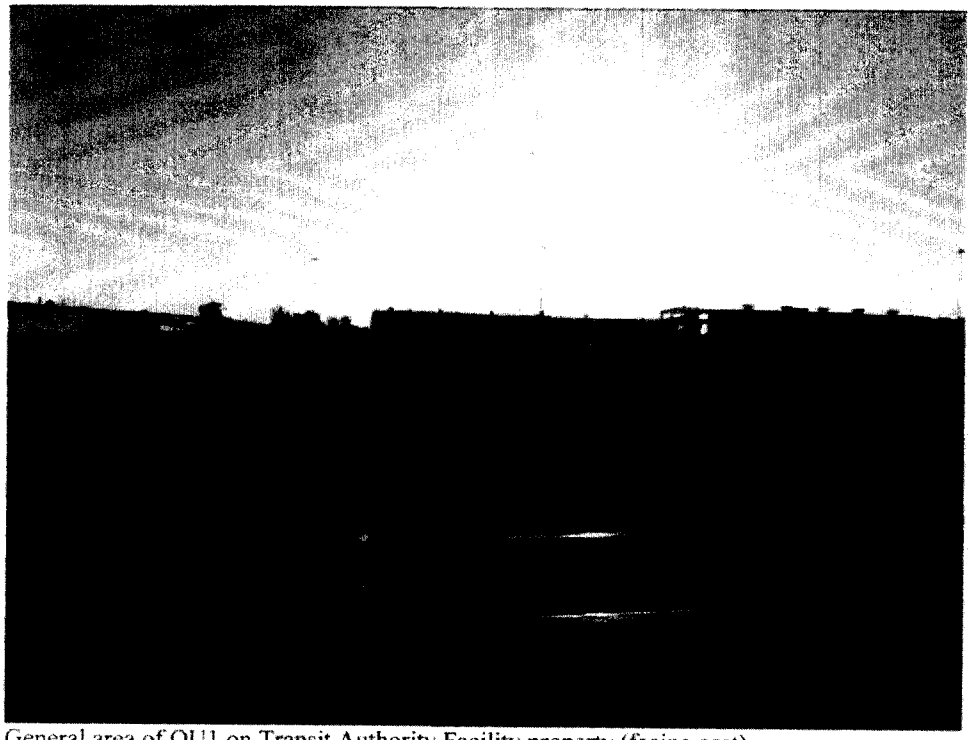


Area where the Transit Authority plans to construct additional electrified storage tracks (facing south)

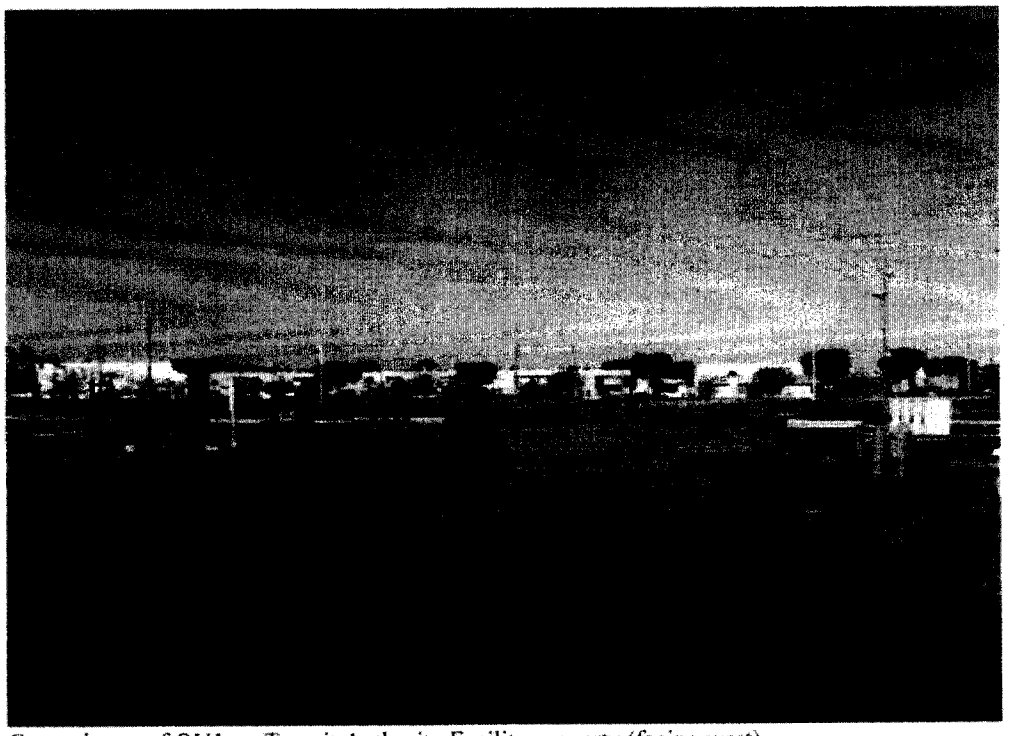
General area of OU1 on Transit Authority Facility property (facing north)



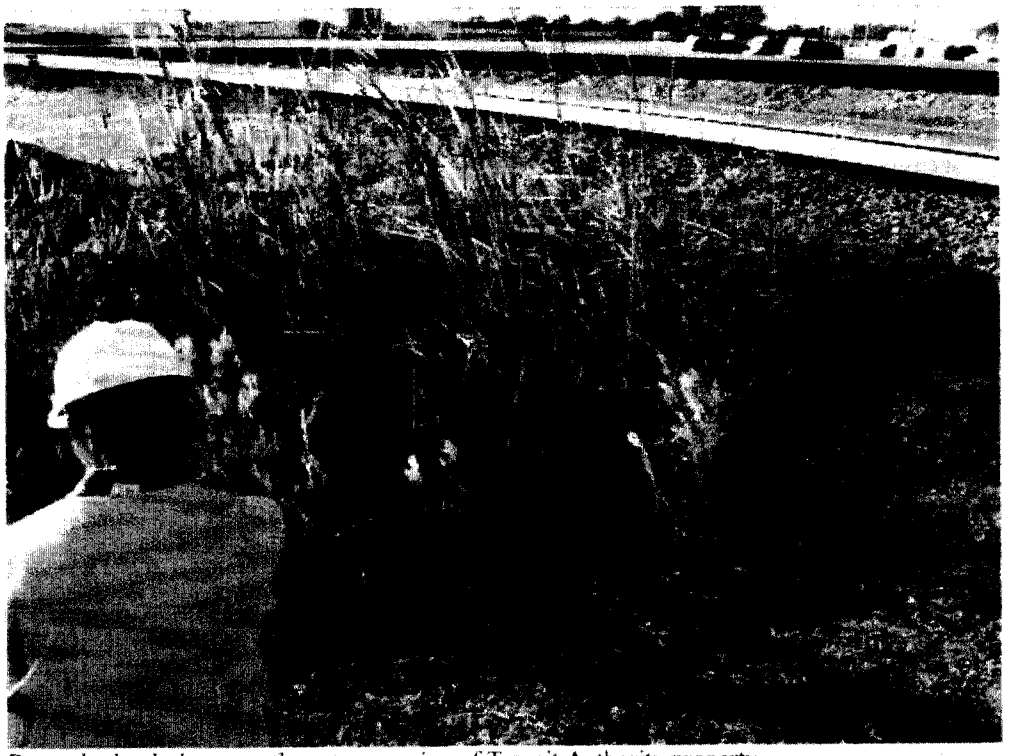
General area of OU1 on Transit Authority Facility property (facing south)



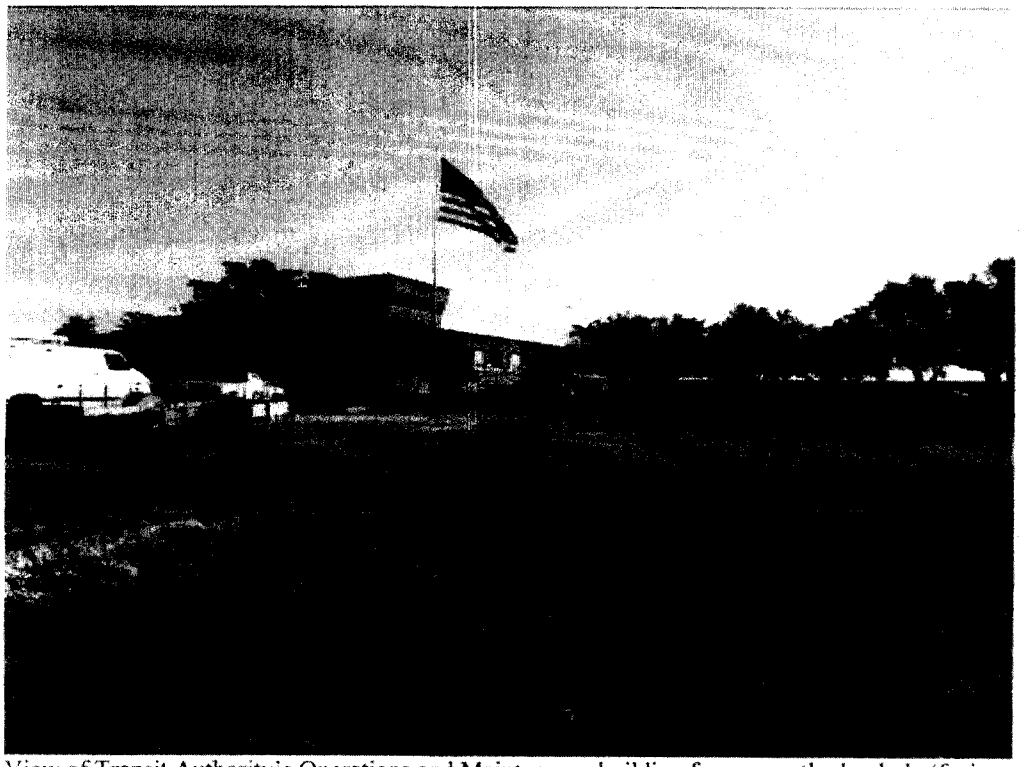
General area of OU1 on Transit Authority Facility property (facing east)



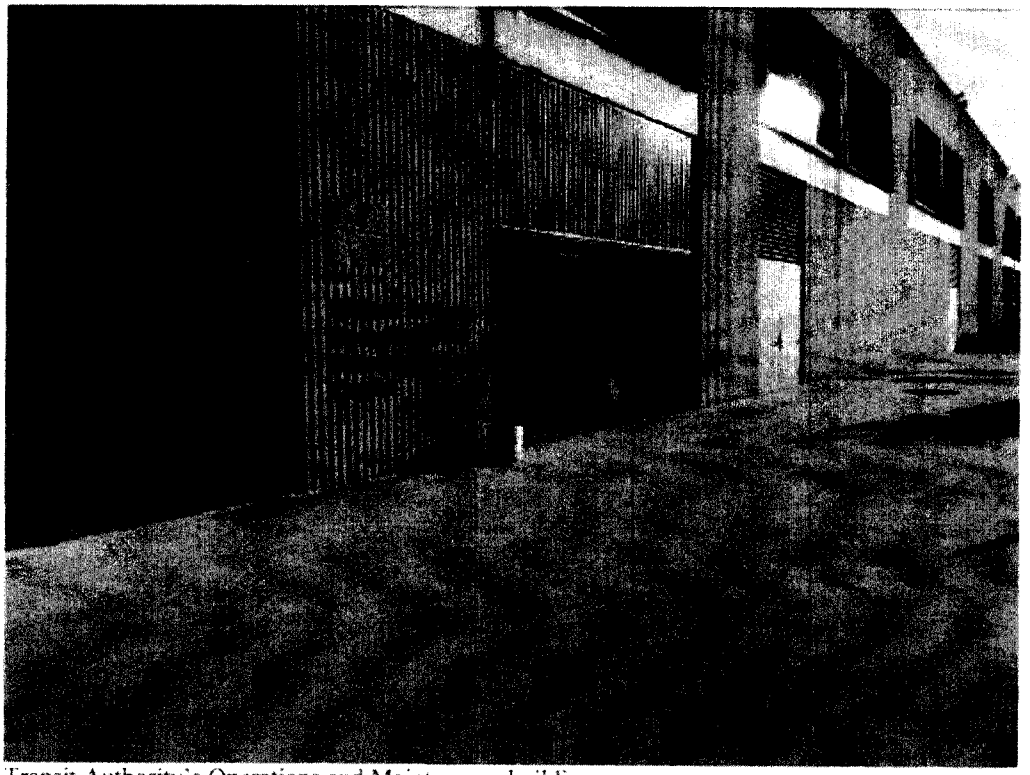
General area of OU1 on Transit Authority Facility property (facing west)



Recently dug hole on southwestern portion of Transit Authority property

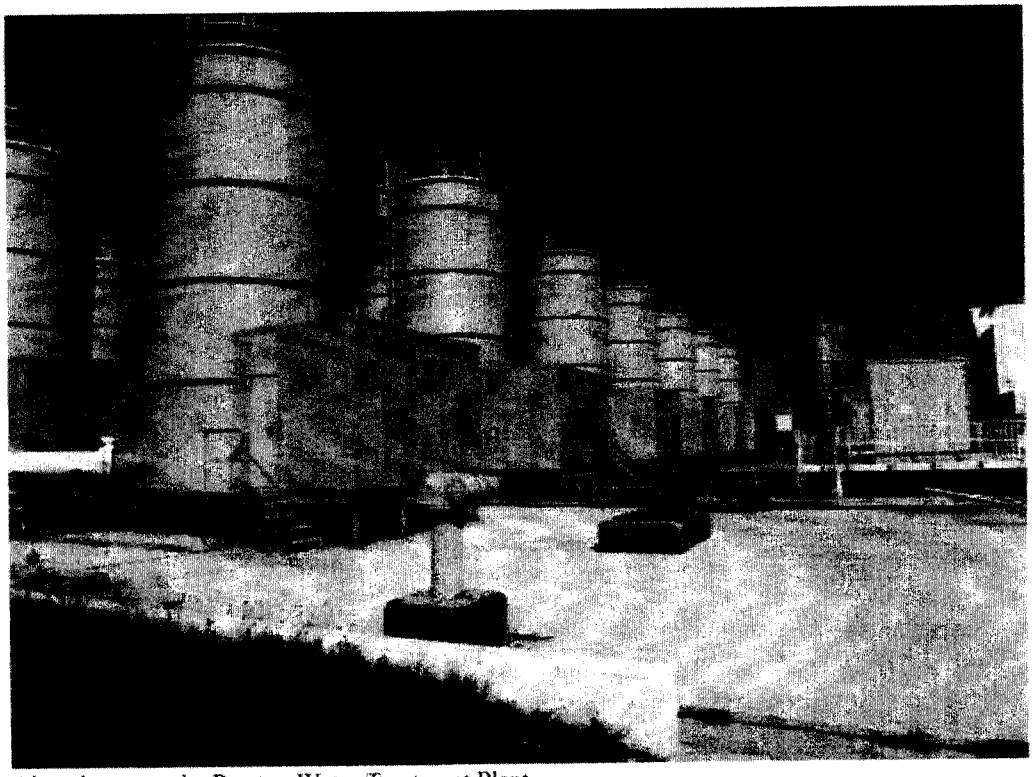


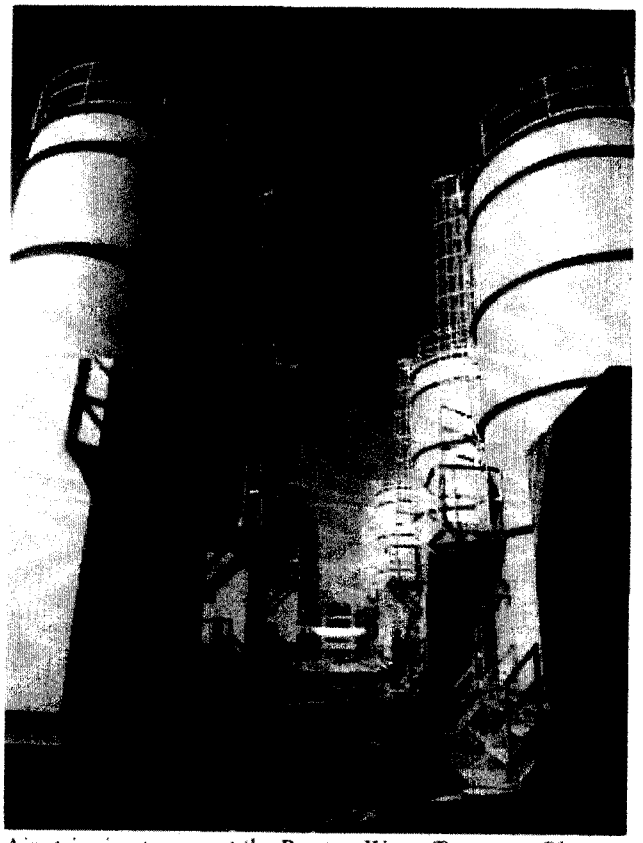
View of Transit Authority's Operations and Maintenance building from recently dug hole (facing east)



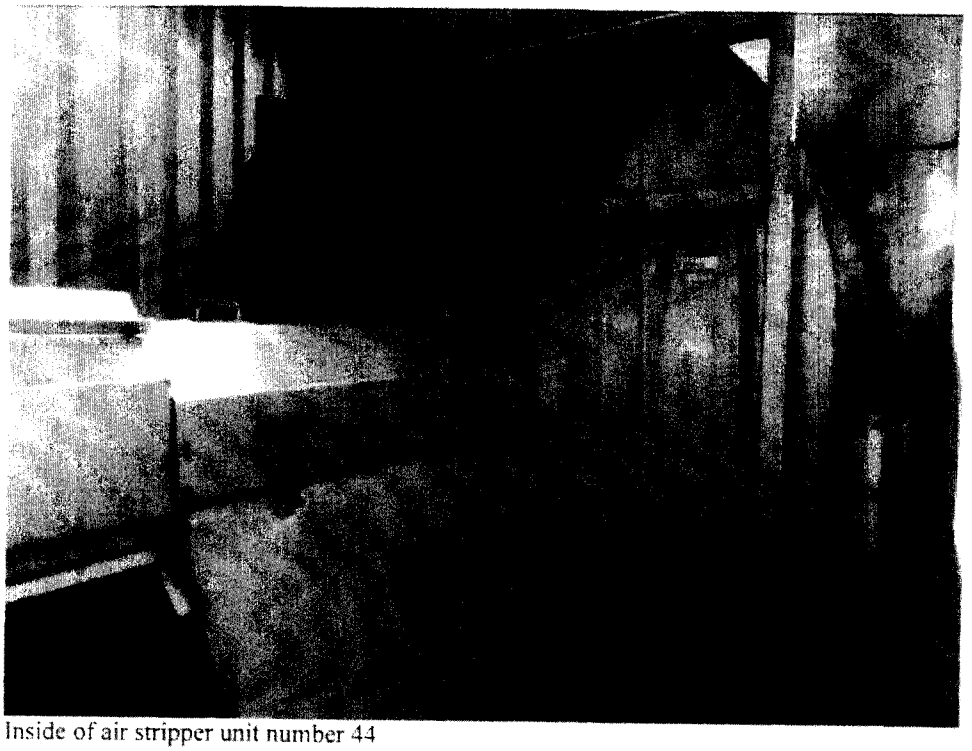
Transit Authority's Operations and Maintenance building

Preston Water Treatment Plant entrance


Air strippers at the Preston Water Treatment Plant



Air stripping towers at the Preston Water Treatment Plant



Inside of air stripper unit number 44

Appendix F: Biscayne Aquifer Protection Plan

The Biscayne Aquifer Protection Plan

Immediate Implementation Recommended

1. Provide local waste storage/transfer facilities for small waste generators, individuals
2. Regulate land use within well field protection zones
3. Monitor small quantity waste generators
4. Improve regulation of small quantity waste generators
5. Develop public awareness/education program
6. Regulate storage tanks
7. Control handling/disposal by commercial waste haulers

Short-term Implementation Recommended

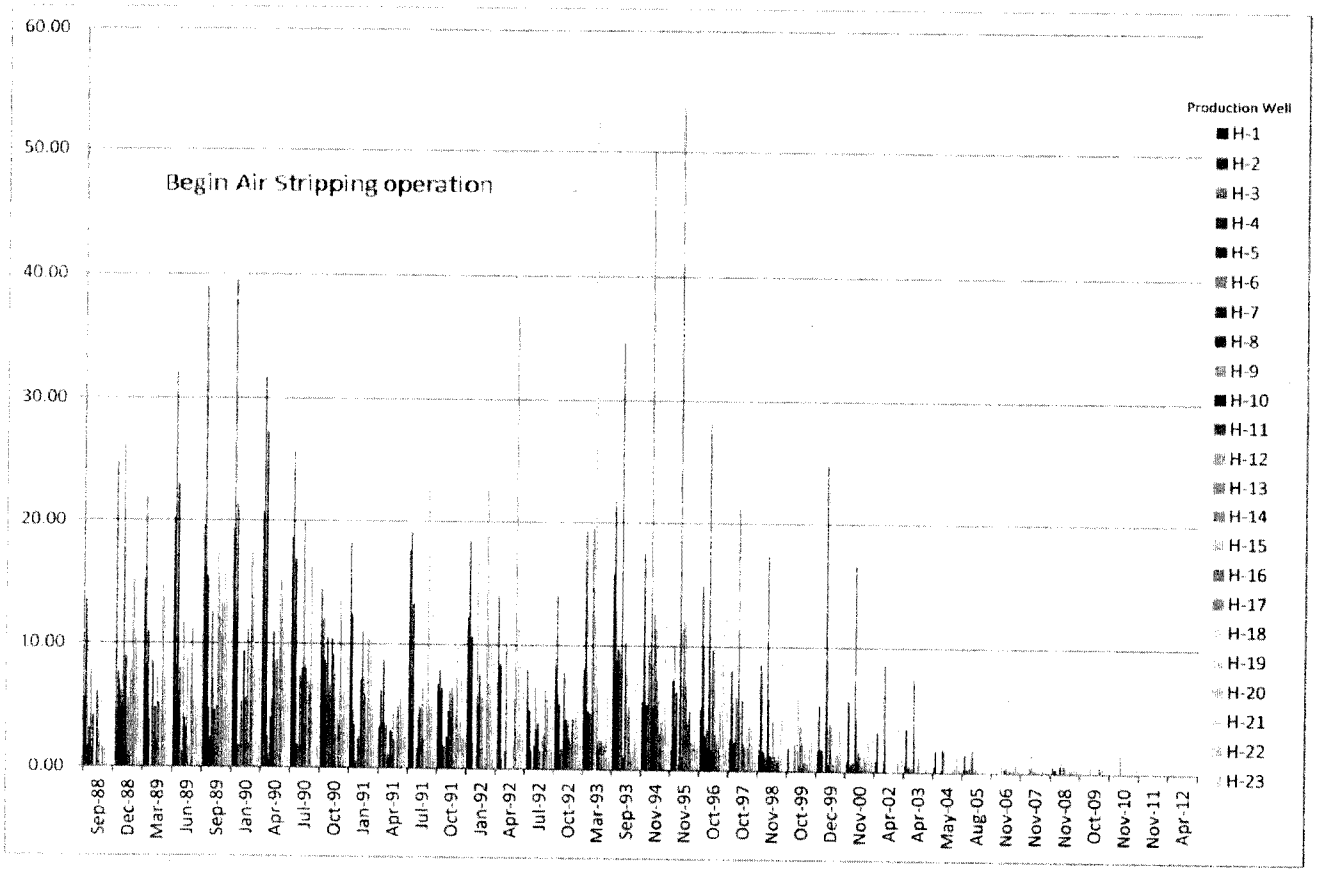
8. Construct leak-proof sewers in well field protection zones
9. Develop a spill prevention, control, and countermeasure program
10. Pretreat commercial/industrial waste
11. Control leakage from existing sewers
12. Hold responsible parties liable for cleanup costs
13. Adopt emergency spill cleanup program
14. Encourage public reporting of improper waste disposal

Future Implementation Recommended

15. Control groundwater pollution from agriculture
16. Collect/recycle automobile drain oils
17. Establish tri-county coordinating committee
18. Review stormwater/wastewater systems
19. Determine "safe" soil contamination levels
20. Monitor groundwater near wells

17

Appendix G: Total VOC Concentrations in Hialeah Production Wells (1988-2012)



Appendix H: Current Toxicity Values for Priority Pollutants

Contaminant	Carcinogenic toxicity changes		Non-carcinogenic toxicity changes	
	2012 Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Inhalation Unit Risk Value $(\mu g/m^3)^{-1}$	2012 Oral RfD Value (mg/kg-d)	2012 Inhalation RfC Value (mg/m^3)
Arsenic	1.5E+00	4.3E-03	3.0E-04	1.5E-05
Cadmium	N/A	1.8E-03	5.0E-04	2.0E-05
Chromium (VI)	5.0E-01	8.4E-02	3.0E-03	1.0E-04
Lead	N/A	N/A	N/A	N/A
Mercury	N/A	N/A	N/A	3.0E-04
Selenium	N/A	N/A	5.0E-03	2.0E-02
Vinyl Chloride	7.2E-01	4.4E-06	3.0E-03	1.0E-01
1,1,2,2-Tetrachloroethane	2.0E-01	5.8E-05	2.0E-02	N/A
Benzene	5.5E-02	7.8E-06	4.0E-03	3.0E-02
Methylene Chloride	2.0E-03	1.0E-08	6.0E-03	6.0E-01
1,1-Dichloroethane	5.7E-03	1.6E-06	2.0E-01	N/A
1,1-Dichloroethene	N/A	N/A	5.0E-02	2.0E-01
Acrylonitrile	5.4E-01	6.8E-05	4.0E-02	2.0E-03
Chlorobenzene	N/A	N/A	2.0E-02	5.0E-02
Cis-1,2-Dichloroethene	N/A	N/A	2.0E-03	N/A
Trans-1,2-Dichloroethene	N/A	N/A	2.0E-02	6.0E-02
Toluene	N/A	N/A	8.0E-02	5.0E+00
Xylenes (total)	N/A	N/A	2.0E-01	1.0E-01
Trichloroethene	4.6E-02	4.1E-06	5.0E-04	2.0E-03
Ethylbenzene	1.1E-02	2.5E-06	1.0E-01	1.0E+00
Tetrachloroethene	2.1E-03	2.6E-07	6.0E-03	4.0E-02
Chloroform	3.1E-02	2.3E-05	1.0E-02	9.8E-02
Bromodichloromethane	6.2E-02	3.7E-05	2.0E-02	N/A
1,1,1-Trichloroethane	N/A	N/A	2.0E+00	5.0E+00
Styrene	N/A	N/A	2.0E-01	1.0E+00
Chlorotoluene	N/A	N/A	2.0E-02	N/A
Carbon Disulfide	N/A	N/A	1.0E-01	7.0E-01
Tetrahydrofuran	N/A	N/A	9.0E-01	2.0E+00
Chloromethane	N/A	N/A	N/A	9.0E-02
Chloroethane	N/A	N/A	N/A	1.0E+01
Chrysene	7.3E-03	1.1E-05	N/A	N/A
Anthracene	N/A	N/A	3.0E-01	N/A

Contaminant	Carcinogenic toxicity changes		Non-carcinogenic toxicity changes	
	2012 Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Inhalation Unit Risk Value $(\mu g/m^3)^{-1}$	2012 Oral RfD Value (mg/kg-d)	2012 Inhalation RfC Value (mg/m^3)
Benzo(a)anthracene	7.3E-01	1.1E-04	N/A	N/A
Benzo(b)fluoranthene	7.3E-01	1.1E-04	N/A	N/A
Benzo(k)fluoranthene	7.3E-02	1.1E-04	N/A	N/A
Benzo(a)pyrene	7.3E+00	1.1E-03	N/A	N/A
Benzo(ghi)perylene	N/A	N/A	N/A	N/A
Phenanthrene	N/A	N/A	N/A	N/A
Pyrene	N/A	N/A	3.0E-02	N/A
Fluoranthene	N/A	N/A	4.0E-02	N/A
Indeno(1,2,3-cd)pyrene	7.3E-01	1.1E-04	N/A	N/A
2,4-Dimethylphenol	N/A	N/A	2.0E-02	N/A
2,4-Dinitrophenol	N/A	N/A	2.0E-03	N/A
4-Nitrophenol	N/A	N/A	2.0E-03	N/A
Pentachlorophenol	4.0E-01	5.1E-06	5.0E-03	N/A
Phenol	N/A	N/A	3.0E-01	2.0E-01
Bis(2-ethylhexyl)phthalate	1.4E-02	2.4E-06	2.0E-02	N/A
1,4-Dioxane	1.0E-01	7.7E-06	3.0E-02	3.0E+00
2,4,5-Trichlorophenol	N/A	N/A	1.0E-01	N/A
Benzyl butyl phthalate	1.9E-03	N/A	2.0E-01	N/A
PCBs (total)	2.0E+00	5.7E-04	N/A	N/A
4,4'-DDT	3.4E-01	9.7E-05	5.0E-04	N/A
2,4-D (or Dichlorophenoxy acetic acid, 2,4-)	N/A	N/A	1.0E-02	N/A
Silvex (2,4,5-TP)	N/A	N/A	N/A	N/A
Endosulfan sulfate	N/A	N/A	6.0E-03	N/A
N/A=Not applicable				

Appendix I: 2013 Vapor Intrusion Evaluation Memorandum

United States Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth St. SW, Atlanta, Georgia 30303-8960

May 8, 2013

4SSD-TSS

MEMORANDUM

SUBJECT: Vapor Intrusion Evaluation in Support of the 3rd Five year Review,
Miami Drum Services
Miami, Fl

FROM: Ben Bentkowski, P. G., Hydrologist,
Technical Services Section
Superfund Division

THROUGH: Glenn Adams, Chief
Technical Services Section
Superfund Division

TO: James Hou
Remedial Project Manager
Superfund Division

This memorandum is in support of the Five Year Review (FYR) for the Miami Drum Services site and will evaluate vapor intrusion for the two operable units (OU). OU1 consists of the soils associated with the Miami Drum Services location. These soils were remediated between 1981 and 1983. The physical location of these remediated soils is now part of a municipal rail yard with no receptors and no change in land use in the foreseeable future. OU2 covers the groundwater at the Miami Drum Services site plus the groundwater associated with two other sites; the NW 58th Street Landfill and the Varsol Spill site in the northeast corner of the Miami Airport. In between these three sites, there are municipal well fields that draw drinking water from the Biscayne aquifer (see figure on page 5). All three sites are within the capture zones of the well fields. The groundwater for all three sites is being addressed in the 1985 Biscayne Aquifer Sites ROD which specifies that the remedial goal is to provide clean drinking water to the public through the use of air strippers. The ROD does not call for the use

1

of monitoring wells at the physical location of the three sites or points in between. The only monitoring is performed within the municipal water treatment plants.

This presents a challenge when performing a vapor intrusion evaluation for a FYR. EPA does have specific vapor intrusion guidance for FYRs[1]. The key language for this memorandum comes from page 7:

> If the potential for a vapor intrusion pathway exists (e.g..vapor-forming chemicals remain in the subsurface and potential receptors are present), does assessment of available data confirm that the pathway is complete using the appropriate guidelines?

This memorandum will describe the current understanding of the vapor intrusion pathway at the three sites included in OU2 of the Miami Drum Services ROD; Miami Drum Services site, Varsol Spill site and the NW 58th Street Landfill site. This memorandum will determine if a vapor intrusion pathway exists based upon current site conditions supported by referencing historical information. If the vapor intrusion pathway exists, then this memorandum will provide a vapor intrusion assessment using the Vapor Intrusion Screening Level (VISL) calculator available on the EPA's vapor intrusion website[2] and the most recent groundwater data. The VISL calculator is a conservative screening tool which is appropriate for use in this situation where the data provided may be incomplete by current standards. If the vapor intrusion pathway does not exist and there is historical data, an evaluation of the historical data will be performed as an additional line of evidence for the vapor intrusion assessment.

The **Miami Drum Services site** is currently within the operation and maintenance center for the Miami-Date County Transit Authority light rail system and has been since 1982. Photographs included in the current FYR document taken at the physical location of the former Miami Drum Services show the land to completely within the rail yard with no buildings nearby. There is no indication that the rail yard will be abandoned and converted to residential use in the foreseeable future. There are no current receptors and as per the guidance cited above, there is no completed vapor intrusion pathway.

As an additional line of evidence, the vapor intrusion screening will be run with a commercial scenario and a residential scenario using historic groundwater data. For Miami Drum services, the only on-site data available and provided is from 1981 and 1983, prior to and just after the onsite soil remedial action. The hypothesis is to use the old data and assume that concentrations of VOCs will only be less in the subsequent decades. And because the concentrations are assumed to be less in the following decades, screening the 1983 data for vapor intrusion risk will provide a maximum risk. This is NOT the preferred methodology for vapor intrusion assessment. If newer shallow groundwater analytical data from on-site monitoring wells becomes available and receptors reoccupy

[1] http://www.epa.gov/superfund/cleanup/postconstruction/pdfs/VI_FYR_Guidance-Final-11-14-12.pdf
[2] http://www.epa.gov/oswer/vaporintrusion/guidance.html

the site on a regular basis, the vapor intrusion assessment should be re-run to provide a more current risk assessment.

The VISL calculator has input for few site specific variables (only scenario type and groundwater temperature) and as such is considered a conservative modeling tool. Both commercial and residential scenarios were evaluated. The groundwater temperature used for these calculations was 26° C. The maximum analytical values for the various compounds from only the shallow groundwater wells were used and the risks from all volatile compounds of concern were summed.

HISTORIC MIAMI DRUM SITE VAPOR INTRUSION RISK AND HAZARD

Data Set	Commercial Risk	Commercial Hazard	Residential Risk	Residential Hazard
1981	1.5E-4	4.6E1	1.0E-3	1.9E2
1983 Pre-Cleanup	4.8E-6	3.1E-1	2.6E-5	1.3E0
1983 Post-Cleanup	1.3E-6	3.8E-3	6.5E-6	1.6E-2

As shown in the table, the most recent data indicates that there was no unacceptable risk or unacceptably high hazard using the 1983 post-cleanup data and the conservative VISL calculator. The current land use has no receptors and therefore, for the 2013 FYR, the vapor intrusion pathway is incomplete for the Miami Drum Services portion of OU2 as well as OU1, the soils operable unit.

The **Varsol Oil Spill site** is located in the northeast corner of the Miami International Airport. The spill was associated with airline maintenance in the 1970's. From the Region 4 Superfund Sites webpage for the Varsol Spill:

> In 1985, after detailed site analyses, EPA determined that no action needed to take place at this site because it posed no public or environmental threat and the site could be deleted from the NPL.
>
> The 1988 Notice of Intent for Deletion for the site states that, "while no varsol was found in and around the airport, the spill did occur. Several factors could contribute to the fact that no varsol is detectable at this time; some of the solvent was recovered. Biodegradation is believed to have destroyed some more, but the hydrology of the aquifer system strongly suggests some of the solvent contributed to and has become a part of the "background" contamination in the aquifer. EPA, with the concurrence of the Florida Department of Environmental Regulation, has determined all appropriate Fund-financed response have been completed" at the site.

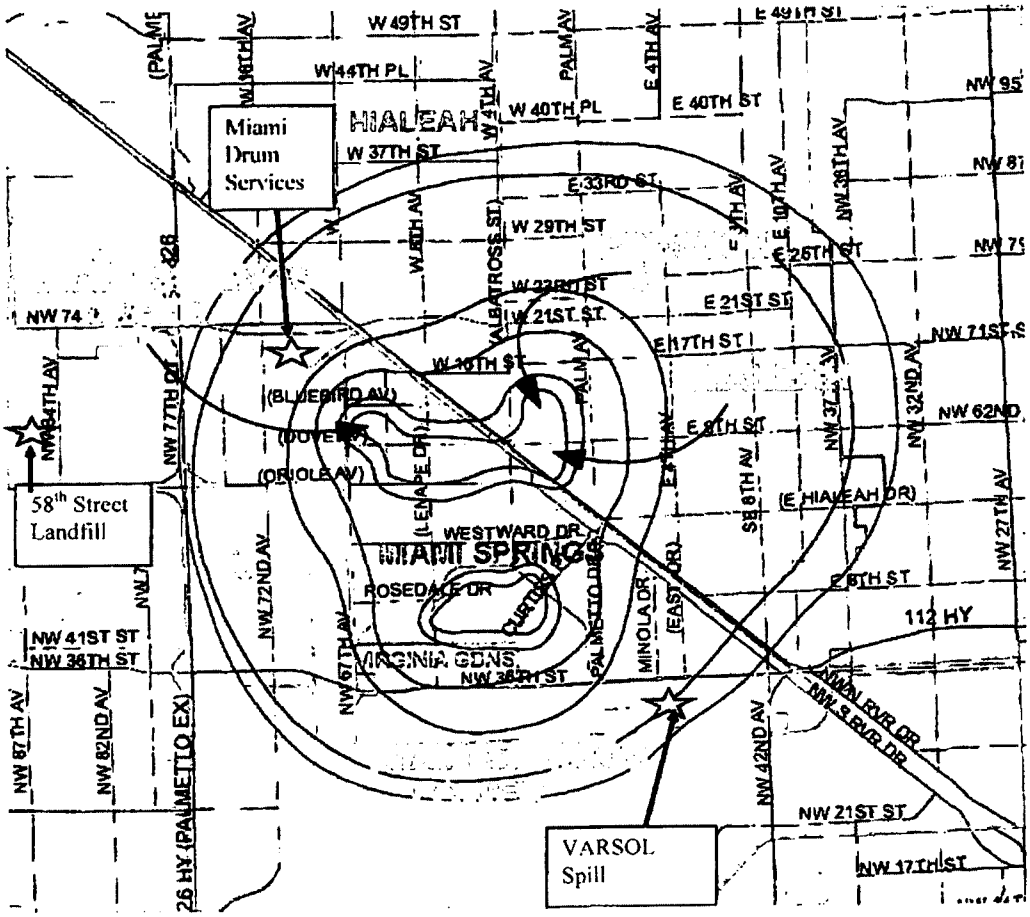
Since there are no longer volatile compounds present at the Varsol Spill site, there is no completed vapor intrusion pathway for this portion of the OU2 FYR for the Miami Drum Services site.

The **Northwest 58th Street Landfill site** is located in Hialeah, Miami-Dade County Fl approximately three miles west of the Miami Drum Services site. As this was a solid waste landfill, part of the landfill closure was the installation of monitoring wells. Included in the 2010 FYR for the Northwest 58th Street Landfill, the analytical data for all volatile contaminants of concern indicated 'non-detects' from the 2009 sampling event. Evaluation of Google images of the landfill confirms it is a closed landfill and there are no buildings of any kind on the landfill proper. The current land use is wildlife habitat. In evaluating the completeness of a vapor intrusion pathway, there may be volatile compounds present within the landfill but there are no potential receptors located within the boundaries of the actual landfill. The 2010 FYR indicated that volatile compounds had been present in the shallow groundwater in the area adjacent to the landfill where there are occupied buildings (suspected administration or shop areas). The most recent sampling indicated there are no volatile compounds present in the shallow groundwater for the monitoring wells in these areas. In summary, one portion of the NW 58th Street Landfill site may have volatile compounds present but no receptors. The other portion of the site may have receptors present but no volatile compounds present. There is not a completed vapor intrusion pathway for the Northwest 58th Street Landfill site portion of the OU2 FYR for the Miami Drum Services site.

For the 2013 Five Year Review fir the Miami Drum Services site it can be said that, based upon the data available, there is no complete vapor intrusion pathway for OU1 or the three sites associated with OU2; the Miami Drum Services site, the NW 58th Street Landfill and the Varsol Spill site. If in the future on-site shallow groundwater data becomes available and receptors occupy any of the three sites, the vapor intrusion evaluation should be rerun.

If you have any questions, please contact me.

Ben Bentkowski, P.G.
Technical Services Section
Bentkowski.Ben@epa.gov
404-562-8507



This map depicts the approximate locations of the three sites associated with OU2 of the Miami Drum Services site ROD and the municipal well fields that are affected. The site labels were added.

http://iaspub.epa.gov/apex/cimc/f?p=255:41:11949119957465::::P41_GEOSEARCH:25.83333%20-80.34721

The following map and data tables were extracted from 30 year old site files and are the most current data available at the time of this assessment. Ben Bentkowski, EPA Technical Services Section

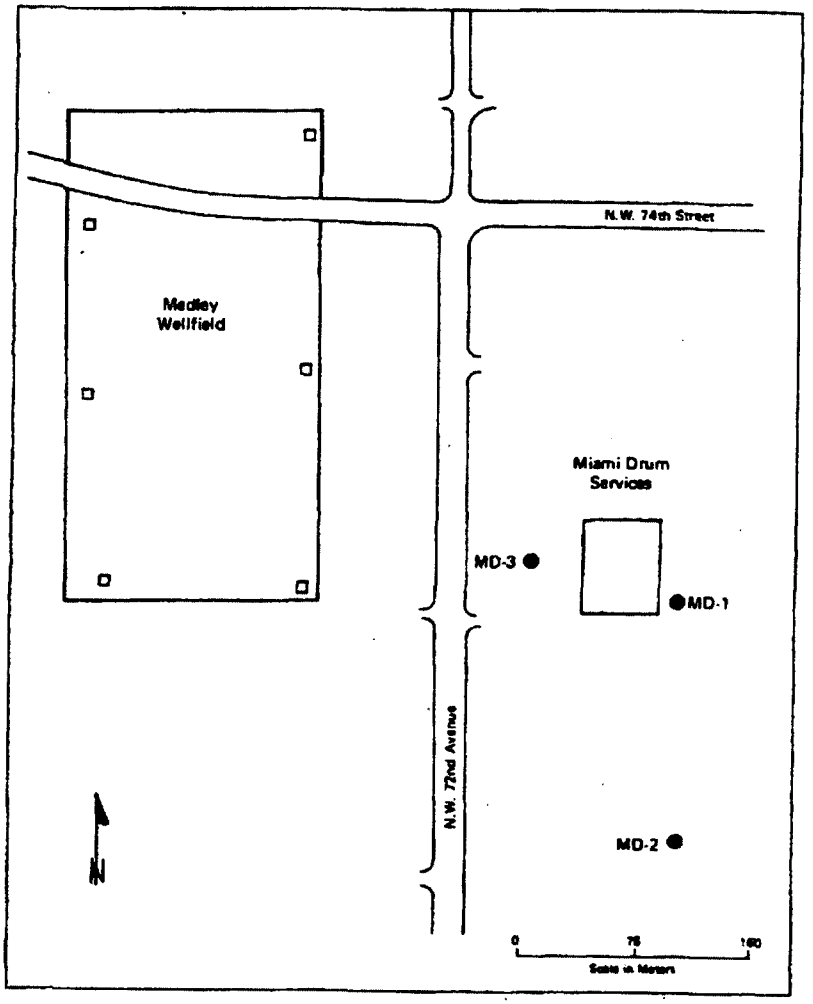


Figure 6-1

Location of Monitoring Well Clusters

6-4

Table 4-1: Contaminants
In Shallow Groundwater and Soil at the Miami Drum Site

Parameters	Concentration In Water (ug/l)	Concentration In Soil (ug/kg)
1,1-Dichloroethane	378	
cis-1, 2-dichlorethylene	839	
Chloroform	12.4	
Trichloroethylene	959	
Phenols	22,500	19,200
Mercury	3.2	8,170
Lead	220	695,000
Cadmium	170	154,600
Chromium	310	153,000
Arsenic	170	48,000
Nickel	210	44,200
Oil and Grease	945,000	31,300,000
Cyanide	1,200	
Dieldrin	-	18,000
Lindane	-	140

Wingerter Laboratories, Inc. (1981) - Maximum levels found at site prior to cleanup

Table 4-2: Shallow Groundwater Analyses at Miami Drum Site

Contaminant	Concentration (ug/l) 0.3 meter	Concentration (ug/l) 3 meter
Chlorobenzene	3.3	14.0
1,1 Dichloroethane	44.4	39.7
1,3 Dichlorobenzene	25.7	5.9
1,4 Dichlorobenzene	26.6	4.5
Tetrachloroethylene	5.7	4.1
Trichloroethylene	5.8	5.6
cis 1,2 Dichloroethane	17.9	13.3

Technos, Inc. (1983). Maximum levels found in monitoring wells prior to cleanup

Table 6-9
Miami Drum Site
Volatile Organic Data (September, 1983)

Wells	1A	1B	2A	2B	2C	3A	3B
Depths(m)	3	14	3	15	27	15	27
	Concentration (ug/l)						
Contaminants							
1,1 Dichloroethane	<1	<1	<1	1.8	<1	<1	8.1
Chlorobenzene	<1	1.9	<1	1.1	4.8	1.1	<1
Chloroethane	<1	52	<1	25	5.4	27	65
Chloroethene	<1	<1	<1	<1	<1	<1	23
Ethylbenzene	<1	<1	<1	<1	<1	<1	<1
1,1 Dichloroethene	<1	<1	<1	<1	<1	<1	2.4
Benzene	<1	1.1	1.3	<1	1.6	<1	<1
Chloroform	1.8	<1	3.7	<1	<1	<1	<1
Dichlorobromomethane	<1	<1	8.4	1.4	<1	<1	<1
Methylene chloride	<1	1.9	1.1	1.3	1.1	<1	1.6
Toluene	1.1	4.2	<1	1.2	<1	<1	<1

All results are UBGB

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Third Five-Year Review Report
for
Wingate Road Municipal Incinerator Dump
FLD981021470

Fort Lauderdale
Broward County, Florida

September 2016

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by: _____ Date: 9/14/2016

Franklin E. Hill, Director
Superfund Division

11050209

Third Five-Year Review Report
for
Wingate Road Municipal Incinerator Dump
1300 NW 31st Avenue
Fort Lauderdale
Broward County, Florida

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
BHHRA	Baseline Human Health Risk Assessment
BLM	Biotic Ligand Model
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FYR	Five-Year Review
GCTL	Groundwater Cleanup Target Level
HQ	Hazard Quotient
IC	Institutional Control
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
mg/kg	Milligram per Kilogram
mg/L	Milligram per Liter
µg/L	Microgram per Liter
ng/kg	Nanogram per Kilogram
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SCTL	Soil Cleanup Target Level
TBC	To-Be-Considered
TEF	Toxicity Equivalent Factor
TEQ	Toxicity Equivalence

Executive Summary

The 61-acre Wingate Road Municipal Incinerator Dump Superfund site (the Site) is located in Fort Lauderdale, Broward County, Florida. From 1954 to 1978, the City of Fort Lauderdale (the City) operated two waste incinerators, offices and a 40-acre disposal area on site. Disposal practices on site included landfilling of residential wastes, industrial wastes and incinerator residues. In addition, the City discharged cooling water from the incinerators into a cooling water percolation pond and periodically removed ash from the pond and placed it in the landfill or around the banks of the pond. Waste disposal activities contaminated site soil, groundwater, surface water and sediment with metals, dioxin and several semi-volatile organic compounds.

The U.S. Environmental Protection Agency designated a single operable unit (OU) to address soil, groundwater, surface water and sediment contamination at the Site. The final remedy selected in the 1996 Record of Decision (ROD) – and revised by Explanations of Significant Differences (ESDs) in 1997 and 2000 – included excavation of soil and sediment and its placement in a capped landfill, and monitoring of groundwater, surface water and fish tissue. The triggering action for this five-year review (FYR) was the signing of the previous FYR on June 21, 2011.

The Site's remedy is protective of human health and the environment. Landfill cap construction is complete and required institutional controls are in place to restrict land use and groundwater use. The remedial action objective (RAO) of reducing Site risks to health-based levels and protecting the surficial aquifer system beyond the current site boundary have been met.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Wingate Road Municipal Incinerator Dump		
EPA ID: FLD981021470		
Region: 4	**State:** FL	**City/County:** Fort Lauderdale/Broward

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

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" selected above, enter Agency name:** Click here to enter text.
Author name: Pam Scully (EPA), Kirby Webster (Skeo) and Claire Marcussen (Skeo)
Review period: September 2015 – September 2016
Date of site inspection: September 23, 2015
Type of review: Statutory
Review number: 3
Triggering action date: June 21, 2011
Due date *(five years after triggering action date)*: June 21, 2016

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU1

Sitewide Protectiveness Statement
Protectiveness Determination: Protective
Protectiveness Statement: The Site's remedy is protective of human health and the environment. Landfill cap construction is complete and required institutional controls are in place to restrict land use and groundwater use. The RAO of reducing Site risks to health-based levels and protecting the surficial aquifer system beyond the current site boundary have been met.

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

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

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

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

Third Five-Year Review Report
for
Wingate Road Municipal Incinerator Dump

1.0 Introduction

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

The U.S. Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Wingate Road Municipal Incinerator Dump Superfund site (the Site) in Fort Lauderdale, Broward County, Florida. The EPA's contractor conducted this FYR from September 2015 to June 2016. The EPA is the lead agency for developing and implementing the remedy for the potentially responsible party (PRP)-financed cleanup at the Site. The Florida Department of Environmental Protection (FDEP), as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the third FYR for the Site. The triggering action for this statutory review is the signature date of the previous FYR. The FYR is required because hazardous substances, pollutants or

contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of one operable unit (OU).

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
The City of Fort Lauderdale purchased the site property	1951
The City of Fort Lauderdale operated two municipal incinerators and a landfill	1954 – June 1978
The EPA discovered contamination at the Site	May 1, 1982
The EPA completed site inspection	March 31, 1986
The EPA completed a preliminary assessment	December 21, 1987
The EPA proposed for listing on the Superfund program's National Priorities List (NPL)	June 24, 1988
The EPA listed the Site on the NPL	October 4, 1989
The EPA issued an Administrative Order on Consent requiring the PRP to conduct a remedial investigation/feasibility study (RI/FS) for remaining soil, sediment and surface water contamination PRP initiated the RI/FS	September 27, 1991
PRP completed RI/FS completed The EPA issued the Site's Record of Decision (ROD)	May 14, 1996
The EPA signed an Explanation of Significant Differences (ESD) changing cap construction material and required on-site treatment or off-site disposal of dioxin soils from the old incinerator building	November 10, 1997
The EPA and PRP entered into a Consent Decree for the PRP to complete remedial design and remedial action The PRP began the remedial design	December 28, 1999
The EPA signed a second ESD to clarify an issue related to the initial cleanup plan, update cleanup goals for soil and groundwater, and add monitoring goals for surface water and fish tissue	May 16, 2000
PRP completed remedial design for debris removal and began remedial action	August 28, 2000
PRP completed remedial design for demolition activities	November 20, 2000
The PRP completed remedial design for final capping	May 29, 2001
The EPA finalized the Site's Preliminary Close-Out Report for remedy construction completion	January 4, 2002
FDEP began removal of dioxin-contaminated soil on 17 residential properties	January 23, 2002
FDEP completed residential removal of dioxin-contaminated soil	April 4, 2002
The PRP began operation and maintenance (O&M) activities	August 1, 2002
PRP completed the remedial action for disposal, demolition and capping	August 5, 2003
The EPA signed the Site's first FYR	December 21, 2005
The EPA designated the Site as Sitewide Readv for Anticipated Use	June 26, 2006
The EPA signed the Site's second FYR	June 21, 2011

3.0 Background

3.1 Physical Characteristics

The 61-acre Site is located at 1300 NW 31st Avenue in a populated area of Fort Lauderdale, Broward County, Florida (Figure 1). NW 31st Avenue borders the Site to the west. A vacant property, which historically was a privately owned metal recycling operation, borders the Site to the north. A privately-owned recreational lake known as Rock Pit Lake, which historically received overflow from the cooling water pond, borders the Site to the northeast. Rock Pit Lake is not currently used recreationally. Residential properties border the Site to the east and south.

The northern portion of the Site includes a capped landfill that is covered in grass and has a maximum elevation of about 41 feet above mean sea level, about 30 feet above the surrounding grade. The 20-acre southern portion of the property was historically referred to as the Process Area. It included (prior to demolition activities) two inactive incinerator buildings, cooling water treatment structures, a vehicle maintenance area, other various buildings and a cooling water percolation pond, known as Lake Stupid. The cooling water percolation pond was excavated and sediment was placed under the landfill cap before construction of what is now the wet retention area, located in the southeastern corner of the Site (Figure 2). There are dry and wet stormwater retention features around the perimeter of the landfill, and larger retention areas on the south end of the landfill. An unpaved road surrounds the landfill, and the entire Site is surrounded by a fence.

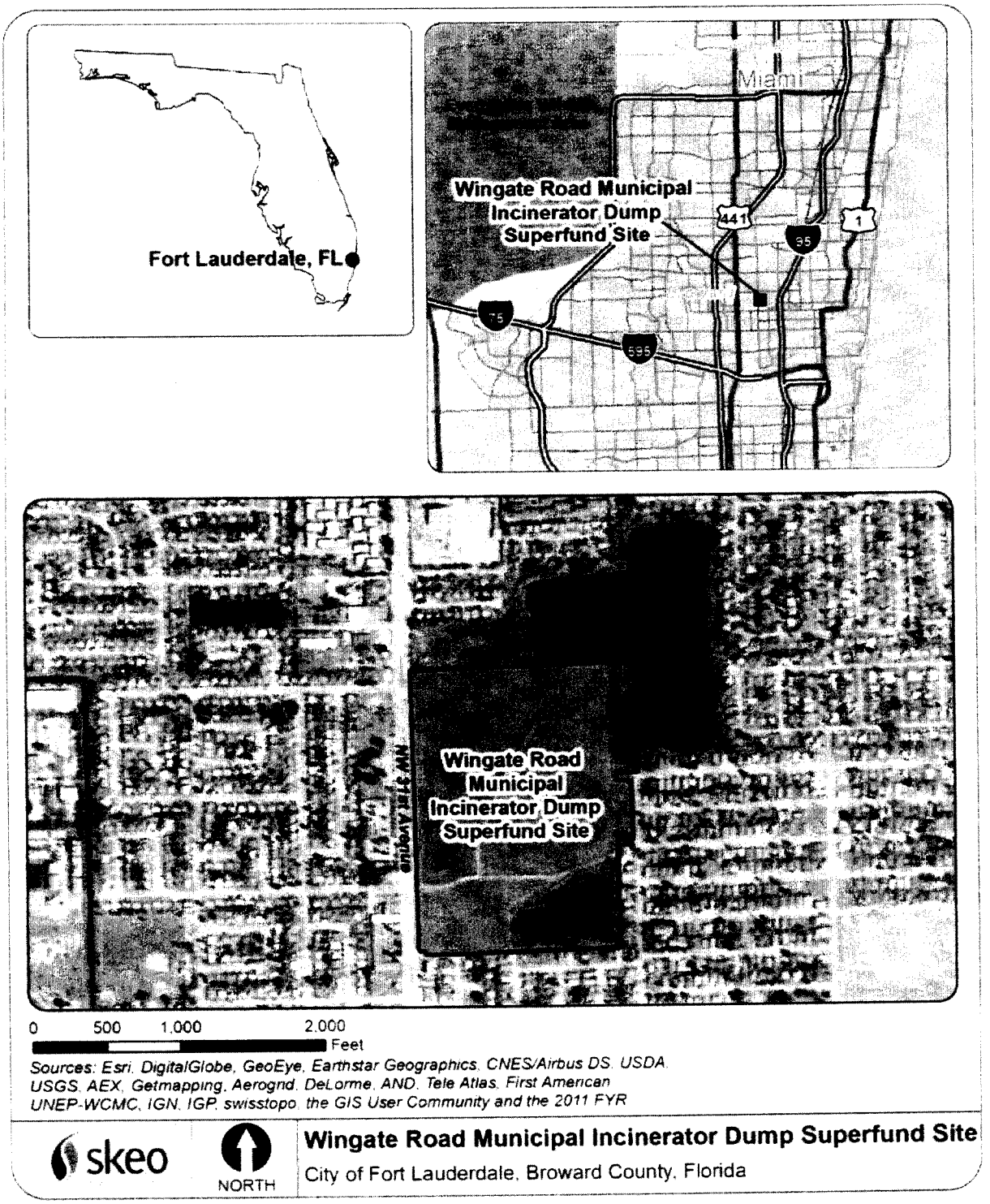
Surface drainage on site is controlled by site topography and drainage features. Precipitation that falls on the landfill is routed through a stormwater management system to the wet retention area. It percolates from the area into the groundwater. The wet retention area and Rock Pit Lake are hydraulically connected to groundwater.

There are three hydrogeologic units at the Site – the Biscayne Aquifer, composed primarily of limestone and sand, the intermediate confining unit, composed of silty, sandy clays, and the Floridan Aquifer. The Biscayne Aquifer is the primary water-producing zone. The water in the Floridan Aquifer in the vicinity of the Site is highly mineralized and is not suitable for potable water supply. Groundwater within the Biscayne Aquifer generally flows toward the east and southeast. Local groundwater flow at the Site is influenced by the landfill topography. A slight mounding of the water table develops beneath the landfill, resulting in a radially-outward flow of groundwater. The mounding effect does not appear to influence the groundwater flow pattern beyond the Site.

3.2 Land and Resource Use

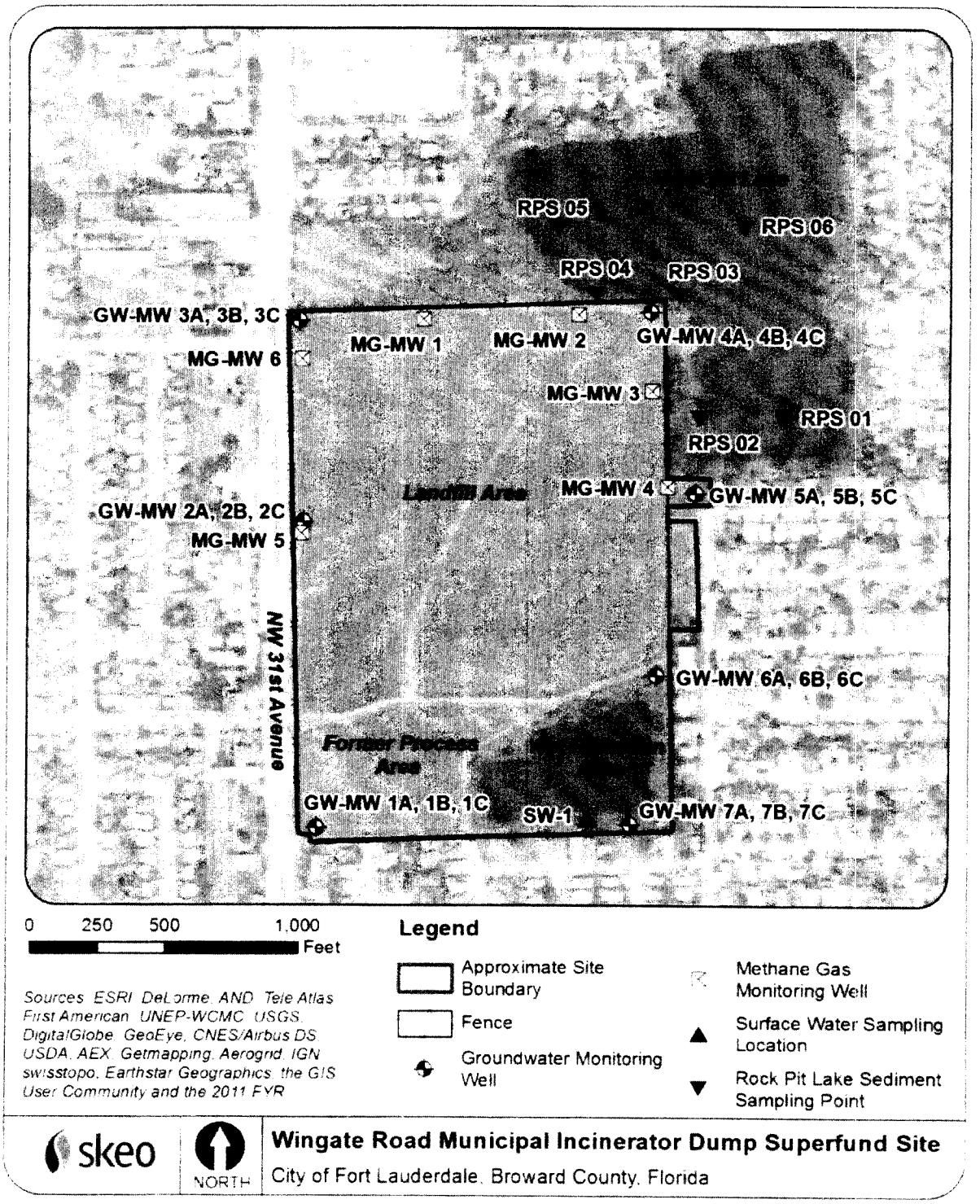
The City purchased the site property in 1951 and operated two municipal incinerators and a landfill from 1954 to June 1978. In 1966, the City also constructed a cooling water percolation pond. By 1975, the City had constructed a cooling water treatment system to remove ash from the cooling water before the water was discharged to the pond.

Figure 1: Site Location Map



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

Figure 2: Detailed Site Map



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

As part of site cleanup, the City demolished site buildings and the incinerators. The Site is currently vacant and available for reuse. The Site is zoned for commercial and industrial land uses. Surrounding land uses are commercial (west and north of the Site) and residential (south and east of the Site). Groundwater at the Site is not used for human consumption or other purposes. Residents near the Site were connected to the public water supply. Groundwater use restrictions were placed on the Site. The Site qualified for the EPA's Sitewide Ready for Anticipated Use measure in 2006, signifying that construction of the remedy had been completed and all institutional controls, as applicable, had been put in place.

To date, no concrete actions have been taken toward reuse. Local stakeholders have discussed several possible site reuse options, including a golf course, a health clinic and a senior center.

3.3 History of Contamination

The City operated two municipal incinerators and a landfill from 1954 to June 1978. They processed about 480 tons of municipal solid waste per day. One incinerator was constructed in 1954, and a second incinerator was added in 1966. An ash cooling water pond was constructed in 1966. The pond lost permeability due to the buildup of fine ash. The City periodically removed the ash from the bottom of the pond and placed the ash in the landfill or around the banks of the pond. The pond was then connected to Rock Pit Lake by an overflow ditch along the eastern edge of the landfill. In 1975, the City constructed a cooling water treatment system to remove the ash from the cooling water before the water was discharged to the cooling water percolation pond. The resultant sludge from the water treatment system was disposed of in the landfill along with the ash from the incinerators. The City ceased incinerator and landfill operations at the Site in 1978. The Site's PRPs include the City of Fort Lauderdale, Waste Management and the Port Everglades Authority, as well as some small contributors that were settled with.

3.4 Initial Response

The EPA completed a site investigation in 1986. Results showed pesticides in surface and subsurface soil from the landfill area. Elevated pesticide concentrations were also reported in sediments from Rock Pit Lake. In 1986 the City began closure of the landfill in accordance with Florida Administrative Code (FAC) landfill closure requirements. The closure process was suspended when the site was added to the National Priorities List.

The EPA proposed the Site for inclusion on the Superfund program's National Priorities List (NPL) on June 24, 1988. The Site was finalized on the NPL on October 4, 1989. The closure of the landfill was delayed until completion of the remedial investigation/feasibility study (RI/FS). In 1991, the EPA entered into an Administrative Order on Consent with the City and the Port Everglades Authority requiring them to conduct the RI/FS.

3.5 Basis for Taking Action

The City performed an RI from August 1992 through September 1994. The results indicated that primary contaminants in the landfill, soils and ash residue were metals, benzo(a)pyrene and dioxin. Metals were detected above ambient water quality criteria in surface water samples from

the cooling water percolation pond and Rock Pit Lake, while sediments included metals, toxaphene and dioxin. The City also sampled fish from the cooling water percolation pond and Rock Pit Lake. Tissue samples indicated the presence of dioxin. Groundwater contaminants included several organic contaminants and metals.

The results of the baseline human health risk assessment (BHHRA) indicated that the primary contaminants contributing to cancer risks greater than 1×10^{-6} or noncancer hazards greater than 1.0 in soil, ash residue and sediment are benzo(a)pyrene, dioxin and metals. Hypothetical risks and noncancer hazards associated with exposure to groundwater were driven by bis(2-ethylhexyl) phthalate and metals. Off-site groundwater did not pose unacceptable risks or hazards.

A qualitative ecological evaluation indicated that metals in site soils in the southern portion of the Site and the landfill have the potential to impact invertebrates and small mammals. Dioxin could impact small mammals in the landfill area. Potential impacts to sensitive aquatic species in the cooling water percolation pond were also possible as a result of metals in lake water.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP. The nine criteria are:

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility or Volume through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

4.1 Remedy Selection

The Site's 1996 Record of Decision (ROD) identified objectives for how the selected remedy will protect human health and the environment:

- Reduce the risks associated with exposure to contaminated media to health-based levels.
- Protect the surficial aquifer system beyond the current site boundary.

The major components of the selected remedy – based on the 1996 ROD, as revised by the Site's 1997 and 2000 Explanations of Significant Differences (ESDs) – include source control and groundwater remedial components:

- Construction of a geosynthetic membrane cap with erosion controls over the landfill.
- Excavation of contaminated soil and incinerator ash, with disposal in the landfill.
- Drainage, treatment and disposal of water in the wet retention area, previously Lake Stupid.
- Excavation of sediment from the wet retention area (Lake Stupid), with disposal in the landfill.
- Construction of a stormwater management system.
- Natural attenuation for the surface water at Rock Pit Lake.
- Decontamination (and/or demolition) of the incinerator buildings and water treatment structures.
- Institutional controls and/or groundwater use restrictions within the site boundary.
- Stormwater controls, fencing, signs and institutional controls for the maintenance of the site cap.
- Groundwater, surface water, sediment and fish tissue monitoring for up to 30 years.
- Treating 150 cubic yards of highly contaminated dioxin materials from the old incinerator building on site or disposing of the material off site.

The 1996 ROD identified performance goals in soil/ash residue, groundwater, surface water, sediment and fish tissue as the remedial goals for the Site. The 2000 ESD eliminated remedial goals for beryllium in soil and aluminum and manganese in groundwater as the goals were not needed for the protection of human health and the environment. Table 2 summarizes remedial goals for soil/ash residue and sediment. Table 3 summarizes the remedial goals for groundwater outside of the current site boundary and surface water. Table 4 summarizes the remedial goal for fish tissue.

Table 2: Summary of Remedial Goals for Soil, Ash Residue and Sediment

Contaminant of Concern (COC)	Remedial Goals[a,b] (mg/kg)	
	Soil/Ash Residue	Sediment
Metal COCs		
Antimony	NA	67
Arsenic	23	46
Cadmium	NA	170
Lead	500	NA
Organic COCs		
Benzo(a)pyrene	0.13	NA
Dioxin TEQs	0.0006	0.0013
Toxaphene	NA	1.8

Contaminant of Concern (COC)	Remedial Goals[a,b] (mg/kg)	
	Soil/Ash Residue	Sediment

Notes:
a. Remedial goals obtained from Section A.2 of the 1996 ROD.
b. Based on a residential exposure that falls within the 1×10^{-6} to 1×10^{-4} cancer risk range or noncancer hazard quotient (HQ) of 1.0.
NA = not applicable; chemical not a COC for this medium.
mg/kg = milligrams per kilogram
TEQ = Toxicity Equivalence

Table 3: Summary of Remedial Goals for Groundwater and Surface Water

COC	Remedial Goals[a] (µg/L)		
	Groundwater	Surface Water	
		Acute	Chronic
Metal COCs			
Aluminum	NA	750	87
Antimony	6	88	30
Cadmium	5	3.9	1.1
Beryllium	NA	NA	0.13
Copper	NA	19	13
Iron	NA	NA	1000
Inorganic COCs			
Lead	15	96	3.6
Mercury	2	2.4	0.012
Silver	NA	4.8	0.12
Zinc	NA	127	115
Organic COCs			
Benzene	1	NA	NA
Bis(2-ethylhexyl) phthalate	6	NA	NA

Notes:
a. Remedial goals obtained from Section B.1 and C. of the 1996 ROD. Groundwater remedial goals are federal and/or state groundwater standards. Surface water criteria are based on acute and chronic ambient water quality criteria.
NA = not applicable; chemical not a COC for this medium.
µg/L = micrograms per liter

Table 4: Remedial Goal for Fish Tissue

COC	Remedial Goals[a] (ng/kg)
Dioxin	0.02

a. Remedial goals obtained from Section D. of the 1996 ROD, calculated for human consumption.
ng/kg = nanograms per kilogram

4.2 Remedy Implementation

In May 1998, the EPA and the City signed a Consent Decree for remedy implementation. Substantial cleanup work was completed in October 2001. Minor elements of the remedy and remedy completion took place in 2003. The three phases of the remedial action were site clearing and debris cleanup, building and structure demolition, and landfill closure.

The PRPs implemented land use restrictions in August 2000 restricting the installation of groundwater drinking wells and the use of any groundwater drinking well at the Site. The restrictions also prohibit the use of the Site in any manner that would disturb the integrity of the final cover or any component of the containment system. Section 6.3 provides detailed information on the restrictions. Section 4.3 discusses operation and maintenance (O&M) activities, including methane monitoring and groundwater, surface water, sediment and fish tissue sampling and analysis. TASK Environmental, a consulting company, started these activities on the City's behalf in August 2002.

Site Clearing and Debris Removal

Work during this phase of the project generally consisted of mobilization, air monitoring station installation, clearing of surficial trash and vegetation from the process and landfill areas, and debris removal.

Building and Structure Demolition

Building and structure demolition began on November 13, 2000. This phase included removal of highly-contaminated ash from the old incinerator, asbestos abatement, demolition of buildings and structures in the Process Area, underground storage tank removal, production well abandonment and placement of the demolition debris in the on-site landfill area.

Contractors removed a minimum of 2 feet of soil across the entire Process Area and perimeter of the landfill outside of the cover system to the limits of the property boundaries until remaining soil complied with maximum specified contaminant concentrations. The vertical extent of the excavation continued to a minimum of 24 inches or until remedial goals were achieved. Soil was transported to the on-site landfill area for disposal.

Landfill Closure

Landfill closure and site restoration work began in May 2001, including: site grading, stormwater system installation, landfill subgrade preparation, liner system installation, vegetative soil cover placement, topsoil placement, and seeding or sodding.

PRP contractors removed contaminated sediments from Lake Stupid, now the wet retention area, and placed sediments in the landfill. Water from the wet retention area was used for dust control during demolition and excavation activities. Wet retention area sediment was removed to a depth of 2 feet and disposed of in the landfill. The sediment was partially replaced with 2 feet of clean soil.

The cap is designed to minimize infiltration of water into the waste materials below the cap. To function properly, the cap must stay intact as a continuous barrier over the waste material and promote quick rainfall runoff. The PRP contractor also installed methane gas vents and drainage pipes and constructed stormwater retention basins and ditches as part of cap construction.

A barrier was installed to prevent materials from the landfill from coming in contact with receptors in Rock Pit Lake. The barrier consists of a heavy geotextile fabric covered with stone riprap installed along the existing lake bank.

Contractors installed seven clusters of groundwater monitoring wells around the Site.

4.3 Operation and Maintenance (O&M)

The EPA approved the Site's O&M plan in November 2002. The City is responsible for oversight and implementation of O&M activities. The City is responsible for procuring services required under the O&M plan and ensuring that the activities are performed in accordance with the O&M guidance. O&M activities are performed by a team of consultants, laboratories and contractors.

The City is responsible for routine inspections of the cap and fence. Routine monthly cap maintenance includes mowing, reseeding and mulching bare spots on the cap, trimming excessive vegetative growth in ditches, removing silt from pipes and ditches, stormwater management, fence maintenance, sign maintenance, and roadway maintenance. Other O&M contractor activities include groundwater, fish tissue, and sediment sampling and analysis The City requested a reduction in monitoring activities in a 2016 letter to the EPA.

O&M costs established in the 1996 ROD were $3,431,000 for 30 years of O&M activities (approximately $114,400 per year in 1996). The City estimates O&M costs over the past five years to be approximately $161,000. This figure includes monitoring, grass cutting and fence repairs.

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2011 FYR for the Site stated:

The remedy currently protects human health and the environment in the short term because the landfill cap construction is complete and the required institutional controls (ground water and land use restrictions) are in place. However, in order for the remedy to be protective in the long term, cleanup goals for ground water and fish tissue must still be met. The following actions need to be taken to ensure protectiveness while ground water and fish tissue continue to recover:

- *Use enforcement authority, if necessary, to gain access to Rock Pit Lake for sampling.*
- *Encourage the burrowing owls to leave the capped area of the Site by: (a) relocating their perches to an area away from the landfill cap; and/or (b) coordinating with the Florida Fish and Wildlife Conservation Commission to relocate them.*

The 2011 FYR included two issues and recommendations. This report summarizes each recommendation and its current status in Table 5.

Table 5: Progress on Recommendations from the 2011 FYR

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Request access six months before needed so that the EPA can get a warrant, if needed, to address access issues at Rock Pit Lake.	PRP	04/30/2012	Considered and not implemented. The City did not require the EPA to assist with obtaining access to Rock Pit Lake. They were able to obtain access to sample in 2013 and 2015.	11/1/2013
Encourage the burrowing owls to leave the capped area of the Site by: (a) relocating their perches to an area away from the landfill cap; and/or (b) coordinating with the Florida Fish and Wildlife Conservation Commission to relocate them.	PRP	12/31/2011	Complete. The perches have been relocated, resulting in the owls moving off site.	09/23/2015

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in September 2015 and scheduled its completion for July 2016. EPA remedial project manager (RPM) Pam Scully led the EPA site review team, which also included EPA community involvement coordinator (CIC) L'Tonya Spencer and contractor support provided to the EPA by Skeo Solutions. In September 2015, the EPA held a kick off call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

6.2 Community Involvement

In September 2015, the EPA published a public notice in the *Sun Sentinel* newspaper announcing the commencement of the FYR process for the Site, providing contact information for Pam Scully and L'Tonya Spencer, and inviting community participation. The press notice is available in Appendix B. No one contacted the EPA as a result of the advertisement.

The EPA will make the final FYR Report available to the public. Upon completion of the FYR, the EPA will place copies of the document in the designated site repository: Broward County Library, located at 100 South Andrews Avenue in Fort Lauderdale.

6.3 Document Review

This FYR included a review of relevant, site-related documents, including the ROD and the 1997 and 2000 ESDs. A complete list of the documents reviewed can be found in Appendix A.

ARARs Review

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

- 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, remedial action, location or other circumstance found at a CERCLA site.

- Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards more stringent than federal requirements may be applicable or relevant and appropriate.

- To-Be-Considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, TBC criteria may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include maximum contaminant levels (MCLs) under the federal Safe Drinking Water Act and ambient water quality criteria enumerated under the federal Clean Water Act.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated groundwater or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the chemical-specific ARARs identified in the ROD. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

Groundwater
The Site's 1996 ROD established remedial goals for eight groundwater COCs: aluminum, antimony, benzene, bis(2-ethylhexyl) phthalate, cadmium, lead, manganese and mercury. The 2000 ESD deleted cleanup goals for aluminum and manganese from the remedy; cleanup goals for these two COCs are no longer applicable. In the 1996 ROD, groundwater remedial goals for groundwater COCs were based on federal and Florida primary drinking water standards. Standards for groundwater COCs have not changed (Table 6). In 2005, FDEP established promulgated health-based groundwater cleanup target levels (GCTLs) under FAC Chapter 62-777.

Table 6: ARAR Review for Groundwater COCs

COC	1996 ROD Groundwater Remedial Goals[a] (µg/L)	Current ARARs (µg/L)	ARAR Change
Antimony	6	6[c,d]	No change
Benzene	1	1[d]	No change
Bis(2-ethylhexyl) phthalate[b]	6	6[c,d]	No change
Cadmium	5	5[c,d]	No change
Lead	15	15[d,e]	No change
Mercury	2	2[c,d]	No change

Notes:
a. Based on federal and/or Florida drinking water MCLs.
b. This COC is also called di(2-ethylhexyl)phthalate. It is referenced as such in the federal and state MCL listings.
c. Federal Safe Drinking Water Act MCLs are available at: http://www.epa.gov/safewater/contaminants/index.html (accessed 9/3/2015).
d. Florida Safe Drinking Water Act MCLs are available at: http://www.dep.state.fl.us/legal/Rules/drinkingwater/62-550.pdf (accessed 9/3/2015).
e. Under the federal Safe Drinking Water Act, lead is regulated by a treatment technique that requires systems to control the corrosiveness of their water. If more than 10 percent of tap water samples exceed the action level, water systems must take additional steps. The action level for lead is 15 µg/L, or 0.015 milligrams per liter (mg/L).
µg/L = micrograms per liter

Soil and Sediment ARARs
Federal ARARs have not been established for soil or sediment COCs. The evaluation of the soil remedial goals compared to the EPA health-based screening levels and state SCTLs is further reviewed in Section 7.2.

Surface Water
The 1996 ROD established federal acute and chronic ambient water quality criteria (AWQCs) for fresh water as the goals for surface water. The AWQCs will confirm the effectiveness of the landfill closure in mitigating the surface water migration pathway for the 10 COCs listed in Table 7. At the time of this FYR, current acute and chronic water quality criteria for aluminum and antimony both remain unchanged.[1] An acute criterion for beryllium was not provided in the 1996 ROD. The chronic criterion for beryllium remains unchanged.[2] The acute and chronic water quality criteria for cadmium are more stringent.[3]

National recommended acute and chronic water quality criteria for copper are not listed but can be determined using the Biotic Ligand Model (BLM). An acute criterion for iron was not provided in the 1996 ROD and a national recommended acute water quality criterion has not been issued; the chronic criterion for iron of 1,000 micrograms per liter (µg/L) has not changed. The acute and chronic water quality criteria are more stringent for lead. The acute criterion for mercury is more stringent; the chronic criterion for zinc is less stringent. The acute criterion for silver is more stringent but a national recommended chronic criterion has not been issued. The acute criterion for zinc is more stringent while the chronic value is less stringent.

Table 7: Surface Water Monitoring Criteria

COC	AWQC: Acute			AWQC: Chronic		
	1996 ROD Cleanup Goals (µg/L)	Current ARARs [a] (µg/L)	ARAR change	1996 ROD Cleanup Goal (µg/L)	Current ARARs [a] (µg/L)	ARAR change
Aluminum	750	750	no	87	87	no
Antimony	88	NA[b]	no	30	NA[b]	withdrawn
Beryllium	NA	NA[b]	NA	0.13	0.13[b]	no
Cadmium[c]	3.9	2.0	more stringent	1.1	0.25	more stringent
Copper	19	NA	NA	13	NA	NA
Iron	NA	NA	NA	1000	1000	no
Lead[c]	96	65	more stringent	3.6	2.5	more stringent
Mercury	2.4	1.4	more stringent	0.012	0.77	less stringent

[1] National recommended acute and chronic criteria for antimony have not been issued.
[2] National recommended chronic criterion for beryllium has not been issued.
[3] Dissolved metal criteria for cadmium, lead, silver and zinc are based on the calculations in Appendix B of the National Recommended Water Quality Criteria (http://www.epa.gov/waterscience/criteria/wqctable/#appendxb), which includes the water hardness. The values shown for the current cleanup goals are from the National Recommended Water Criteria, which use a default 100 mg/L calcium carbonate hardness value to illustrate the application of the calculation. No hardness value was defined in site decision documents, so the 100 mg/L hardness value is used as a proxy value.

COC	AWQC: Acute			AWQC: Chronic		
	1996 ROD Cleanup Goals (µg/L)	Current ARARs [a] (µg/L)	ARAR change	1996 ROD Cleanup Goal (µg/L)	Current ARARs [a] (µg/L)	ARAR change
Silver[c]	4.8	3.2	more stringent	0.12	NA	NA
Zinc[c]	127	120	more stringent	115	120	less stringent

Notes:

a. National Recommended Water Quality Criteria are available at http://www.epa.gov/waterscience/criteria/wqctable (accessed 9/3/2015).

b. No promulgated AWQC.

c. Dissolved metal criteria are based on the calculations in Appendix B of the National Recommended Water Quality Criteria (http://www.epa.gov/waterscience/criteria/wqctable/#appendxb, accessed 9/3/2015), which includes the water hardness. The values shown for the current cleanup goals are from the National Recommended Water Criteria, which uses a default 100 mg/L calcium carbonate hardness value to illustrate the application of the calculation. No hardness value was defined in site decision documents, so the 100 mg/L hardness value is used as a proxy value.

According to EPA's summary table containing national recommended water quality criteria for the protection of aquatic life and human health in surface water, freshwater criteria were calculated using the BLM. The table further notes that available toxicity data, when evaluated using the procedures described in the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses," indicate that freshwater aquatic life should be protected if the 24-hour average and four-day average concentrations do not respectively exceed the acute and chronic criteria concentrations calculated by the BLM.

NA = not applicable
µg/L = micrograms per liter

Institutional Control Review

Two parcels of land – 494232000110 and 494232000120 – make up most of the Site's land area (Figure 3). Ten additional parcels were annexed to the Site during construction of the remedy. The City owns all property parcels at the Site. The 1996 ROD included institutional control restrictions for the two original parcels; it did not include institutional controls for the additional parcels. The Broward County Official Records website provided information for these 10 properties.[4]

Table 8 lists the institutional controls associated with areas of interest at the Site. The objectives of the institutional controls at the Site are to restrict the use of wells to extract groundwater for drinking, restrict the installation of new wells and restrict any use of the Site that could disturb the integrity of the landfill cap. These restrictions are included in a Declaration (Instrument Number 100452441, Book 30746, Page 1530). A Notice of Obligation to Provide Access in Accordance with Section IX of the Consent Decree for the Wingate Road Municipal Incinerator and Landfill Superfund Site is also logged (Instrument Number 100452440, Book 30746, Page 1524).

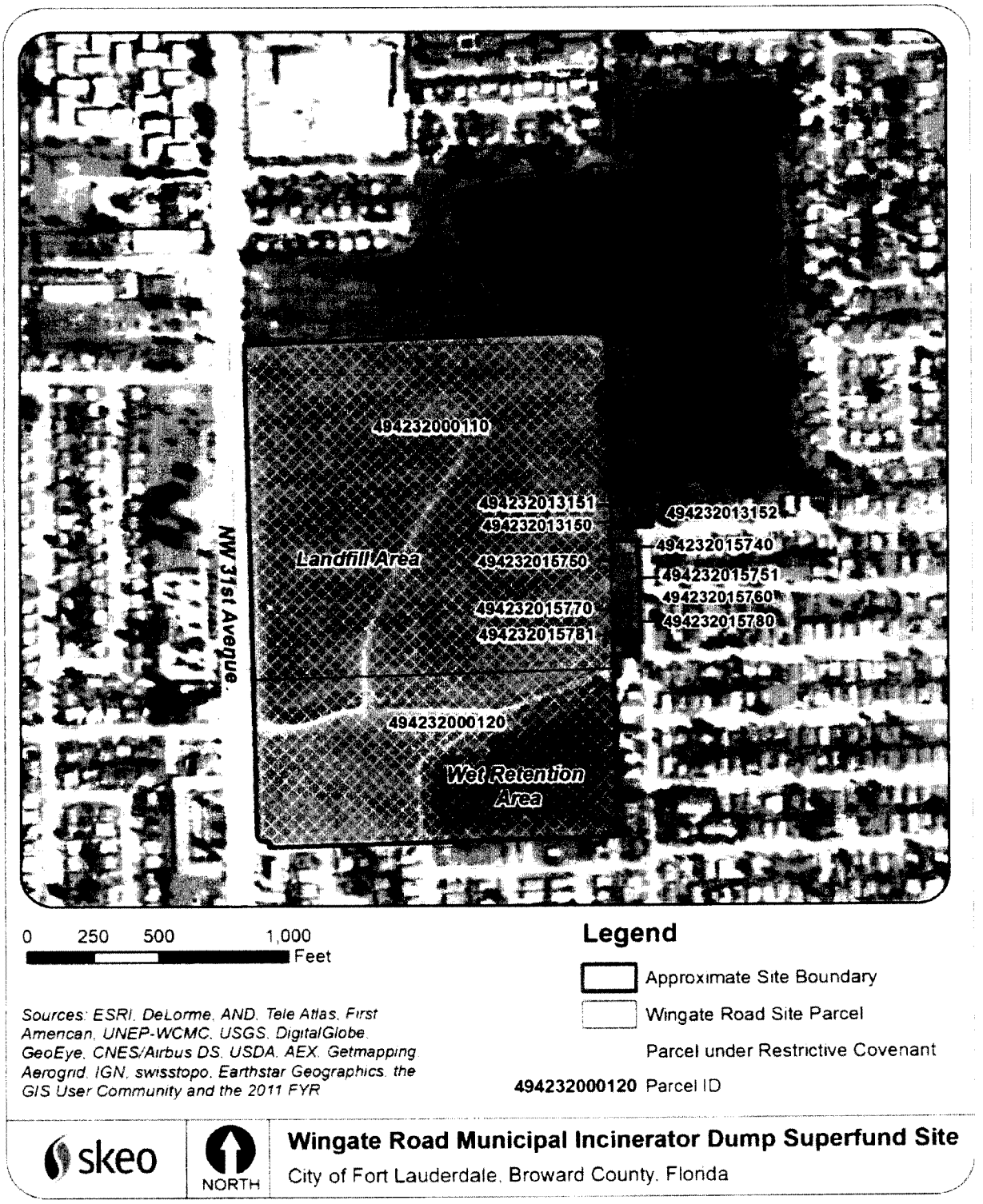
[4] Broward County Official Records Search: https://officialrecords.broward.org/oncoreV2/Search.aspx (accessed 01/15/2016).

Table 8: Institutional Control (IC) Summary

Media	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
Groundwater	Yes	Yes	494232000110 and 494232000120	Restrict installation of groundwater wells and the use of existing ones for drinking purposes.	2000 Deed Restriction
Land	Yes	Yes	494232000110 and 494232000120	Prohibit the use of the Site in any manner that would affect the final cover or any component of the containment system.	2000 Deed Restriction

Notes:
The Site also includes10 parcels annexed to support construction of the remedy. These 10 parcels are 494232013151, 494232013150, 494232013152, 494232015740, 494232015750, 494232015751, 494232015760, 494232015770, 494232015780 and 494232015781.

Figure 3: Institutional Control Base Map



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

6.4 Data Review

During this five year review period, TASK Environmental (PRP contractor) conducted sampling that was modified in both scope and schedule. The modified sampling was proposed in a November 2010 letter to the EPA, was approved in March 2011 by the EPA. It required the following sampling of groundwater, Rock Pit Lake sediment and Rock Pit Lake fish tissue:

Media	Parameters	Frequency
Groundwater		
MW-1A	Arsenic	Annually
MW-1C, 7B, 7C	Ammonia	Annually
MW-1B, 2A, 4A, 4C, 5C, 6A, 7A	Antimony	Annually
MW-2B	Lead	Annually
Rock Pit Lake Sediment	Antimony, Arsenic, Cadmium	Once per 2 years
Rock Pit Lake Fish Tissue	Dioxins	Once per 2 years

TASK Environmental submitted a request to the EPA in January 2016 for approval to:

- discontinue groundwater sampling and analysis;
- plug and abandon all monitoring wells;
- discontinue sediment and fish tissue sampling and analysis; and
- abandon the methane monitor wells.

The City will continue to inspect and maintain the cap, fence and stormwater management system.

Groundwater

For this FYR, data from 2011 to 2014 were analyzed. Samples had detections of antimony, arsenic, lead and ammonia. As per FDEP's request during the 2005 FYR, samples were also analyzed for aluminum, manganese and ammonia, and compared to secondary drinking water standards. Of these metals, the only groundwater cleanup goals established by the EPA in the ROD were for antimony and lead. Detections of contaminants identified in the 11 wells sampled for this FYR are presented in Table 9.

- Antimony was detected in only two wells between 2011 and 2014 at concentrations of 1.1 µg/L in WN-GW-MW-4A and 2.3 µg/L in WN-GW-MW-6A; both concentrations were detected in 2014 and are below the MCL of 6 µg/L. All remaining data were below detection; the detection limits in October 2011 for antimony were 6.5 µg/L, which slightly exceeds the MCL. Since 2011, the detection limits have been below the MCL.
- Arsenic and lead were sampled for in only one well each, WN-GW-MW-1A and WN-GW-MW-1B, respectively; however, these metals were below detection and detection limits were below the ROD cleanup goal.
- Ammonia was detected above the FDEP GCTL of 2.8 mg/L in every sample collected from two wells – WN-GW-MW-1C and WN-GW-MW-7C – from 2011 to 2014. Ammonia is not a site COC.

Table 9: Summary of Groundwater Data Collected from 2011 to 2014

Parameter		Antimony (µg/L)	Arsenic (µg/L)	Lead (µg/L)	Ammonia (mg/L)
Cleanup Goal		6	10	15	FDEP GCTL - 2.8
Sample #	Date				
WN-GW-MW-1A	10/2011	NA	4.8 U	NA	NA
WN-GW-MW-1A	11/2012	NA	3.3 U	NA	NA
WN-GW-MW-1A	10/2013	NA	3.3 U	NA	NA
WN-GW-MW-1A	11/2014	NA	5.0 U	NA	NA
WN-GW-MW-1B	10/2011	6.5 U	NS	4.4 U	NA
WN-GW-MW-1B	11/2012	2.26 U	NS	2.9 U	NA
WN-GW-MW-1B	10/2013	2.3 U	NS	2.9 U	NA
WN-GW-MW-1B	11/2014	0.50 U	NS	5.0 U	NA
WN-GW-MW-1C	10/2011	NA	NA	NA	6.3 V
WN-GW-MW-1C	11/2012	NA	NA	NA	7.1
WN-GW-MW-1C	10/2013	NA	NA	NA	5.3
WN-GW-MW-1C	11/2014	NA	NA	NA	4.9
WN-GW-MW-2A	10/2011	6.5 U	NA	NA	NA
WN-GW-MW-2A	11/2012	2.26 U	NA	NA	NA
WN-GW-MW-2A	10/2013	2.3 U	NA	NA	NA
WN-GW-MW-2A	11/2014	0.50 U	NA	NA	NA
WN-GW-MW-4A	10/2011	6.5 U	NA	NA	NA
WN-GW-MW-4A	11/2012	2.26 U	NA	NA	NA
WN-GW-MW-4A	10/2013	2.3 U	NA	NA	NA
WN-GW-MW-4A	11/2014	1.1	NA	NA	NA
WN-GW-MW-4C	10/2011	6.5 U	NA	NA	NA
WN-GW-MW-4C	11/2012	2.26 U	NA	NA	NA
WN-GW-MW-4C	10/2013	2.3 U	NA	NA	NA
WN-GW-MW-4C	11/2014	0.50 U	NA	NA	NA
WN-GW-MW-5C	10/2011	6.5 U	NA	NA	NA
WN-GW-MW-5C	11/2012	2.26 U	NA	NA	NA
WN-GW-MW-5C	10/2013	2.3 U	NA	NA	NA
WN-GW-MW-5C	11/2014	0.50 U	NA	NA	NA
WN-GW-MW-6A	10/2011	6.5 U	NA	NA	NA
WN-GW-MW-6A	11/2012	2.26 U	NA	NA	NA
WN-GW-MW-6A	10/2013	2.3 U	NA	NA	NA
WN-GW-MW-6A	11/2014	2.3	NA	NA	NA
WN-GW-MW-7A	10/2011	6.5 U	NA	NA	NA
WN-GW-MW-7A	11/2012	2.26 U	NA	NA	NA
WN-GW-MW-7A	10/2013	2.3 U	NA	NA	NA
WN-GW-MW-7A	11/2014	0.50 U	NA	NA	NA
WN-GW-MW-7B	10/2011	NA	NA	NA	1.7 V
WN-GW-MW-7B	11/2012	NA	NA	NA	1.7
WN-GW-MW-7B	10/2013	NA	NA	NA	1.4
WN-GW-MW-7B	11/2014	NA	NA	NA	1.5
WN-GW-MW-7C	10/2011	NA	NA	NA	5.6 V
WN-GW-MW-7C	11/2012	NA	NA	NA	4.6
WN-GW-MW-7C	10/2013	NA	NA	NA	5.5
WN-GW-MW-7C	11/2014	NA	NA	NA	3.6

Notes:
NA = not analyzed
NS = not sampled
U = non-detect

Parameter		Antimony (µg/L)	Arsenic (µg/L)	Lead (µg/L)	Ammonia (mg/L)
Cleanup Goal		6	10	15	FDEP GCTL - 2.8
Sample #	Date				
V = analyte detected in the associated method blank. µg/L = micrograms per liter mg/L = milligrams per liter					

Rock Pit Lake Sediments

Sediment samples were taken in 2013 and 2015 at Rock Pit Lake. Antimony, arsenic and cadmium were detected in all samples in 2013 (Table 10). In 2015, cadmium was detected in all samples, antimony was detected in WN-RPL-SE-1 and WN-RPL-SE-2, and arsenic was detected in all samples except WN-RPL-SE-6. Samples were not analyzed for dioxin or toxaphene. In 2013, antimony and arsenic were detected above the cleanup goals of 67 milligrams per kilogram (mg/kg) and 46 mg/kg, respectively, in two sample locations – WN-RPL-SED-03 and WN-RPL-SED-04 (Table 10). Cadmium concentrations in 2013 exceeded the cleanup goal of 170 mg/kg in three sampling locations – WN-RPL-SED-06 as well as the same sample locations that exceeded cleanup goals for antimony and arsenic. The exceedances at these three locations were 1.5 to 2 times the cleanup goals. There were no concentrations above the cleanup goals in the 2015 samples.

Table 10: Concentration of Metals in Rock Pit Lake Sediments

Parameter		Antimony	Arsenic	Cadmium
Units		mg/kg	mg/kg	mg/kg
1996 ROD Cleanup Goal		67	46	170
Sample #	Date			
WN-RPL-SED-01	02/01/2013	26	18	74
WN-RPL-SED-01	09/01/2015	32	17.6	122
WN-RPL-SED-02	02/01/2013	10	8.7	1.6
WN-RPL-SED-02	09/01/2015	20.7	12.2	96.8
WN-RPL-SED-03	02/01/2013	**140**	**59**	**260**
WN-RPL-SED-03	09/01/2015	4.3 U	5.6 I	1.9
WN-RPL-SED-04	02/01/2013	**130**	**56**	**230**
WN-RPL-SED-04	09/01/2015	0.75 U	3.6	2
WN-RPL-SED-05	02/01/2013	21	14	39
WN-RPL-SED-05	09/01/2015	4.4 U	5.4 I	1.4
WN-RPL-SED-06	02/01/2013	**87**	37	**190**
WN-RPL-SED-06	09/01/2015	0.97 U	0.65	5.3
Notes: **Bold** = contaminant exceeds 1996 ROD cleanup goal. U = sample was analyzed for compound, but compound not detected. I = Reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. mg/kg = milligrams per kilogram				

Rock Pit Lake Fish Tissue

The only fish fillet samples available since the last FYR from Rock Pit Lake were two samples collected in 2013 and 2015 that were sampled for dioxin compounds (Appendix F, Table F-1). The analytical

results for individual dioxin compounds were converted to total dioxin toxicity equivalence (TEQs) by multiplying each dioxin compound by a toxicity equivalency factor (TEF) established by the World Health Organization in 2005 (Appendix F, Table F-2). The total dioxin equivalent concentration for the 2013 and 2015 fish samples were 0.189 nanogram per kilogram (ng/kg) and 0.168 ng/kg, respectively. These values were similar to the concentrations that were observed in 2008 to 2010, which had dioxin TEQs ranging from 0.247 ng/kg in 2008 to 0.15 ng/kg in 2010. Dioxin TEQ concentrations at the site have not significantly changed historically, but the concentration in all samples remain above the cleanup goal of 0.02 ng/kg. See section 7.2 for a screening level risk-based evaluation.

6.5 Site Inspection

On September 24, 2015, Pam Scully of the EPA, Susan Tobin of TASK Environmental (PRP contractor), Todd Hiteshew and Mike Pafford of the City, Kelsey Helton of FDEP, and Treat Suomi and Brice Robertson of the EPA contractor Skeo Solutions, performed the site inspection. The overall purpose of the inspection was to assess the efficacy of the Site's remedy. The site inspection included the inspection of monitoring wells, drainage facilities, the landfill cap, perimeter fencing, gates and signs. The site inspection checklist and photographs are provided in Appendices D and E.

The fencing surrounding the Site was in good condition, except for a small portion along the northern boundary of Rock Pit Lake, which appeared to be cut. The capped area had well-established vegetative cover, maintained monthly by the City's O&M staff. All monitoring wells were locked, well marked and in good working condition. The drainage system appeared to be in good condition and no wet areas were present on the landfill surface. The wet retention area on the southeastern portion of the Site was also in good condition and contained water at the time of the inspection. Several specimens of burrowing owls (*Athene cunicularia*) were observed during the visit. However, all were observed to the south of the capped area and none were observed on the cap. It appears as if the perches placed along the access road have been working to relocate the burrowing owls off site. Each specimen was near these perches, with one owl resting atop one of the perches.

Skeo Solutions performed research at the site repository at Broward County Library at 100 South Andrews Avenue in Fort Lauderdale. The library has a complete copy of all early administrative records for the Site, including the 1996 ROD and the 1997 and 2000 ESDs. However, there were no copies of the 2005 and 2011 FYRs. O&M reports are all current up through 2015.

6.6 Interviews

The FYR process included interviews with parties affected by the Site, including the current landowners and regulatory agencies involved in site activities or aware of the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. All of the interviews took place via email. The interviews are summarized below. Appendix C provides the complete interviews.

Pam Scully: Ms. Scully is the EPA's RPM for the Site. Ms. Scully thinks the Site is well maintained and monitored. Since closure completion in 2003, there has been little effect on the surrounding community from the Site. Occasionally, there has been redevelopment interest in the Site, but to date, nothing has worked out. The Site is fenced and well maintained by the City's Public Works Department. Groundwater meets federal and state standards. The remedy provides protection intended by the ROD.

Ms. Scully is comfortable with the institutional controls and is not aware of any community concerns regarding the Site.

Susan Tobin: Ms. Tobin is from the site PRP's O&M contractor, TASK Environmental. Ms. Tobin believes the Site is well maintained and well managed and should be available for reuse. The remedy is protective of human health and the environment, COCs in the groundwater and surface water are below site cleanup goals, and sediment and fish tissue quality are stable. Burrowing owls had taken up residence on top of the landfill but were successfully relocated. Ms. Tobin believes that groundwater monitoring should cease and all wells should be plugged, with surface casings removed. She believes the fish tissue and sediment sampling should also cease.

Todd Hiteshew: Mr. Hiteshew is from the City of Fort Lauderdale, which is a PRP at the Site and is responsible for site O&M. Mr. Hiteshew feels the Site is effectively maintained and the remedy continues to be effective. He is not aware of any effects on the surrounding community. Groundwater contaminant levels have declined below cleanup goals and COCs in sediment and fish tissue are stable, with a decrease in sediment concentrations. Mr. Hiteshew recommends a reduction in monitoring.

7.0 Technical Assessment

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

A review of the relevant site documents, ARARs and site inspection indicate that the remedy, as specified in the 1996 ROD and amended by the 1997 and 2000 ESDs, is functioning as intended. The remedy required closure of the Site's incinerators and landfill in accordance with state and federal requirements. This portion of the remedy has been satisfied via capping of the landfill using a geosynthetic membrane, implementation of stormwater management, drainage control and grading. Site access controls include locks on the security fencing. The PRP is currently monitoring the landfill in accordance with the Site's O&M plan.

Federal Clean Water Act water quality regulations regulate discharges (both point and non-point) to waters of the United States. As there are no point source discharges from the Site to waters of the United States, it is assumed that the water quality standards referenced in the 1996 ROD were intended for application to stormwater runoff from the landfill. Stormwater runoff from the landfill is directed into the on-site wet retention area, with a net zero discharge outside of the Site. Although analytical data have not been required to verify that the stormwater meets ambient water quality standards, this use of stormwater is in accordance with the approved landfill closure design with required runoff water management.

The PRP has filed deed restrictions with Broward County for the two original site parcels described in the 1996 ROD. The deed restrictions restrict the use of groundwater in any way, as well as installation of groundwater wells. The same instrument also restricts use of the land in any way that would harm the remedy. Site O&M activities include grass cutting and fence maintenance. Current O&M procedures should maintain the effectiveness of the remedy at the Site. The perimeter fence surrounding the Site was cut at the time of the site inspection. It was repaired in October 2015.

Groundwater monitoring data indicate that cleanup levels are being achieved for the remaining COCs that historically had exceeded the ROD cleanup goals to include antimony, arsenic and lead.

Sediment was sampled in 2013 and 2015 from Rock Pit Lake. Antimony, arsenic and cadmium were detected at concentrations above the cleanup goals in two sample locations (WN-RPL-SED-03 and WN-RPL-SED-04) and cadmium in a third location (WN-RPL-SED-06) in 2013. The exceedances at these three locations were 1.5 to 2 times the cleanup goals. There were no exceedances in 2015.

Dioxin concentrations in fish fillet samples from the lake remain above the cleanup goal of 0.02 ng/kg, but concentrations appear to be consistent with concentrations detected during the 2010 FYR. The relative significance of the concentrations detected in the fish fillet are evaluated in Section 7.2 due to the changes in toxicity values that have occurred since the 1996 ROD.

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

Exposure assumptions and RAOs have not changed since the 1996 ROD and 1997 and 2000 ESDs. Toxicity values have changed for dioxin as a result of the EPA's reassessment in 2012.[5] The remedial goals for dioxin in soil, sediment and fish were reviewed through a screening-level residential risk evaluation comparing ROD cleanup goals to the EPA's residential regional screening level (RSL). As shown in Table 11, the remedial goal for dioxin in soil exceeds the noncancer hazard quotient (HQ) of 1.0 based on the new noncancer toxicity value for this compound. The less stringent remedial goal does not call into question the protectiveness of the Site's remedy. Dioxin-contaminated soils were excavated, placed into the onsite landfill and the landfill was capped. Deed restrictions are in place to ensure the final cover is not disturbed so there are no completed exposure pathways to the contaminated soil. Soil excavation performance standards were met. Confirmation sampling is shown in Appendix F, Figure F-1.

The 1996 ROD soil dioxin remedial goal of 0.0006 mg/kg TEQs remains protective for commercial and industrial exposure. The 2016 dioxin worker cancer RSL is 0.000022 mg/kg TEQ and non-cancer RSL for soil dioxin is 0.00072 mg/kg TEQ which is equivalent to a cancer risk of 2.7×10^{-5} and the non-cancer HQ of 0.8. These results are within EPA's acceptable cancer risk range and below EPA's non-cancer HQ of 1.

Rock Pit Lake sediment samples met the dioxin TEQ sediment remedial goal of 0.0013 mg/kg in 2004, shown in the Quarterly Monitoring Data Review, August 2002 through August 2004. In a letter dated February 10, 2005, FDEP agreed to a reduced sediment monitoring schedule, excluding dioxin sampling.

[5] The EPA's dioxin reassessment has been developed and undergone review for many years, with the participation of scientific experts in EPA and other federal agencies, as well as scientific experts in the private sector and academia. The Agency followed current guidelines and incorporated the latest data and physiological/biochemical research into the reassessment. On February 17, 2012, EPA released the final human health non-cancer dioxin reassessment, publishing an oral non-cancer toxicity value, or reference dose, of 7×10^{-10} mg/kg-day for 2,3,7,8-tetrachlorodibenzo-p-dioxin in EPA's Integrated Risk Information System. The dioxin cancer reassessment will follow thereafter. The dioxin reference dose was approved for immediate use at Superfund sites to ensure protection of human health.

Table 11: Risk Evaluation of Human Health-Based Remedial Goals for Dioxin

COC	1996 ROD Remedial Goal (mg/kg)	EPA Residential RSL[a]		Residential	
		1×10^{-6} Risk	HQ = 1.0	Risk[b]	Noncancer HQ[c]
Soil					
Dioxin TEQ	0.0006	0.0000048	0.000051	1×10^{-4}	**12**
Sediment					
Dioxin TEQ	0.0013	NA	NA	NA	NA
Fish Tissue					
Dioxin TEQ	0.00000002	0.000000032[d]	0.0000011[d]	6×10^{-7}	0.02

Notes:

a. Current RSLs, dated May 2016, are available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016 (accessed 7/15/2016).

b. Cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1×10^{-6} risk:

Cancer risk = (1996 ROD remedial goal ÷ soil cancer RSL) × 10^{-6}

c. The noncancer HI was calculated using the following equation:

HI = (1996 ROD remedial goal ÷ soil noncancer RSL)

d. Fish RSL values were calculated using EPA's calculator based on a default daily fish consumption of 54 grams per day.

NA = not applicable; sediments are covered by water. Therefore, EPA Region 4 does not consider exposure to sediment as a completed exposure pathway.

Bold = cancer risk exceeds 1×10^{-4} or a noncancer HQ exceeds 1.0.

TEQ = Toxicity Equivalence

mg/kg = milligrams per kilogram

The Site's 1996 ROD established a cleanup goal of 0.02 ng/kg of dioxin TEQs in fish fillet tissue to confirm the effectiveness of the landfill closure in mitigating this contaminant migration pathway. As shown in Table 11 the remedial goal remains valid as the cleanup goal is within the EPA's risk management range of 1×10^{-4} and 1×10^{-6} and below a noncancer hazard quotient (HQ) of 1.0 for nearby residents. In 2013, the dioxin TEQs for the fish sample was 0.189 ng/kg, which exceeds the ROD cleanup goal; however, based on a screening-level risk evaluation shown in Table 12, this concentration falls within EPA's risk management range and below the noncancer HQ of 1.0.

Table 12: Screening-level Risk Evaluation of Dioxin TEQs Detected in Fish

COC	2013 Fish Concentration (ng/kg)	EPA Residential RSL[a]		Residential	
		1×10^{-6} Risk	HQ=1	Risk[b]	Noncancer HQ[c]
Dioxin TEQ	0.189	0.032[d]	1.1[d]	6×10^{-6}	0.2

a. Current RSLs, dated May 2016, are available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016 (accessed 7/15/2016).
b. Cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1×10^{-6} risk:
Cancer risk = (2013 site concentration ÷ fish cancer RSL) × 10^{-6}
c. The noncancer HI was calculated using the following equation:
HI = (2013 site concentration ÷ fish noncancer RSL)
d. Fish RSL value was calculated using EPA's calculator based on a default daily fish consumption of 54 grams per day.
ng/kg = nanograms per kilogram

The MCL for arsenic has become more stringent since the 1996 ROD. However, long-term groundwater monitoring uses the most current MCL and data from this FYR period demonstrate that arsenic is below the current MCL. ARARs for surface water at the Site and at Rock Pit Lake have changed since the signing of the 1996 ROD. For cadmium, lead, mercury, zinc and silver, current ARARs are more stringent than AWQC acute cleanup goals. For cadmium and lead, current ARARs are more stringent for AWQC chronic cleanup goals. However, for mercury and zinc, ARARs are less stringent for AWQC chronic cleanup goals. In the case of the wet retention area at the Site, lead was not detected above the method detection limit from August 2002 through November 2009, and therefore, monitoring for lead ceased with EPA's concurrence. Cadmium was not considered a contaminant of concern because it was not detected in surface water samples collected following completion of the wet retention area construction. For Rock Pit Lake, lead and cadmium were not detected above the method detection limit from August 2002 through November of 2009, and therefore, monitoring for lead and cadmium ceased with EPA's concurrence.

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

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

7.4 Technical Assessment Summary

The PRP consolidated wastes in the landfill and capped it using a geosynthetic membrane. Stormwater management, drainage control and grading has been implemented. The PRP is currently monitoring the landfill in accordance with the Site's O&M plan. Deed restrictions restrict the use of groundwater and restrict the installation of groundwater wells. The same instrument also restricts use of the land in any way that would harm the remedy. Groundwater monitoring data indicate that cleanup goals are being achieved for the remaining COCs that historically had exceeded ROD cleanup goals. Sediment in Rock Pit Lake exceeds cleanup goals. Exposure assumptions and RAOs have not changed since the 1996 ROD and 1997 and 2000 ESDs. Toxicity values have changed for dioxin as a result of the EPA's reassessment in 2012. However, this does not affect the protectiveness of the remedy, as shown in Section 7.2.

8.0 Issues, Recommendations and Follow-up Actions

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU1

9.0 Protectiveness Statement

Table 13: Protectiveness Statement

Sitewide Protectiveness Statement
Protectiveness Determination: Protective
Protectiveness Statement: The Site's remedy is protective of human health and the environment. Landfill cap construction is complete and required institutional controls are in place to restrict land use and groundwater use. The RAO of reducing Site risks to health-based levels and protecting the surficial aquifer system beyond the current site boundary have been met.

10.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

Explanation of Significant Differences Wingate Road Municipal Incinerator and Landfill Site, Ft. Lauderdale, Broward County, Florida. United States Environmental Protection Agency Region 4. November 1997.

Explanation of Significant Differences Wingate Road Municipal Incinerator and Landfill Site, Ft. Lauderdale, Broward County, Florida. United States Environmental Protection Agency Region 4. May 2000.

Feasibility Study Wingate Road Municipal Incinerator and Landfill Site. Prepared by TASK Environmental for City of Fort Lauderdale, Florida and the Port Everglades Authority. November 1994.

First Five-Year Review Report for Wingate Road Incinerator Landfill Site, Fort Lauderdale, Florida. Prepared by United States Environmental Protection Agency Region 4. December 21, 2005.

Monitoring Results and Monitoring Modification Request. Wingate Road Municipal Incinerator and Landfill Site. Fort Lauderdale, Florida. Prepared by TASK Environmental. January 15, 2016.

Operations and Maintenance Plan for Wingate Road Municipal Incinerator and Landfill Site, Fort Lauderdale, Florida. Prepared by GeoSyntec Consultants. November 2002.

Record of Decision for the Wingate Road Municipal Incinerator and Landfill Site. U.S. Environmental Protection Agency Region 4. May 14, 1996.

Remedial Action Report for Wingate Road Municipal Incinerator and Landfill Site, Fort Lauderdale, Florida. Prepared by IT Corporation and Geosyntec Consultants for Wingate Cooperating Parties Group June 2003.

Second Five-Year Review Report for Wingate Road Municipal Incinerator Dump Superfund Site. Prepared by E2 Inc. for United States Environmental Protection Agency. June 21, 2011.

Appendix B: Press Notice

THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 4 ANNOUNCES THE COMPLETION OF THE FOURTH FIVE-YEAR REVIEW FOR THE STANDARD AUTO BUMPER CORP. SUPERFUND SITE, HIALEAH, DADE COUNTY, FLORIDA

THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 4 ANNOUNCES THE FIRST FIVE-YEAR REVIEW FOR THE FLASH CLEANERS SUPERFUND SITE POMPANO BEACH, BROWARD COUNTY FLORIDA

THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 4 ANNOUNCES THE THIRD FIVE-YEAR REVIEW FOR THE WINGATE ROAD MUNICIPAL INCINERATOR DUMP SUPERFUND SITE FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

Sun-Sentinel
Sunday
Sept. 27 2015

Appendix C: Interview Forms

Wingate Road Municipal Incinerator Dump **Five-Year Review Interview Form**

Site Name: **Wingate Road Municipal Incinerator Dump** **EPA ID No.:** **FLD981021470**
Subject Name: **Pam Scully** **Affiliation:** **U.S. EPA**
Subject Contact Information: **scully.pam@epa.gov, 404-562-8935**
Time: 2:15 p.m. **Date: 11/02/2015**
Interview Format (circle one): **In Person** **Phone** **Mail** **Other: email**

Interview Category: **EPA Remedial Project Manager**

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

   I think the site is well maintained and monitored.

2. What have been the effects of the Site on the surrounding community, if any?

   Since closure was completed in 2003, there has been little effect on the surrounding community from the Site.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?

   Occasionally, there is a redevelopment interest, but nothing has worked out to date.

4. What is your assessment of the current performance of the remedy in place at the Site?

   The Site is fenced and well maintained by the City of Fort Lauderdale's Public Works Department. The groundwater meets federal and state standards. The remedy provides the protection intended by the ROD.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   I am comfortable with the institutional controls.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.

   No.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   No.

Site Name:	**Wingate Road Municipal Incinerator Dump**	**EPA ID No.:**	**FLD981021470**
Subject Name:	**Susan Tobin**	**Affiliation:**	**TASK Environmental, Inc.**
Date:	**01/04/16**		
Interview Format (circle one):	**In Person**	**Phone**	**Mail** **Other: email**

Interview Category: O&M Contractor

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

   The project has been well managed and successfully cleaned up. The site is well maintained and available for reuse.

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

   The current remedy is performing as designed and is protective of human health and the environment. Concentrations of COCs in the groundwater and surface water have diminished and are below site cleanup goals. The landfill cap provides an effective barrier to eliminate human contact with incinerator ash and minimizes infiltration of stormwater.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

   COCs in the groundwater and surface water are below site cleanup goals and have remained below goals for two years. Sediment and fish tissue quality are stable, as anticipated with the selected remedy for Rock Pit Lake.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

   O&M activities include mowing, maintenance of the fence, inspection of the cap and stormwater management system, and management of burrowing owls. City staff conduct O&M activities on a monthly basis and prepare monthly inspection reports. Groundwater is sampled annually. Fish tissue and sediment samples are collected every two years by TASK Environmental, Inc.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

   Since startup, surface water quality goals for the stormwater pond and Rock Pit Lake were achieved and we are no longer sampling surface water. Groundwater quality has improved and the frequency of monitoring and constituent list has declined in response to quality improvements. The frequency of fish tissue and Rock Pit Lake sediment sampling has declined in response to demonstrated stability of monitoring data. Landfill gas monitoring was discontinued because landfill gas was not detected in any of the gas monitoring wells. These changes do not affect the effectiveness of the remedy.

6. Have there been unexpected O&M difficulties or costs at the Site since startup or in the last five years? If so, please provide details.

   Burrowing owls have taken up residence on the property, and had moved onto the top of the landfill during the previous FYR. However, city staff have successfully managed to maintain the owl population in an area that is not on the landfill cap.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

   The reduction in sample frequency and analytical parameters has represented a significant savings for the City.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

   The COCs in the groundwater have diminished significantly in concentration and there have not been any exceedances in the cleanup goals in several years. The groundwater monitoring should cease, and all groundwater monitoring wells and gas monitoring wells should be plugged and surface casings removed. Since the fish tissue and sediment samples from Rock Pit Lake demonstrate no increases in COC concentrations, further sampling and analysis of these media should also cease. The City should continue to inspect the Site and fence on a monthly basis, and prepare inspection reports through the next FYR.

Site Name:	**Wingate Road Municipal Incinerator Dump**	**EPA ID No.:**	**FLD981021470**
Subject Name:	**Todd Hiteshew**	**Affiliation:**	**City of Fort Lauderdale**
Subject Contact Information:			
Date:	**12/03/15**		
Interview Format (circle one):	**In Person**	**Phone**	**Mail** **Other: email**

Interview Category: **O&M Contractor**

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

   My overall impression of the project is the remedy continues to be effective; any O&M issues are quickly identified and resolved. The Site continues to be maintained effectively to ensure the remedy is still performing.

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

   My assessment is the remedy is still currently performing as needed.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

   Groundwater data demonstrate that all groundwater contaminant levels have declined to levels below ROD cleanup goals. Contaminant concentrations in sediment and fish tissue from Rock Pit Lake are stable, with a decrease in concentrations in sediment samples.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

   Yes, the Site is inspected monthly with an inspection report completed by an environmental inspector. Any issues identified at time of inspection or on an as-needed basis are handled by the environmental inspector. The grounds as well as any fence repairs are managed by a contract with our Parks and Recreation Department.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since startup or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

   No changes.

6. Have there been unexpected O&M difficulties or costs at the Site since startup or in the last five years? If so, please provide details.

   No unexpected difficulties related to O&M at the Site. Typically, O&M is just grounds maintenance and fence repairs.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

   No opportunities to optimize O&M activities or sampling effort. I feel current O&M activities are currently optimal for current site conditions.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

   None at this time. We will request to reduce the monitoring even further as was requested and granted from the last FYR.

Site Name:	**Wingate Road Municipal Incinerator Dump**	**EPA ID No.:**	**FLD981021470**
Subject Name:	**Todd Hiteshew**	**Affiliation:**	**City of Fort Lauderdale**
Date:	**12/03/15**		
Interview Format (circle one):	**In Person**	**Phone**	**Mail** **Other: email**

Interview Category: Potentially Responsible Parties (PRPs)

1. What is your overall impression of the remedial activities at the Site?

   My overall impression is positive as the remedy is currently working as designed.

2. What have been the effects of the Site on the surrounding community, if any?

   I have not been made aware of any positive or negative effects from the surrounding community about the Site from the time of the last FYR.

3. What is your assessment of the current performance of the remedy in place at the Site?

   Positive assessment as the remedy is working as designed.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

   I am not aware of any complaints.

5. Do you feel well informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   I feel well informed.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   None at this time.

Site Name:	**Wingate Road Municipal Incinerator Dump**	**EPA ID No.:**	**FLD981021470**
Subject Name:	**Susan Tobin**	**Affiliation:**	**TASK Environmental, Inc.**
Date:	**01/04/16**		
Interview Format (circle one):	**In Person**	**Phone**	**Mail** **Other: email**

Interview Category: Potentially Responsible Parties (PRPs)

1. What is your overall impression of the remedial activities at the Site?

   The remedial activities have been effective in reducing any risk to human health or the environment previously associated with the Site.

2. What have been the effects of the Site on the surrounding community, if any?

   Unknown.

3. What is your assessment of the current performance of the remedy in place at the Site?

   The remedy has performed as designed, eliminating the migration of contaminants to groundwater and eliminating the exposure pathway for humans and wildlife to landfilled material.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

   No.

5. Do you feel well informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   Yes.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   No.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST	
I. SITE INFORMATION	
Site name: Wingate Road Municipal Incinerator Dump	**Date of inspection: 09/23/2015**
Location and Region: Fort Lauderdale, FL; Region 4	**EPA ID: FLD981021470**
Agency, office, or company leading the five-year review: EPA Region 4	**Weather/temperature: Upper 80's, Mostly Cloudy then rain and thunderstorms**
Remedy Includes: (Check all that apply) ☒ Landfill cover/containment ☒ Access controls ☒ Institutional controls ☐ Groundwater pump and treatment ☐ Surface water collection and treatment ☐ Other _____	☒ Monitored natural attenuation ☐ Groundwater containment ☐ Vertical barrier walls
Attachments: ☒ Inspection team roster attached	☐ Site map attached
II. INTERVIEWS (Check all that apply)	
1. **O&M site manager** Todd Hiteshew (Name) Environmental Services Manager (Title) Interviewed ☐ at site ☐ at office ☒ by email email: thiteshew@fortlauderdale.gov Problems, suggestions; ☐ Report attached _____	
2. **O&M staff** Name Title Interviewed ☐ at site ☐ at office ☐ by email email: Problems, suggestions; ☐ Report attached _____	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.). Fill in all that apply.

Agency Contact	Name	Employee Title	Date	Phone No.
Problems; suggestions; ☐ Report attached				
Agency _____ Contact	_____ Name	_____ Title	_____ Date	_____ Phone No.
Problems; suggestions; ☐ Report attached _____				
Agency _____ Contact	_____ Name	_____ Title	_____ Date	_____ Phone No.
Problems; suggestions; ☐ Report attached				
Agency _____ Contact	_____ Name	_____ Title	_____ Date	_____ Phone No.
Problems; suggestions; ☐ Report attached				
Agency _____ Contact	_____ Name	_____ Title	_____ Date	_____ Phone No.
Problems; suggestions; ☐ Report attached				

4. **Other interviews** (optional) ☐ Report attached

EPA Region 4: RPM Pam Scully, 404-562-8935

O&M Contractor: Susan Tobin, 352-383-0717, susant@taskenvironmental.com

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

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

Remarks: _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks:			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			

IV. O&M COSTS

1.	**O&M Organization**		
	☐ State in-house	☐ Contractor for State	
	☐ PRP in-house	☐ Contractor for PRP	
	☐ Federal Facility in-house	☐ Contractor for Federal Facility	
	☒ City of Fort Lauderdale		

2. **O&M Cost Records-**

☐ Readily available ☒ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate $/year ☐ Breakdown attached

Total annual cost by year for review period if available

From Date	To Date	$ Total cost	☐ Breakdown attached
From Date	To Date	$ Total cost	☐ Breakdown attached
From Date	To Date	$ Total cost	☐ Breakdown attached
From Date	To Date	$ Total cost	☐ Breakdown attached
From Date	To Date	$ Total cost	☐ Breakdown attached

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

Describe costs and reasons: None

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

A. Fencing

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

Remarks: One area of cut fencing along northern boundary of Rock Pit Lake.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: Signage all along fence line on all sides.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

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

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

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

Frequency Monthly

Responsible party/agency Broward County

Contact	Todd Hiteshew	Environmental Services Manager	09/23/2015	954-828-7807
	Name	Title	Date	Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks:

D. General

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

Remarks: Very little damage to one area of fence, which was cut.

2. **Land use changes on site** ☒ N/A

Remarks:

3. **Land use changes off site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

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

Remarks:

B. Other Site Conditions

Remarks:

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

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

Arial extent _____ Depth _____

Remarks: _____

2.	**Cracks**	☐ Location shown on site map	☒ Cracking not evident
	Lengths _____	Widths _____	Depths _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☒ Erosion not evident
	Arial extent _____		Depth _____
	Remarks:		
4.	**Holes**	☐ Location shown on site map	☒ Holes not evident
	Arial extent _____		Depth _____
	Remarks: Burrowing owls present in area off to the south of the landfill cap. No owls observed on the cap.		
5.	**Vegetative Cover**	☒ Grass	☒ Cover properly established
	☒ No signs of stress	☐ Trees/Shrubs (indicate size and locations on a diagram)	
	Remarks:		
6.	**Alternative Cover** (armored rock, concrete, etc.)		☒ N/A
	Remarks:		
7.	**Bulges**	☐ Location shown on site map	☒ Bulges not evident
	Arial extent _____		Height _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent _____
	☐ Ponding	☐ Location shown on site map	Arial extent _____
	☐ Seeps	☐ Location shown on site map	Arial extent _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent _____
	Remarks: No wet areas on landfill surface. Drainage system working properly.		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☒ No evidence of slope instability		
	Arial extent _____		
	Remarks: _____		
B. Benches		☒ Applicable	☐ N/A
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☒ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☒ N/A or okay
	Remarks: _____		

3. **Bench Overtopped** ☐ Location shown on site map ☒ N/A or okay

Remarks: _____

C. Letdown Channels ☒ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ No evidence of settlement

Arial extent _____ Depth _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☒ No evidence of degradation

Material type_____ Arial extent _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ No evidence of erosion

Arial extent _____ Depth _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☒ No evidence of undercutting

Arial extent _____ Depth _____

Remarks: _____

5. **Obstructions** Type _____ ☒ No obstructions

☐ Location shown on site map Arial extent _____

Size _____

Remarks: _____

6. **Excessive Vegetative Growth** Type _____

☒ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Arial extent _____

Remarks: _____

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☒ Active ☐ Passive

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

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

Remarks: _____

2. **Gas Monitoring Probes**

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

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

Remarks: No longer monitors gas due to low levels.

3. **Monitoring Wells** (within surface area of landfill)

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

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

Remarks: _____

4. **Extraction Wells Leachate**

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

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A

Remarks: _____

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

Remarks: _____

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

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks: _____

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

☐ Good condition ☐ Needs Maintenance

Remarks: _____

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

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☒ Applicable ☐ N/A

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

Remarks: _____

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

Remarks: _____

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

1. **Siltation** Area extent _____ Depth _____ ☒ N/A

☐ Siltation not evident

Remarks: _____

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

☒ Erosion not evident

Remarks: _____

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

Remarks: _____

4. **Dam** ☐ Functioning ☒ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

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

Horizontal displacement _____ Vertical displacement _____

Rotational displacement _____

Remarks: _____

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

Remarks: _____

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

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

Area extent _____ Depth _____

Remarks: _____

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

☒ Vegetation does not impede flow

Area extent _____ Type _____

Remarks: There is some vegetative growth in ditch, but does not appear to impede flow.

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

Area extent _____ Depth _____

Remarks: _____

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

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

Area extent _____ Depth _____

Remarks: _____

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

☐ Performance not monitored

Frequency _____ ☐ Evidence of breaching

Head differential _____

Remarks: _____

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

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

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

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

Remarks: _____

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

☐ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

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

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

☐ Good condition ☐ Needs Maintenance

Remarks: _____

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

☐ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

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

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters _____

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

☐ Others _____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually _____

☐ Quantity of surface water treated annually _____

Remarks: _____

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

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks: _____

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

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

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemicals and equipment properly stored

Remarks: _____

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

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

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

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☐ Is routinely submitted on time ☐ Is of acceptable quality

2. **Monitoring data suggests:**

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks:

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy is effective and functioning as intended by decision documents to reduce the risks associated with exposure to contaminated media to health-based levels and to protect the surficial aquifer system beyond the current site boundary.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. Monthly site inspections and routine maintenance ensure the Site is well maintained.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The EPA, FDEP and PRPs are in discussions to reduce monitoring frequency and possibly close out the groundwater monitoring program and abandon unnecessary wells.

Site Inspection Team:

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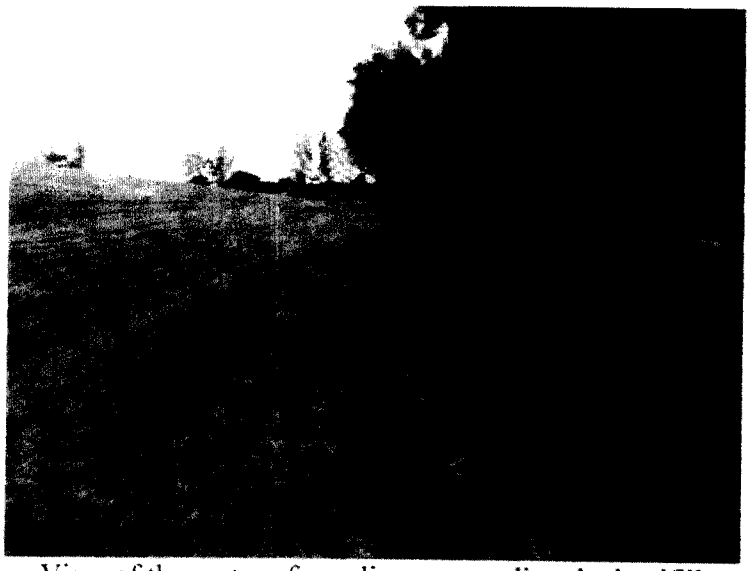
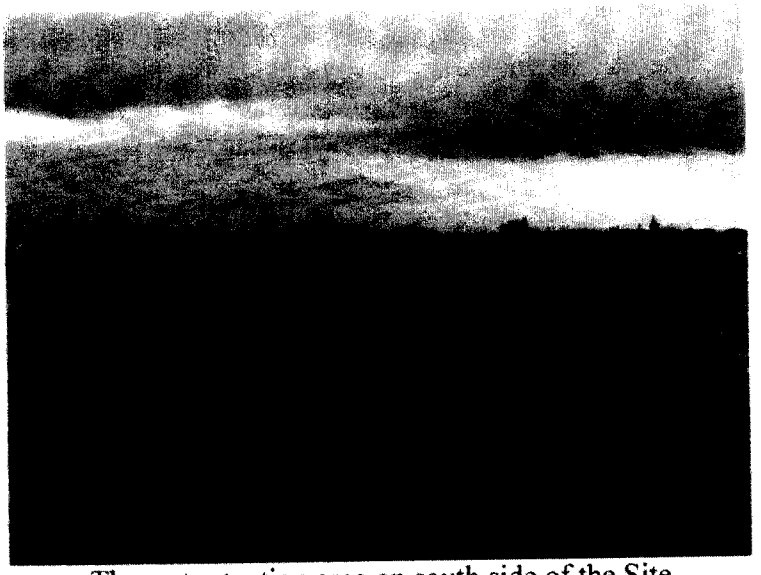
Appendix E: Photographs from Site Inspection Visit

A well-marked and locked methane gas monitoring well

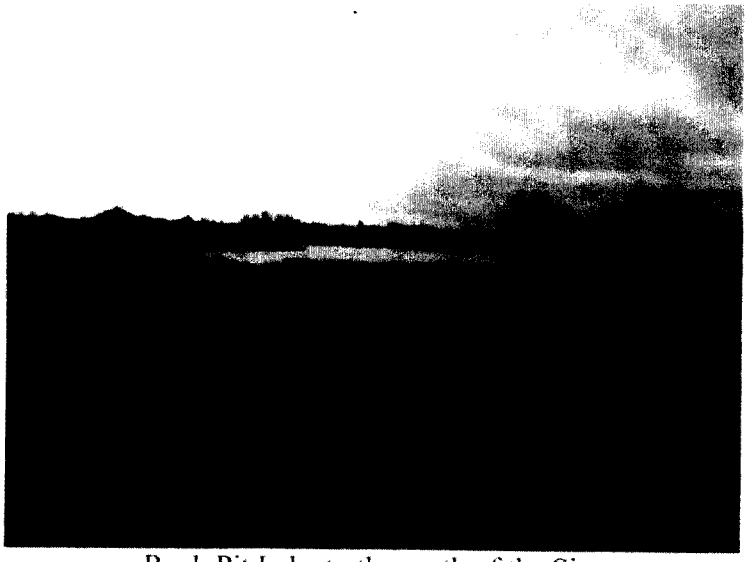


View of the eastern fence line surrounding the landfill

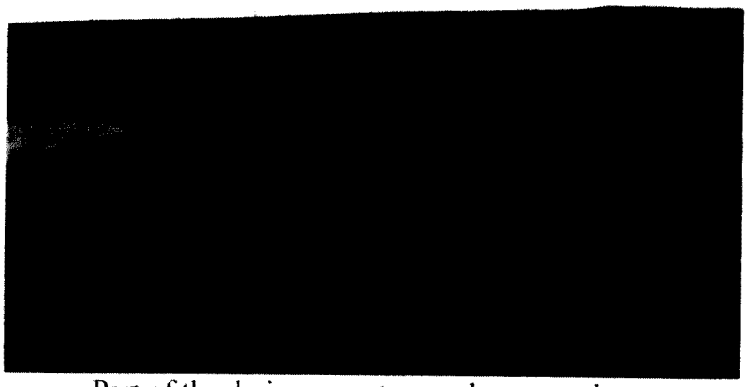
Locked rear entrance gate



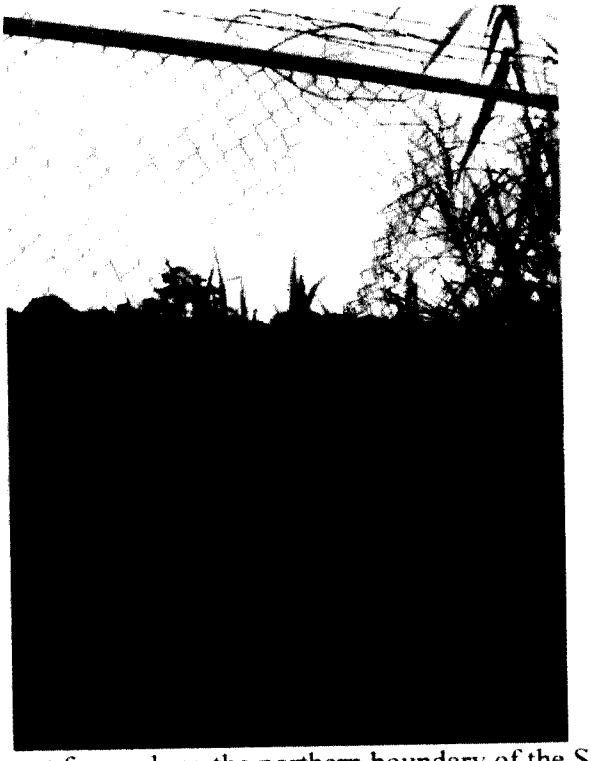
The wet retention area on south side of the Site



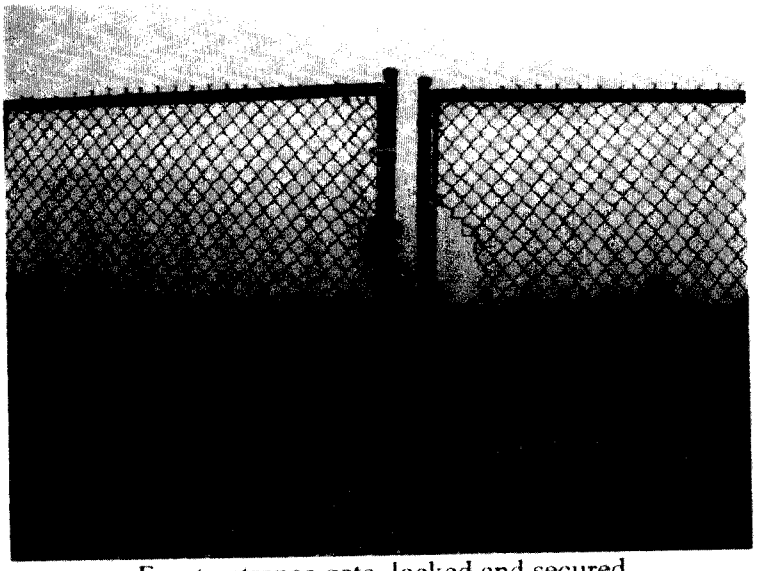
Rock Pit Lake to the north of the Site



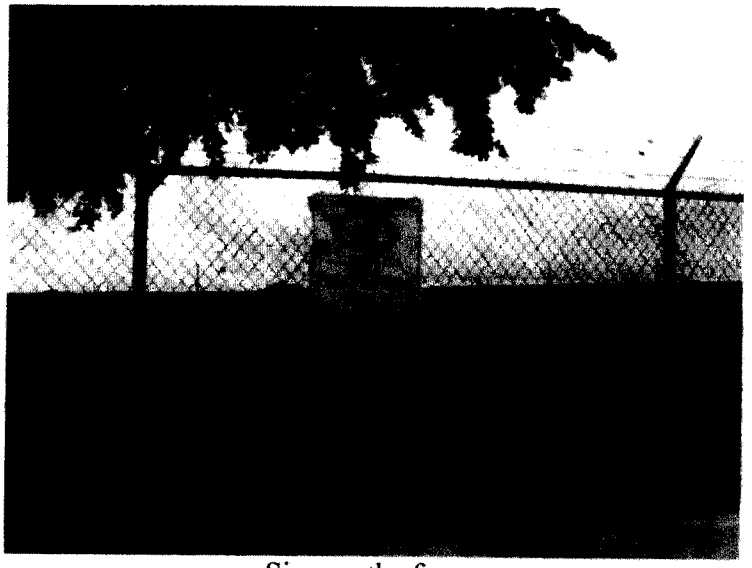
Part of the drainage system and vegetated cap



The cut fence along the northern boundary of the Site



Front entrance gate, locked and secured



Sign on the fence

Appendix F: Data Review

Table F-1: Summary of Historical Dioxin Fish Data (ng/kg)

Parameter/ Sample No. Date	Bass Fillet RP-FTS-02 Dec-92	Large Bass Fillet RP-FTS-07 Dec-92	Medium Bass Fillet RP-FTS-08 Dec-92	Bass Fillet RP-FTS-10 Dec-92	WIN-RPL-BASS-COMP Aug-02	WIN-RPL- BASS-1 Mar-03	WIN-RPL- BASS-2 Mar-03	WIN-RPL- BASS-3 Mar-03	WIN-RPL-TOPWATER-1 Nov-03	WIN-RPL-FTS Nov-08	WIN-RPL-FTS Nov-09	WIN-RPL-FTS Nov-10	WN RPL-FT-1 Aug-13	WN RPL-FT-1 Sep-15
2,3,7,8-TCDF	0.61	0.27	0.59	0.58	ND	0.52	1.7	ND	0.45	0.57	1.7	1.5	1.1	1.2
total TCDF	0.61	0.27	0.59	0.58	ND	0.52	2.9	1.0	0.45	0.57	1.7	1.5	1.7	1.2
1,2,3,7,8-PeCDF	ND	ND	ND	ND	ND	ND	ND	2.0	1.1 E	ND	ND	ND	0.083 EIJ	0.18
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.12	0.32 E
total PeCDF	ND	ND	ND	ND	ND	ND	ND	2.0	ND	ND	ND	ND	0.46 J	0.18
1,2,3,4,7,8-HxCDF	ND	ND	ND	ND	1.3 E	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,6,7,8-HxCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.9 E	ND	ND	ND	ND
total HxCDF	ND	ND	ND	ND	ND	ND	ND	6.2	ND	1.9 E	ND	ND	ND	0.18
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	0.22 E
total HpCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.200 J	ND
1,2,3,4,6,7,8-HpCDD	1.3 E, B	1.3 E, B	ND	1.2 E	ND	1.5 J	1.1 J	1.3 J	ND	ND	ND	ND	0.200 J	0.23E
total HpCDD	1.3	2.3	ND	2.6	ND	1.5	1.1	1.3 J	ND	ND	ND	ND	0.350 J	ND
OCDF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.150 J	ND
OCDD	22.2 E, B	19.2 B	18.5 B	23.5 B	ND	21 B	8.1 B, J	12 B	2.7 BJ	ND	ND	ND	0.770 EIJ	0.79 E

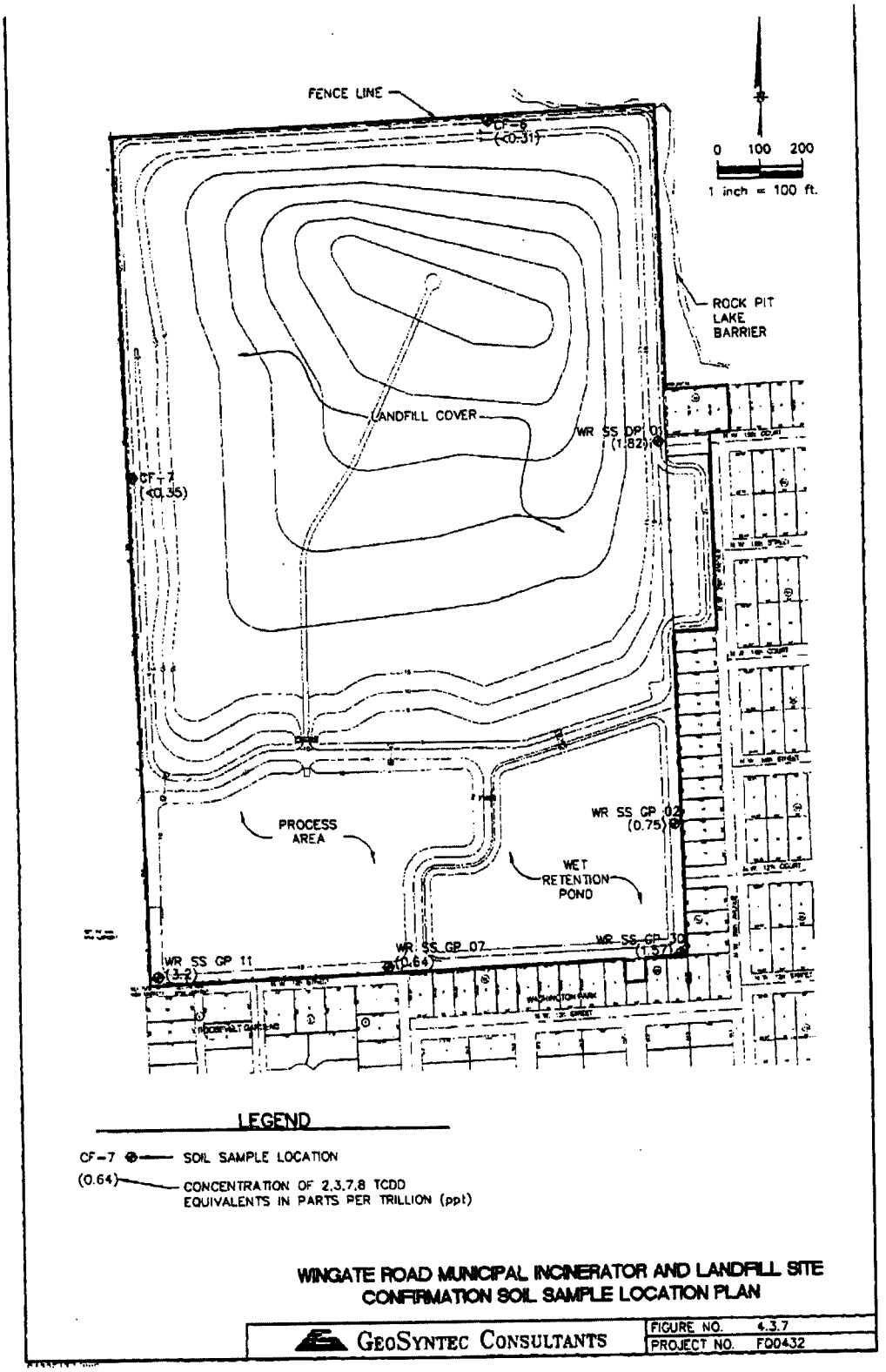
B = less than 10 times higher than method blank level
J = estimated value
E = estimated maximum possible concentration
I = interference present
ND = non-detect
NA = not applicable
ng/kg = nanogram per kilogram

Table F-2: Summary of Total Dioxin Toxicity Equivalence (TEQ) in Fish Tissue (ng/kg)

Bass Fillet RP-FTS-02 Dec-92 TEQ	Large Bass Fillet RP-FTS-07 Dec-92 TEQ	Medium Bass Fillet RP-FTS-08 Dec-92 TEQ	Bass Fillet RP-FTS-10 Dec-92 TEQ	WIN-RPL-BASS-COMP Aug-02 TEQ	WIN-PL-BASS-1 Mar-03 TEQ	WIN-RPL-BASS-2 Mar-03 TEQ	WIN-RPL-BASS-3 Mar-03 TEQ	WIN-RPL-TOPWATER-1 Nov-03 TEQ	WIN-RPL-FTS Nov-08 TEQ	WIN-RPL-FTS Nov-09 TEQ	WIN-RPL-FTS Nov-10 TEQ	WN RPL-FT-1 Aug-13 TEQ	WN FT-1 Sep-15 TEQ
Including B qualified data													
0.08066	0.05576	0.06455	0.09105	0.13	0.0733	0.30343	0.7966	0.07881	0.247	0.17	0.15	0.189576	0.167937
Excluding B qualified data													
0.061	0.037	0.059	0.084	0.13	0.067	0.301	0.793	0.078	0.247	0.17	0.15	0.189576	0.167937

TEQ concentrations calculated by multiplying each dioxin compound by its corresponding TEFs established by the World Health Organization in 2005 and summing the TEQ for each sample as follows:
total TCDF x TEF of 0.1
total PeCDF x TEF of 0.03
total HxCDF x TEF of 0.1
total HpCDF x TEF of 0.01
total HpCDD x TEF of 0.01
total OCDF x TEF of 0.0003
total OCDD x TEF of 0.0003
ng/kg = nanograms per kilogram

Figure F-1: Soil Confirmation Sampling[6]



[6] Remedial Action Report for Wingate Road Municipal Incinerator and Landfill Site. June 2003.

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Five-Year Review Report

Second Five-Year Review Report
for
Trans Circuits, Inc.
FLD091471904

Lake Park
Palm Beach County, Florida

September 2012

Prepared By:
Skeo Solutions
921 Second Street SE
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For:
United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

for Franklin E. Hill
Director, Superfund Division

Date: 9/19/12

10903452

Second Five-Year Review Report
for
Trans Circuits, Inc.
210 Newman Road
Lake Park
Palm Beach County, Florida

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
BaP	Benzo(a)pyrene
BaP-TE	Benzo(a)pyrene Toxicity Equivalent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
DCE	Dichloroethylene
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
ESI	Expanded Site Investigation
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDER	Florida Department of Environmental Regulation
FDOH	Florida Department of Health
FYR	Five-Year Review
GCTL	Ground Water Cleanup Target Level
IC	Institutional Control
J&E	Johnson & Ettinger
MAGS	Modified Active Gas Sampling
MCL	Maximum Contaminant Level
MOA	Memorandum of Agreement
µg/L	Micrograms per Liter
$\mu g/m^3$	Micrograms per Cubic Meter
mg/kg	Milligrams per Kilogram
NADC	Natural Attenuation Default Concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	Operable Unit
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PBCHD	Palm Beach County Health Department
PCE	Tetrachloroethene
PHA	Public Health Assessment
PPA	Prospective Purchaser Agreement
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SCTL	Soil Cleanup Target Level
TBC	To-Be-Considered

TCE	Trichloroethylene
VOC	Volatile Organic Compound
UU/UE	Unlimited Use and Unrestricted Exposure

Executive Summary

Introduction

The Trans Circuits, Inc. Superfund site (the Site) is located at 210 Newman Road in the southwestern quadrant of Lake Park, Palm Beach County, Florida. The Site is less than 1 acre in size and has one operable unit (OU). The Site is partially paved and includes a 21,000-square-foot building. The Site is the location of a former circuit board manufacturing and plating facility that operated from 1978 to 1985. The facility's operations contaminated site soil and ground water. Soil contaminants include polycyclic aromatic hydrocarbons (PAHs) and arsenic. Ground water contaminants include tetrachloroethene (PCE), trichloroethene (TCE), fluoride, nickel and polycyclic aromatic hydrocarbons (PAHs). The United States Environmental Protection Agency (EPA) addressed soil contamination with a removal action in 2004. The site's in-situ bioremediation ground water remedy is currently in the construction phase. EPA placed the Site on the National Priorities List (NPL) in 2000.

The Site is Protective for People Under Current Conditions, according to criteria for the EPA cross-program revitalization measure, and exposure to contamination is under control. The Site property has been recently purchased by Florida Aero Precision, a machine shop for aircraft engines and gas turbine parts, and a subsidiary of Meyer Tool in Cincinnati, Ohio. The triggering action for this Five-Year Review (FYR) was the signing of the previous FYR on September 19, 2007.

Remedial Action Objectives

The remedial action objectives (RAOs) established to address human health concerns for the Site were:

- Reducing the risk to human health from soil contamination to within EPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$ and a maximum individual contaminant Hazard Index of less than or equal to one.
- Restoring ground water to maximum contaminant levels (MCLs) or within EPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$ and a maximum individual contaminant Hazard Index of less than or equal to one.

The first RAO was achieved through the excavation and off-site disposal of contaminated soils. The second RAO has yet to be achieved. EPA is in process of constructing the remedy for site ground water.

The remedy selected in the Site's 2001 Record of Decision (ROD) included:

- Funding to the City of Riviera Beach for the operation and maintenance (O&M) of air stripper towers in the water treatment plant until the plume is isolated from the well field by relocation of municipal well PW-17.
- Construction of a new municipal well outside of the contaminated plume area and abandoning municipal well PW-17.
- Performance of in-situ chemical oxidation of the plume via the injection of potassium permanganate, hydrogen peroxide, ozone or a combination thereof through injection

wells in the surficial aquifer.

- Natural attenuation of fluoride and nickel, if not addressed by oxidation.
- Verification that the property owner maintains institutional controls to prohibit residential development of the Site and to prohibit installation of potable wells until ground water remedial goals are met.
- Excavation and disposal off site of approximately seven cubic yards of PAH-contaminated soils to satisfy Florida Department of Environmental Protection (FDEP) concerns regarding industrial exposure to soils.

EPA modified the remedy in the Site's 2010 Explanation of Significant Differences (ESD) to include:

- Meeting standards for unrestricted use and unlimited exposure (UU/UE), which will allow for no institutional control requirements related to soil contamination. (If UU/UE cannot be achieved, institutional controls are necessary to restrict future use of the site to industrial or commercial uses.)
- Conducting sampling in the area that previously showed PAH exceedances for industrial cleanup standards. If confirmed, conduct additional soil excavation to achieve the residential cleanup standard of 0.1 milligram per kilogram (mg/kg) of benzo(a)pyrene to allow for UU/UE.
- Clarifying that future potable well construction is being restricted through the recently signed Memorandum of Agreement (MOA) between EPA and the South Florida Water Management District until ground water cleanup goals are met.
- Conducting in-situ bioremediation instead of in-situ chemical oxidation for ground water remediation.

Technical Assessment

The review of documents, Applicable or Relevant and Appropriate Requirements (ARARs), risk assumptions and the site inspection indicate that the Site's remedy is being constructed in accordance with the requirements of the decision documents and is expected to be protective once it is completed.

The 2001 ROD contained soil cleanup goals based on industrial use. In 2004, EPA completed the excavation of onsite soil to attain industrial cleanup standards. In 2010 EPA issued an ESD which called for additional soil sampling in areas that previously showed exceedances of residential cleanup standards and excavation of the contaminated soil if necessary to meet UU/UE criteria. If residential cleanup standards are unable to be achieved, institutional controls will be necessary to restrict future use of the Site. The ground water pilot study was completed in 2009, during the Remedial Design (RD) and EPA is working to fully implement the selected ground water remedy in 2012.

EPA is in the process of evaluating the vapor intrusion pathway. Vapor intrusion evaluations rely upon multiple lines of evidence to make decisions. For the Trans Circuits vapor intrusion evaluation, there are multiple but conflicting lines of evidence. Using recently updated volatile organic compound (VOC) toxicity values, the soil gas samples collected in 2009 in a small room in the southern portion of the building show an unacceptable risk but the soil and ground water

samples collected in 2012 indicate an acceptable risk. Therefore additional evaluation is needed to resolve these conflicting lines of evidence.

Seven private wells were identified in the 2000 Public Health Assessment (PHA). These wells were sampled in 2000 and again in 2002. Analytical results showed that ground water from these wells did not contain site-related chemicals or other contaminants at levels of concern. In 2012, only three of these wells continue to be used. These three wells are located over a half mile from the Site in the opposite direction of the ground water flow and not within the boundary of the Site's contaminant plume. In August 2012, the Palm Beach County Health Department (PBCHD) initiated another well survey in the area around the Site to ensure the Site continues not to impact any private wells. Private wells identified in the survey will be sampled.

Conclusion

The remedy at the Site is expected to be protective of human health and the environment upon full scale implementation. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The soil remedy implemented to date is protective of the industrial use currently supported by the Site and an MOA is in place restricting use of ground water. The vapor intrusion pathway is being further evaluated to resolve the conflicting results from previous sampling events and to take into account the changes in building configuration and new VOC toxicity values which were updated in May 2012.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Trans Circuits, Inc.		
EPA ID: FLD091471904		
Region: 4	**State:** FL	**City/County:** Lake Park/Palm Beach
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name:**		
Author name: Treat Suomi and Kirby Webster (Reviewed by EPA)		
Author affiliation: EPA Contractor		
Review period: October 2011 – September 2012		
Date of site inspection: January 25, 2012		
Type of review: Statutory		
Review number: 2		
Triggering action date: September 19, 2007		
Due date *(five years after triggering action date)*: September 19, 2012		

Five-Year Review Summary Form (continued)

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU1	Issue Category: Changed Site Conditions			
	Issue: The vapor intrusion pathway needs to be further evaluated due to conflicting lines of evidence and a change in the use of the building.			
	Recommendation: Conduct another sampling event in the room in question. Reevaluate the vapor intrusion based on these sample results.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA/State	09/18/2014

Protectiveness Statement(s)

Operable Unit: OU1	*Protectiveness Determination:* Will be Protective	*Addendum Due Date (if applicable):* Click here to enter date.

Protectiveness Statement:
The remedy at the Site is expected to be protective of human health and the environment upon full scale implementation. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The soil remedy implemented to date is protective of the industrial use currently supported by the Site and an MOA is in place restricting use of ground water. The vapor intrusion pathway is being further evaluated to resolve the conflicting results from previous sampling events and to take into account the changes in building configuration and new VOC toxicity values which were updated in May 2012.

Five-Year Review Summary Form (continued)

Environmental Indicators
- Current human exposures at the Site are under control.

Are Necessary Institutional Controls in Place?
Yes. It is not expected that additional institutional controls will be necessary.

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

Has site been put into reuse?
☒ Yes ☐ No

Second Five-Year Review Report
for
Trans Circuits, Inc. Superfund Site

1.0 Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings and conclusions of FYRs are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

> "If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action."

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Trans Circuits, Inc. Superfund site (the Site) in Lake Park, Palm Beach County, Florida. This FYR was conducted from October 2011 to September 2012. EPA is the lead agency for developing and implementing the remedy for the Superfund-financed cleanup at the Site. The Florida Department of Environmental Protection (FDEP), as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the second FYR for the Site. The triggering action for this statutory review is the previous FYR, signed in September 2007. The FYR is required due to the fact that hazardous substances, pollutants or contaminants currently remain at the Site above levels that allow for unlimited use

and unrestricted exposure. The Site consists of one operable unit (OU), which is addressed in this FYR.

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
Initial discovery of contamination	July 1, 1979
State fund-financed site-wide preliminary assessment completed	October 1, 1984
Well PW-17 taken out of service	1984
Trans Circuits, Inc. discontinues operations	1985
Air strippers installed for PW-17; well put back into service	1988
Air strippers taken offline due to lack of funding	1990
State fund-financed site-wide site inspection completed	September 26, 1991
EPA fund-financed site-wide expanded site inspection/remedial investigation begins	February 27, 1997
Combined remedial investigation/feasibility study (RI/FS) started	September 30, 1998
EPA fund-financed site-wide expanded site inspection/remedial investigation completed	October 30, 1998
EPA fund-financed Hazard Ranking Package completed	December 3, 1998
EPA federal enforcement potentially responsible party (PRP) search started	July 27, 1999
Site proposed to National Priorities List (NPL)	October 22, 1999
Federal enforcement notice letters issued by EPA	January 25, 2000
Site listed on NPL	February 4, 2000
Prospective purchaser agreement assessment started	March 10, 2000
Prospective purchaser agreement assessment completed by EPA; Administrative Order on Consent issued by EPA	July 11, 2000
Public Health Assessment (PHA) completed	November 19, 2000
Combined RI/FS completed	November 28, 2000
Federal enforcement PRP search completed by EPA	December 1, 2000
Record of Decision (ROD) signed by EPA	April 12, 2001
Remedial design phase 1[1] begins	January 18, 2002
Remedial design phase 2[2] begins	February 7, 2002
Remedial design phase 3[3] begins; Remedial design 3 completed; Remedial action phase 1 begins	September 26, 2002
EPA funding of city air strippers begins	October 2002
Remedial design phase 1 completed	September 12, 2003
EPA Superfund-financed removal started	September 29, 2003
Remedial action phase 2 begins	September 30, 2003
EPA funding of city air strippers ends	January 2006
EPA Superfund-financed removal completed	March 3, 2006
Remedial action phase 1 completed	June 29, 2006
Remedial action phase 2 completed	September 25, 2006
First FYR signed by EPA	September 19, 2007
Remedial design phase 2 completed	December 17, 2009
Memorandum of Agreement (MOA) signed by EPA and the South Florida Water Management District	March 11, 2010
Explanation of Significant Difference (ESD) signed by EPA	September 29, 2010
Remedial action phase 3 begins	September 28, 2011

[1] Phase 1 refers to the funding of O&M of the City of Riviera Beach's air stripping towers.
[2] Phase 2 refers to the relocation of municipal supply well PW-17 and excavation of contaminated soil.
[3] Phase 3 refers to the final phase of the remedy which focuses primarily on the remediation of contaminated ground water.

3.0 Background

3.1 Physical Characteristics

The Site is located at 210 Newman Road in the southwestern quadrant of Lake Park, Palm Beach County, Florida, as shown in Figure 1. The Site occupies approximately 1 acre in the Tri-City Industrial Park near Silver Beach Road, as shown in Figure 2. The Site is partially asphalt-paved and includes one building, a 21,000-square-foot facility owned by Florida Aero Precision, a precision machine shop for aircraft engine and industrial gas turbine parts. The Site also includes a graded area, which was the location of the former evaporation-percolation pond north of the building and an inactive rail line extends across the northern portion of the Site.

The on-site building owned by Florida Aero Precision shares a wall with an adjacent commercial building in the industrial park owned by Royal White Cement. Occupied and vacant commercial and industrial buildings of the Tri-City Industrial Park surround the Site. A large parcel of undeveloped land is located north and west of the industrial park and a residential area is located south and east of the industrial park. Contaminated ground water from the Site has migrated to the northeast and east; the plume now lies under several neighboring industrial, commercial and residential properties. As part of a public health assessment (PHA) performed in 2000, seven nearby private wells were identified and sampled. They were sampled again in 2002. The analytical results from both sampling events showed that none of these wells contained site-related chemicals, or any other chemicals at levels of health concern. In 2012, only three of these wells continue to be used. These three wells are located over a half mile from the Site in the opposite direction of the ground water flow and not within the boundary of the Site's contaminant plume. In August 2012, the Palm Beach County Health Department initiated another well survey in the area around the Site to ensure the Site continues not to impact any private wells. Private wells identified in the survey will be sampled.

A Memorandum of Agreement (MOA) between EPA and the South Florida Water Management District was put in place in 2010 which provides the framework for restricting ground water use within the plume area and requires well surveys to be conducted every five years.

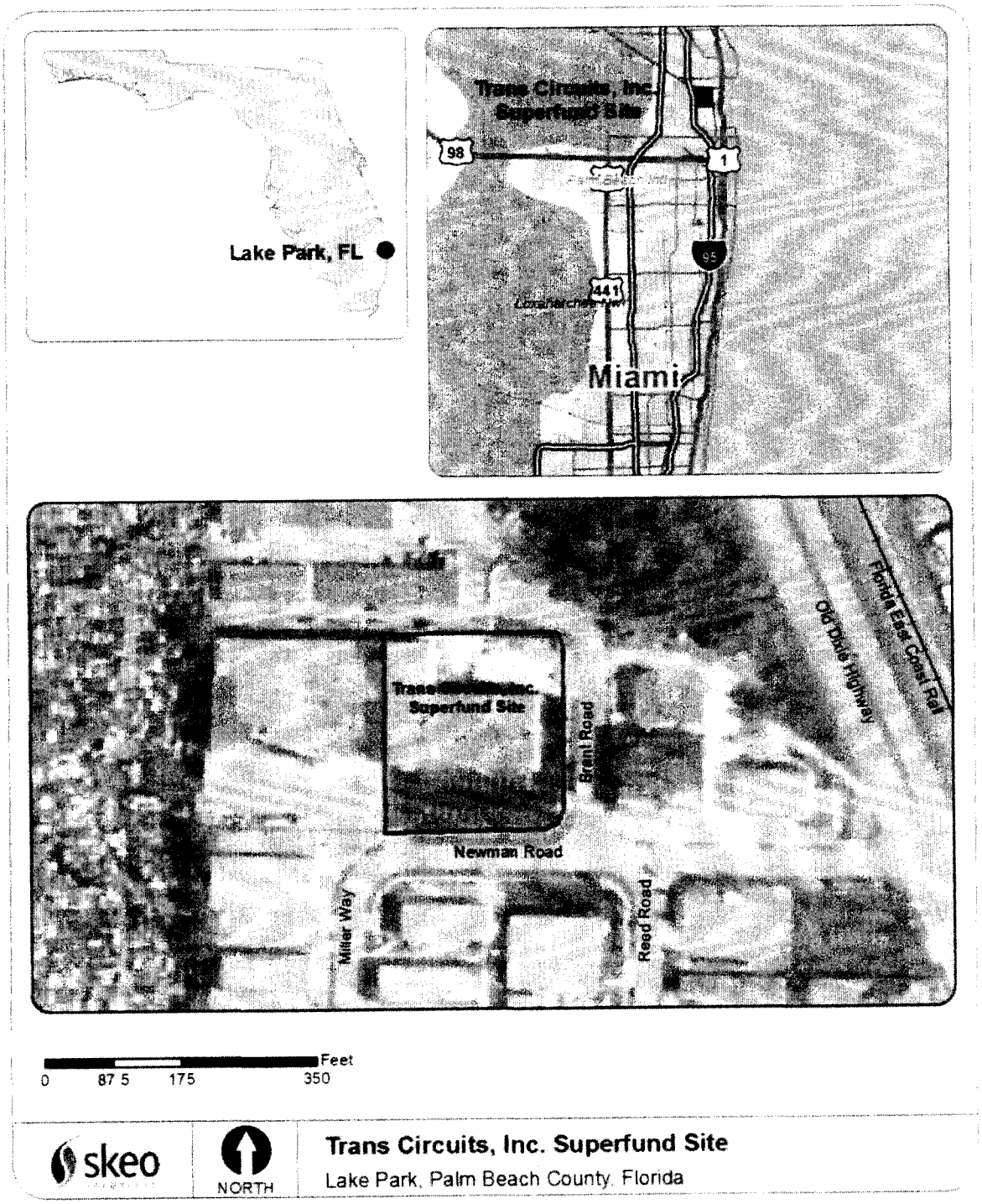
Hydrogeological investigations assessing ground water conditions in the area have identified two aquifer systems, the shallow aquifer and the Floridan Aquifer. The shallow aquifer, the sole source for potable ground water in the area, is the uppermost of the two aquifer systems. A confining unit rests between the shallow aquifer and the Floridan Aquifer. In this area, the Floridan Aquifer is brackish and not used for drinking water. The shallow aquifer is unconfined, with a thickness at the Site of approximately 250 feet.

The Site lies at the northern extremity of the Atlantic Coastal Ridge subdivision of the Southern Geomorphologic Zone of Florida. Soils on the coastal ridge are deep and excessively drained and typically consist of shelly sands.

Table 2: Site Parcel

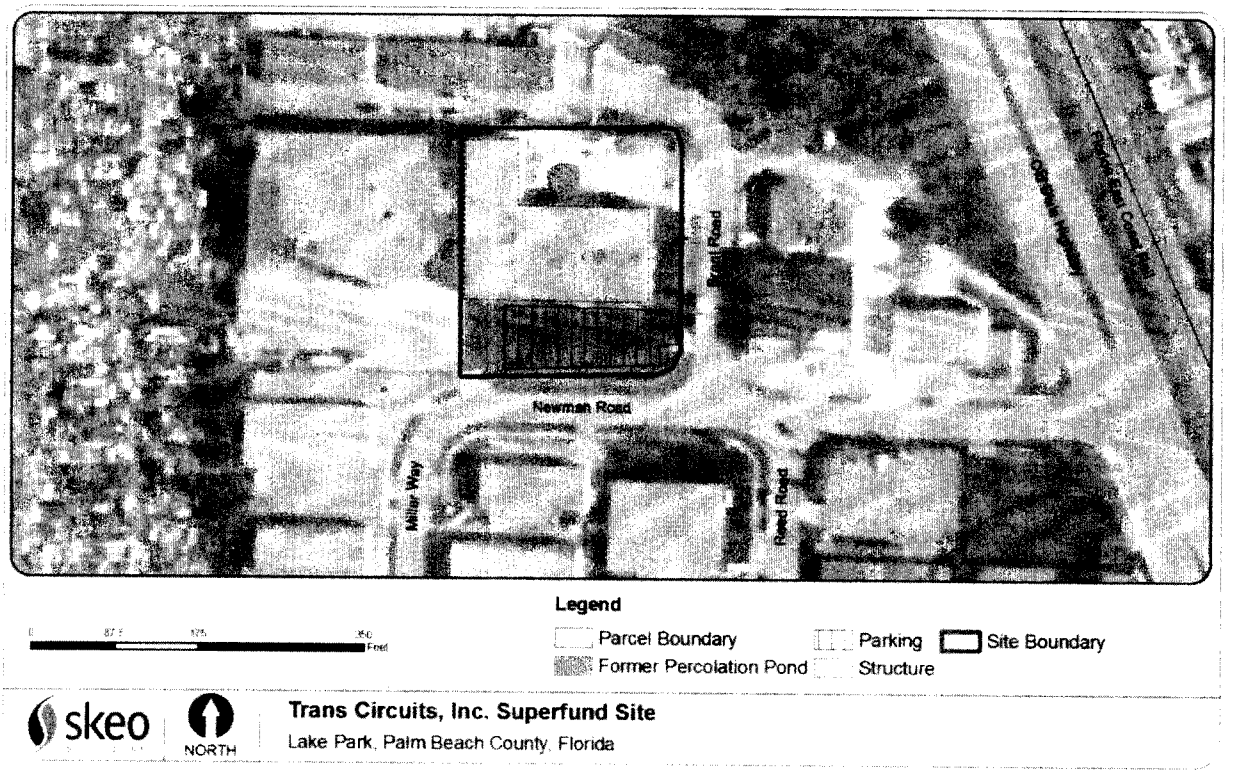
Parcel Number	Total Parcel Acres	Owner
36-43-42-20-00-000-5120	0.48	Florida Aero Precision, Inc.

Figure 1: Site Location Map



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

Figure 2: Detailed Site Map



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

3.2 Land and Resource Use

Land use in the immediate vicinity of the Site consists of a variety of commercial and light industrial facilities in the Tri-City Industrial Park, which surrounds the Site. Vacant industrial park land borders the Site to the north. To the east are several commercial facilities, including JAS Marine. To the west are several other commercial properties, and to the south are the other two buildings housing Florida Aero Precision's operations. Land uses within a mile of the Site consist primarily of commercial, industrial and residential uses.

The site property has been recently purchased by Florida Aero Precision, a precision machine shop for aircraft engine and gas turbine parts that currently bases its operations in two buildings located across the street from the Site, employing about 36 people. Florida Aero Precision has expanded onto the Site after completing interior renovations to make the building operational and expects to hire 15 additional machinists.

The Site currently meets the criteria for EPA cross-program revitalization measure Protective for People Under Current Conditions since there are no unacceptable risks to current industrial users. A local developer and EPA entered into a Prospective Purchaser Agreement (PPA) for the Site in 2000. Land use restrictions noted in the PPA are referenced in subsequent property transfer documents, including the 2004 Warranty Deed that conveyed the property to its previous corporate owner, Direct Access International. Florida Aero Precision purchased the Site in November 2011. EPA extended the PPA and Covenant Not to Sue to the new owner in November 2011.

In order to achieve the more stringent Sitewide Ready for Anticipated Use, EPA Government Performance and Results Act measure, the Site must complete construction of the remedy, have all institutional controls described in decision documents in place and all cleanup goals must be achieved for those media that may affect reasonably anticipated current and future land use such that there is no unacceptable risk associated with the Site.

Two aquifers underlie the Site. The shallow aquifer is the sole source of potable drinking water in the area. The deeper Floridan aquifer is not a potable water source in the area because it is brackish or saline. One of the applicable or relevant and appropriate requirements (ARARs) in the Site's 2001 Record of Decision (ROD) describes the surficial aquifer as a sole source aquifer that warrants a high degree of protection as a Class I source of ground water. The shallow aquifer, which is contaminated by hazardous substances attributable to operations at the Site, serves as the sole source of water for three communities. Riviera Beach operates 25 public water supply wells, Magnolia Park operates four wells and Seacoast Utilities operates 20 wells within four miles of the Site. Most of the Site's ground water contamination has migrated to the north and east, underneath nearby commercial, industrial and residential areas.

3.3 History of Contamination

Etched Products, Inc. first owned and operated an electroplating business on site from April 1976 until April 1978, when Trans Circuits, Inc. purchased the property. Trans Circuits, Inc. performed electroplating and manufactured electronic components and subassemblies for electronic circuit boards from 1978 until approximately June 1985, when its facility closed and the company dismantled its treatment systems. Operations included stripping, etching, electrolysis and electrolytic plating, and nickel and gold plating. The company used various solvents, acid-based stripping solutions and plating solutions containing lead, tin, copper, nickel, fluoride and cyanide in manufacturing processes at the facility.

Trans Circuits was listed as a Resource Conservation and Recovery Act (RCRA) large quantity generator of hazardous wastes. Trans Circuits completed a RCRA Part A Permit application on November 13, 1980. An evaporation/percolation pond with a synthetic liner constructed in 1981 originally collected and allowed evaporation of electroplating rinse water. With the installation of an industrial wastewater treatment system in September 1982, the liner was partially removed from the pond and the remaining liner punctured to allow percolation of treated wastewater to ground water. A 1982 industrial waste discharge monitoring report indicated that approximately 336,000 gallons of effluent per month were discharged to the pond at this time. Water quality of the effluent exceeded the effluent limits for copper, fluoride and lead.

The Florida Department of Environmental Regulation (FDER, now FDEP) recorded an anonymous complaint concerning storage of hazardous waste at the facility in 1983. Site investigations in response to the complaint identified visible sludge in the evaporation/percolation pond and puddles of liquid surrounding the pond perimeter. In addition, the investigations found approximately 100 large drums (55-gallon capacity) of unidentified waste in the treatment area on site.

3.4 Initial Response

In 1981, EPA sampled the City of Riviera Beach public well field for volatile organic compounds (VOCs) as part of a study of water supplies in South Florida. Results from this and subsequent sampling events indicated the presence of chlorinated hydrocarbons in seven of the 18 wells in the well field. A subsequent FDER investigation of the well field tentatively traced the contamination in one of the wells (PW-17) to the Trans Circuits, Inc. facility. Other constituents detected in the site monitoring well samples included fluoride, cadmium, chromium, copper, iron, lead, mercury and nickel.

The Riviera Beach Water Department took the PW-17 municipal well out of service in 1984 due to contamination. Trans Circuits, Inc. discontinued operations in 1985. In 1987, an air stripper treatment system was constructed on the Trans Circuits Site to reduce the levels of tetrachloroethene (PCE) and trichloroethene (TCE). The system captured, treated and redistributed more than one million gallons of ground water during its two years of operation. In 1988, the City Riviera Beach installed air stripping towers at their

water plant to treat area-wide VOC contamination in the ground water. The City of Riviera Beach still operates these large-scale air stripping towers. In 2005, EPA installed a new public supply well in an uncontaminated area for the City of Riviera Beach. The City continues to treat its water supply with the air strippers.

EPA Region 4 completed an expanded site inspection in January 1998. As part of the inspection, EPA Region 4 collected 10 surface soil, 35 subsurface soil and 35 ground water samples. Soil samples contained elevated levels of several inorganic contaminants, including lead. Subsurface soil samples collected from the former evaporation/percolation pond also contained elevated levels of lead. Ground water samples contained elevated concentrations of lead and the chlorinated hydrocarbons 1,2-dichloroethene (1,2-DCE) and TCE. Lead and TCE had been detected in the plant's discharge to the evaporation/percolation pond, and 1,2-DCE, though not detected in the effluent, is a common degradation product of PCE and TCE, both of which were detected in the effluent. Other than the Riviera Beach well (PW-17), which was closed in 1984, no other public supply wells are believed to have been affected by contamination from the Site.

EPA proposed listing the Site on the National Priorities List (NPL) in October 1999 and finalized the listing in February 2000.

3.5 Basis for Taking Action

Between 1989 and 1998, EPA and FDEP conducted several investigations at the Site. By 1998, it was determined that further action under EPA's Superfund program was necessary. Trans Circuits, Inc. did not have sufficient resources to address the contamination and EPA could not identify any other known viable potentially responsible parties (PRPs). Therefore, EPA has conducted site investigations and cleanup using federal Superfund resources.

During the site's 1999 remedial investigation/feasibility study (RI/FS), EPA undertook sampling, analysis and modeling to estimate the magnitude of potential human exposure to the chemicals of potential concern at the Site. In evaluating potential health risks, the activities considered both carcinogenic and non-carcinogenic health effects.

Of the exposure pathways analyzed for the Site's remedy, the primary pathways of concern were incidental ingestion of and dermal contact with arsenic and polycyclic aromatic hydrocarbons (PAHs) in surface soil. Contaminant concentrations were considered elevated if they: 1) were greater than two times background; 2) exceeded EPA regional risk-based concentrations; or 3) exceeded Florida soil cleanup target levels (SCTLs). For the potential exposure scenarios examined for the Site (current trespassers, future industrial workers and residential users), the Hazard Index values were greater than one and resulted in an excess lifetime risk of greater than 1×10^{-4}.

EPA conducted an ecological risk assessment for the Site in 1999. The PAHs detected in site surface soils were the most ubiquitous of the Site's contaminants of potential

concern. However, PAHs were not generated by the former manufacturing operation on site. Chromium was higher than screening levels in all surface soil samples. Since most of the Site is paved or occupied by a building, there is very little terrestrial habitat available on the Site. Accordingly, there is minimal risk of exposure to site soils by ecological receptors.

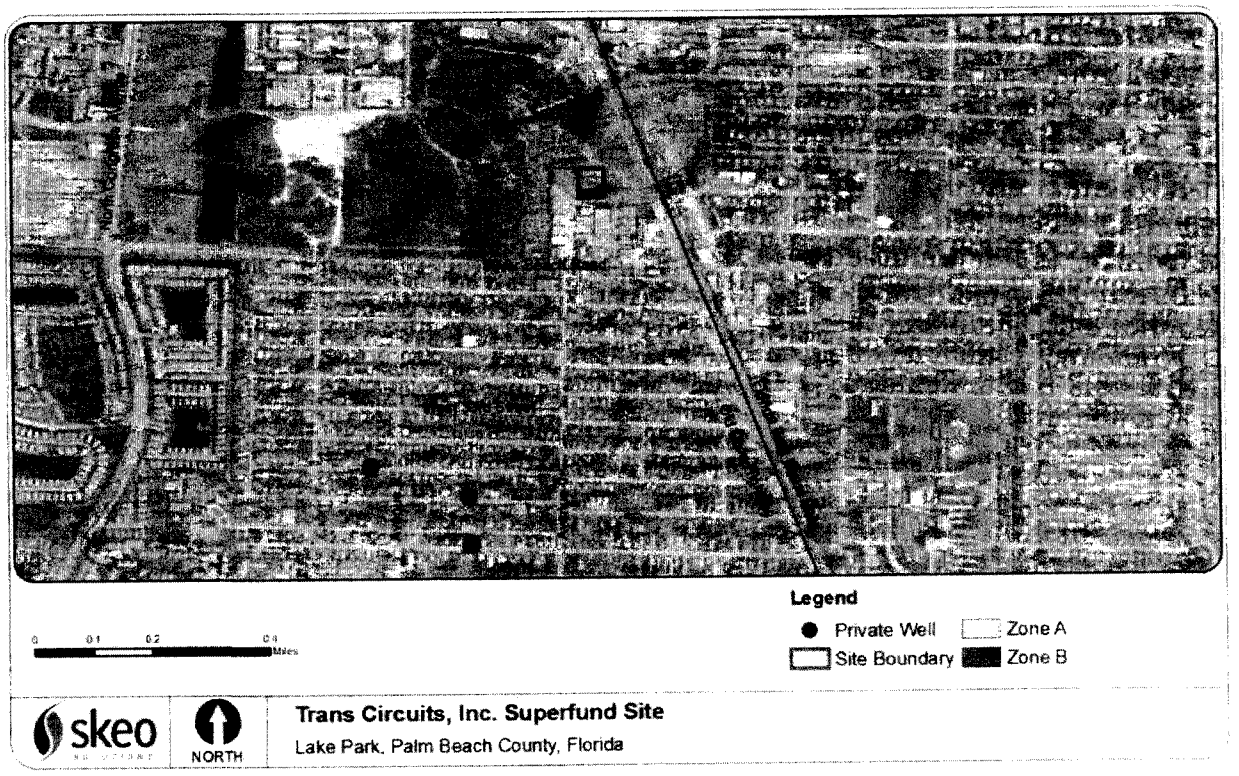
The Florida Department of Health (FDOH) conducted a PHA in 2000, which concluded that while ingestion and inhalation of ground water contaminants from tap water were potential exposure pathways for people using wells without treatment devices, these pathways were unlikely to be completed for two reasons. First, only a few private wells northeast of the Site remained in use. The City of Riviera Beach has provided most of the surrounding area with municipal water service since the mid-1960s. Second, private wells, both for home use and irrigation, are likely too shallow to reach contaminated ground water which has been confirmed to be between 150 and 250 feet below land surface. Site-related chemicals are heavier than water, so they sink once they reach the water table.

While conducting the PHA, FDOH staff searched the area near the Site for private wells. They identified and sampled seven private wells in February 2000 and again in 2002. Analyses of these samples showed that ground water from these wells did not contain site-related chemicals or other contaminants at levels of concern. Of the seven wells found by FDOH staff for this PHA only three continue to be used in 2012 (Table 3). These three are more than a half mile from the Site in the opposite direction of ground water flow and not near the contaminant plume (Figure 3, Zone A and B show the plume as described by the MOA). Investigations since the PHA was conducted have confirmed that Site contaminants in the ground water are between 150 and 250 feet below the land surface and do not impact any known private wells. . In August 2012, the PBCHD initiated another well survey in the area around the Site to ensure the Site continues not to impact any private wells. Private wells identified in the survey will be sampled.

Table 3: Status of Wells Identified in the PHA

Well	Status	Address
AAD0951	Closed	Not Available
AAE2005	Closed	Not Available
AAE2012	Closed	Not Available
AAE2001	Closed	Not Available
AAE2003	Active	1517 W. 31st St
AAE2000	Active	1390 W 28th St
AAE2001	Active	1409 W 30th St

Figure 3: Location of Private Wells



4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with ARARs. A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP. The nine criteria include:

1. Overall Protectiveness of Human Health and the Environment.
2. Compliance with ARARs.
3. Long-Term Effectiveness and Permanence.
4. Reduction of Toxicity, Mobility or Volume of Contaminants through Treatment.
5. Short-term Effectiveness.
6. Implementability.
7. Cost.
8. State Acceptance.
9. Community Acceptance.

4.1 Remedy Selection

EPA issued the ROD for the Site on April 12, 2001. The remedial action objectives (RAOs) defined in the ROD and established to address human health concerns for the Site were:

- Reducing the risk to human health from soil contamination to within EPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$ and a maximum individual contaminant Hazard Index of less than or equal to one.
- Restoring ground water to maximum contaminant levels (MCLs) or within EPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$ and a maximum individual contaminant Hazard Index of less than or equal to one.

To-be-considered (TBC) goals for PAHs in soil and fluoride in ground water were considered achievable objectives given the scope of the remedies considered and did not significantly affect overall cleanup costs. Therefore, they were included in the remedy. Remedial goals for soil and ground water were established to satisfy these RAOs and the ROD selected the following remedial components to achieve them:

- Funding to the City of Riviera Beach for the operation and maintenance (O&M) of air stripper towers in the water treatment plant until the plume is isolated from the well field by relocation of municipal well PW-17.
- Construction of a new municipal well outside of the contaminated plume area and abandoning municipal well PW-17.
- Performance of in-situ chemical oxidation of the plume via the injection of potassium permanganate, hydrogen peroxide, ozone or a combination thereof through injection wells in the surficial aquifer.
- Natural attenuation of fluoride and nickel, if not addressed by oxidation.
- Verification that the property owner maintains institutional controls to prohibit

residential development of the Site and to prohibit installation of potable wells until ground water remedial goals are met.

- Excavation and disposal off site of approximately seven cubic yards of PAH-contaminated soils to satisfy FDEP concerns regarding industrial exposure to soils.

The 2001 ROD identified two contaminants of potential concern (COPCs) for soil and 17 COPCs for ground water. Of these contaminants, remediation goals were selected for those COPCs detected above federal or state regulations at the time of the signing of the ROD, as well as vinyl chloride in ground water. Vinyl chloride was not detected during the RI, but is a known breakdown product of PCE and TCE. COCs and their cleanup goals are shown in Table 4. The ROD called for a bench study using approximately five contaminated core samples to determine the optimized chemistry configuration for site treatment prior to implementing the chemical oxidation part of the remedy. In 2004, a bench-scale treatability study evaluated six oxidants. A pilot-scale treatability study in 2008 and 2009 evaluated the effectiveness of enhanced bioremediation. The final design evaluates the results of the bench-scale and pilot-scale treatability studies to determine which technology or combination of technologies is the most viable for full-scale implementation for treatment of the VOC-contaminated ground water.

Table 4: Contaminant of Concern (COC) Cleanup Goals

COC	Cleanup Level	Basis for Cleanup Level
On-site soils (milligrams per kilogram, mg/kg):		
Carcinogenic PAHs (toxicity equivalence factor, TEF)	0.5	FDEP SCTLs and risk assessment
Ground water (micrograms per liter, µg/L):		
Tetrachloroethene (PCE)	3	ARAR (state primary MCL)
Trichloroethene (TCE)	3	ARAR (state primary MCL)
1,2-Dichloroethene (1-2-DCE)	70	ARAR (federal/state primary MCL)
Chloroform	6	FDEP guidance concentrations and risk assessment
Vinyl chloride*	1	ARAR (state primary MCL)
Nickel	100	ARAR (federal/state primary MCL)
Fluoride	2,000	State secondary MCL

* Vinyl chloride was not detected in RI sampling but is a known breakdown product of TCE and PCE and has been found in the Riviera Beach well field. Therefore, a goal was set in the 2001 ROD to address any residual vinyl chloride that might result over time from site cleanup or natural attenuation of the contaminants.

EPA issued an Explanation of Significant Differences (ESD) on September 29, 2010, to modify the remedy to include:

- Conducting sampling in the area that previously showed PAH exceedance. If confirmed, conduct additional soil excavation to achieve the residential cleanup standard of 0.1 mg/kg of benzo(a)pyrene.
- Meeting standards for unlimited use and unrestricted exposure (UU/UE), which will allow for no institutional control requirements related to soil contamination.

- If UU/UE cannot be achieved, institutional controls are necessary to restrict future use of the site to industrial or commercial uses.
- Clarifying that future potable well construction is being restricted through the recently signed MOA between EPA and the South Florida Water Management District until ground water cleanup goals are met.
- Conducting in-situ bioremediation instead of in-situ chemical oxidation for ground water remediation.

4.2 Remedy Implementation

EPA is implementing the Site's remedy in three phases. Phases 1 and 2 are complete. Phase 3 is currently underway.

Phase 1 – Funding of Air Strippers: EPA entered into an agreement with the City of Riviera Beach and used federal Superfund money to reimburse the City for O&M expenses for the air stripping towers used to remove VOCs from the municipal water supply because of the VOC contamination discovered in municipal well PW-17, which was believed to be site related. Funding was provided from October 2002 until January 2006.

Phase 2 – Municipal Supply Well Construction/Soil Excavation: EPA began this phase of the cleanup in October 2002 and completed it in early 2006. During this time, EPA designed the replacement well, obtained the necessary permits for its construction, and completed construction of the well and nearly two miles of piping to transfer water from the new well to the municipal water treatment system. On September 29, 2003, EPA began a removal action at the Site, which included excavation of approximately seven cubic yards of contaminated soil, removal of a block wall, post-excavation confirmation sampling, disposal of excavated soils and drums, and site restoration. EPA received analytical results for the excavation area and removed additional soil in one quadrant so that all samples met industrial cleanup standards. EPA completed the removal action on January 26, 2004.

Phase 3 – Treatment of Contaminated Ground Water: The remedy selected in the Site's 2001 ROD specifies treatment of VOC-contaminated ground water using in-situ chemical oxidation. EPA has continued to conduct additional sampling to obtain the information necessary to design the ground water remedy. Part of the design process included a pilot study at the Site to evaluate the effectiveness and cost of full implementation of the remedy, which began in June 2007 and was completed in August 2009. After conducting the pilot study, EPA determined that in-situ bioremediation would be a more effective remedy than in-situ chemical oxidation. EPA included this decision in the 2010 ESD. Installation of monitoring wells and potential injections wells to support implementation of the ground water remedy began in spring 2012. Ground water monitoring is ongoing to gather additional information and ensure that fluoride and nickel concentrations continue to decrease through natural attenuation. EPA expects it to take several years for ground water to reach the cleanup goals outlined in the 2001 ROD.

The 2010 ESD proposed additional soil sampling to determine if PAHs cleaned up to industrial/commercial standards meet residential cleanup standards. If exceedances are confirmed, additional soil excavation will occur to achieve these standards and allow for UU/UE.

EPA and the South Florida Water Management District signed an MOA on March 11, 2010, to develop a framework for cooperation and to set forth the mutual understanding of the parties concerning cooperative efforts to minimize the potential effects of ground water contamination in areas within the District's jurisdiction that are impacted or potentially impacted by Superfund sites. In general, the MOA states that EPA must:

- Notify the District of ground water impacted by Superfund sites.
- Ensure a well survey within the plume area at least every five years through field inspection to identify any new wells since the last review was conducted.
- Incorporate in its institutional controls for such Superfund Area provisions for complying with the regulations promulgated in Chapter 62-524, F.A.C. if any portion of a Superfund Area is situated within an area delineated as an area of ground water contamination pursuant to Section 373.309(1)(c), F.S.

In general, the District will:

- Transmit data about affected ground water to state or local agencies that have been delegated authority to issue well construction permits.
- Take into account a proposed well location's proximity to a Superfund site and deny applications for a water well construction permit for activity in Zones A or B of a Superfund Area. Zone A is the inner boundary, also the contamination zone of the ground water plume. The area between the inner and outer boundary of ground water contamination shall be known as the buffer zone or Zone B.
- Provide notice to EPA of the receipt of a written request for a variance or waiver. Both EPA and the District agree to make their personnel available for timely consultation as to the potential for impacts to the water resource occurring within Zones A and B of a Superfund Area. The MOA may be amended in writing upon mutual consent as the parties deem necessary.

Vapor intrusion evaluations rely upon multiple lines of evidence to make decisions. For the Trans Circuits vapor intrusion evaluation, there are multiple but conflicting lines of evidence. Using recently updated VOC toxicity values, the soil gas samples collected in 2009 in a small room in the southern portion of the building show an unacceptable risk but the soil and ground water samples collected in 2012 indicate an acceptable risk. Therefore additional evaluation is needed to resolve these conflicting lines of evidence.

4.3 Operation and Maintenance (O&M)

The remedy at the Site is not yet completed. Therefore, the Site has not yet entered the O&M phase. When the in-situ bioremediation injections for the ground water remedy are completed, EPA anticipates the Site will enter an O&M phase that includes continued monitoring of ground water. The remedy selected for the Site in the 2001 ROD included a provision for limited O&M activities during remedy design and construction. Previous

O&M activities included operation of air strippers at the water treatment plant until the relocation of municipal well PW-17. Since the relocation of the well on April 26, 2006, there has been no additional O&M in the current FYR period.

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2007 FYR for the Site stated the following:

"The remedy at the Trans Circuits Site currently protects human health and the environment because all soils exceeding industrial cleanup standards have been removed from the Site, the Site is not being used for residential purposes, and contaminated ground water is not being used for potable purposes. However, in order for the Site to be protective in the long-term, the following actions need to be taken:

- *Complete the ground water pilot study and proceed with the in-situ ground water remedy;*
- *Work with FDEP to notify all property owners above the contaminated ground water plume pursuant to FAC 62-780.220 and provide FDEP with data as needed to complete this task;*
- *Implement a restrictive covenant at the Site that prohibits residential use, restricts use of ground water, and includes precautions during any excavation to accommodate existing contamination to ensure long-term protectiveness; and*
- *Ensure adequacy of South Florida Water Management District permitting process for the construction of new wells to prevent potential exposure to contaminated ground water."*

The 2007 FYR included five issues and recommendations. Each recommendation and its current status are discussed below.

Table 5: Progress on Recommendations from the 2007 FYR

Section	Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
5.1	Conduct further investigations to define best option for treatment of contaminated ground water.	EPA, FDEP	06/01/09	The remedial design has been completed.	12/17/2009
5.2	Work with FDEP to ensure current owners over the migrating ground water plume have been notified, pursuant to FAC 62-780.220. Provide FDEP with data as needed to complete this task.	EPA, FDEP	9/26/08	EPA determined that FDEP had notified property owners of exceedances of ground water criteria where confirmed by monitoring wells on those properties.	6/2/2010

Section	Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
5.3	Work with the current property owner and FDEP to implement a restrictive covenant at the Site, including no residential use, restricted use of ground water and precautions during any excavation to accommodate existing contamination.	EPA, FDEP	9/26/08	The 2010 ESD stipulated additional soil sampling and removal of soils exceeding unrestricted and commercial/industrial criteria such that restricting site to commercial /industrial use would not be required. The 2010 MOA provides the framework necessary to document the institutional control in place to restrict the use of ground water.	9/29/2010
5.4	Evaluate existing State of Florida rules regarding the permitting of new well construction and work with FDEP and the South Florida Water Management District to determine its adequacy for preventing potential future exposure to contaminated ground water. Provide the District with any required information to notify them of this known contaminant source.	EPA, FDEP, South Florida Water Management District	09/26/08	An MOA between EPA and the South Florida Water Management District is in place which provides the framework to restrict future potable well construction.	3/11/2010
5.5	Work with the Florida Department of Health to determine the need to resample the seven wells previously identified and tested within the vicinity of the Site.	EPA, Florida Department of Health	09/26/08	EPA and FDOH determined that as of 2012, only 3 wells remained in use and they are more than a half mile from the Site in the opposite direction of ground water flow and not near the plume boundary. Therefore, there is no need to resample.	8/15/2012

5.1 Finish the remedial design for the pilot program's in-situ treatment of ground water.

EPA completed the remedial design for the ground water remedy at the Site on December 17, 2009.

5.2 Provide FDEP the data needed to ensure current owners of property above the contaminant plume have been notified pursuant to FAC 62-780.220.

On June 2, 2010, EPA determined that FDEP had been provided the necessary data to complete this task.

5.3 Implement enforceable restriction at the Site to ensure long-term protectiveness of institutional controls.

The 2010 ESD stipulated additional soil sampling and removal of soils exceeding unrestricted and commercial/industrial criteria such that restricting site to commercial /industrial use would not be required.

5.4 Ensure adequacy of South Florida Water Management District permitting process for the construction of new wells to prevent potential exposure to contaminated ground water.

An MOA entered into between EPA and the District on March 11, 2010, provides the framework for information sharing between EPA and the South Florida Water Management District to restrict future potable well construction and water use until ground water cleanup goals are met. The MOA ensures that the South Florida Water Management District has up to date information on the Superfund site ground water plume so that the South Florida Water Management District permitting process can address existing ground water conditions.

5.5 Ensure private wells identified in the Site's public health assessment continue to meet drinking water standards.

On August 15, 2012, the PBCHD provided EPA information on the seven wells identified in the PHA. The wells were sampled in 2000 and again in 2002. Analyses of these samples showed that ground water from these wells did not contain site-related chemicals or other contaminants at levels of concern. Of the seven wells found by FDOH staff for the PHA only three continue to be used in 2012. These three are more than a half mile from the Site in the opposite direction of ground water flow and not near the contaminant plume. In August 2012, the PBCHD initiated another well survey in the area around the Site to ensure the Site continues not to impact any private wells. Private wells identified in the survey will be sampled.

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in October 2011 and scheduled its completion for September 2012. The EPA site review team was led by EPA Remedial Project Manager (RPM) Bill Denman and also included EPA Community Involvement Coordinator (CIC) L'Tonya Spencer, FDEP representative Kelsey Helton and contractor support provided to EPA by Skeo Solutions. In October 2011, EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. A review schedule was established that consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

6.2 Community Involvement

In January 2012, a public notice was published in the *Palm Beach Daily News* newspaper announcing the commencement of the FYR process for the Site, providing contact information for EPA RPM Bill Denman and CIC L'Tonya Spencer, and inviting community participation. A copy of the press notice is available in Appendix B. No one contacted EPA as a result of this advertisement.

The FYR Report will be made available to the public once it has been finalized. Copies of this document will be placed in the designated site repository: Riviera Beach Public Library, 600 West Blue Heron Boulevard, Riviera Beach, Florida 30404.

6.3 Document Review

This FYR included a review of relevant, site-related documents, including the 2001 ROD, 2009 Remedial Design Report, 2010 ESD, remedial action reports and recent monitoring data. A complete list of the documents reviewed is provided in Appendix A.

<u>ARARs Review</u>

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. 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, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards more stringent than federal requirements may be applicable or relevant and appropriate. TBC criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, TBCs may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include MCLs under the federal Safe Drinking Water Act and ambient water quality criteria enumerated under the federal Clean Water Act.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated ground water or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the chemical-specific ARARs identified in the Site's ROD. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

Ground Water ARARs

According to the Site's 2001 ROD, cleanup goals for ground water COCs were based on National Primary Drinking Water Standards, FDEP ground water cleanup target levels (GCTLs) and FDEP guidance concentrations and risk assessment. ARARs from the 2001 ROD were compared to current National Primary Drinking Water Standards and GCTLs (Table 6). COC ARARs for PCE, TCE, 1,2-DCE, vinyl chloride, nickel and fluoride have not changed since the signing of the ROD. Current COC ARARs for chloroform are less stringent than at the time of the signing of the ROD.

Table 6: Previous and Current ARARs for Ground Water COCs

COCs	2001 ROD ARARs (µg/L)	Current ARARs (µg/L)[a]	ARARs Change
PCE	3	3[b]	None

COCs	2001 ROD ARARs (µg/L)	Current ARARs (µg/L)[a]	ARARs Change
TCE	3	3[b]	None
1,2-DCE	70	70[c]	None
Chloroform	6	70	Less stringent
Vinyl chloride	1	1[b]	None
Nickel	100	100[b]	None
Fluoride	2000	2000[d]	None

a. National Primary Drinking Water Standards available at: http://water.epa.gov/drink/contaminants/index.cfm (accessed 2/15/12)
b. Florida SCTLs available at: http://www.dep.state.fl.us/water/drinkingwater/standard.htm (accessed 2/15/12)
c. For cis-1,2-dichloroethylene
d. Secondary Drinking Water Standards

Soil ARARs

The Site's 2001 ROD identified FDEP SCTLs (F.A.C 62-777) as TBC criteria. SCTLs were considered for PAHs in soil because the soil volume was small and cleanup to SCTLs would allow for state concurrence with the remedy. Cleanup goals for PAHs in soil were based on FDEP SCTLs for industrial cleanup. The 2010 ESD specified additional testing and potential cleanup to meet SCTLs for residential use. ARARs from the 2001 ROD and 2010 ESD were compared to current Florida SCTLs (Table 7). Current SCTLs for carcinogenic PAHs for industrial land use are less stringent than at the time of the ROD's signing and have not changed since the 2010 ESD.

Table 7: Previous and Current ARARs for Soil COCs

COCs	2001 ROD and 2010 ESD ARARs (mg/kg)	Current ARARs (mg/kg)[a]	ARARs Change
Carcinogenic PAHs	0.5[b,c] industrial 0.1 residential	0.7 industrial 0.1 residential	Less stringent None

a. Florida Soil Cleanup Target Levels available at: http://www.dep.state.fl.us/legal/Rules/waste/62-777/62-777_TableII_SoilCTLs.pdf (accessed 2/15/12)
b. The 2001 ROD mistakenly identified the units as ng/kg
c. For benzo(a)pyrene

6.4 Data Review

Soil

Soil sampling data from the Site's 2009 remedial design are provided in Appendix F. On August 10, 2009, soil samples were collected at five different locations for four different depths (0-0.5 feet, 0.5-1 foot, 1-2 feet, 2-3 feet) to further evaluate the presence of PAH-contaminated soil. Locations of the soil samples included three locations in front of the building, one location to the side of the building near Brant Road, and one location to the rear of the building near the railroad tracks. The number of SCTL exceedances among the 21 samples analyzed are shown in Table 8 below. Both exceedances of industrial cleanup standards were 1.5 mg/kg. The surface industrial exceedance was located in the front of the building underneath the parking lot and the exceedance in the 0.5-1 foot range was

located behind the building near the railroad tracks. PAHs detected beneath the parking lot and near the rail spur are not thought to be site-related because PAHs are commonly found in urban areas, particularly beneath asphalt and near areas with treated wood. Further evaluation is being conducted to confirm which PAH detections are site related and to determine if further soil excavation is needed to remediate the site to levels that would allow for UU/UE. The ROD selected a carcinogenic PAH soil cleanup goal based on the FDEP SCTL for benzo(a)pyrene.

Table 8: Number of Benzo(a)pyrene SCTL Exceedances by Soil Depth

		Soil Depth (number of exceedances)			
		0-0.5 feet	0.5-1 foot	1-2 feet	2-3 feet
Benzo(a)pyrene	Residential	3	1	1	0
	Industrial	1	1	0	0
Benzo(a)pyrene (BaP) Equivalents[a]		1	1	0	0

[a]Calculated based on "Polycyclic Aromatic Hydrocarbons (PAHs) in Urban Soil: A Florida Risk Assessment Perspective, International Journal of Soil, Sediment, and Water: Volume 1: Issue 2, Article 2 (Teaf, 2008)

Ground Water

A summary of historical and current ground water data is included in Appendix F. A summary of the current status of ground water contamination is included below. Although the ground water remedy is still being implemented and sampling will occur according to the O&M plan once the remedy is complete, ground water sampling has occurred historically from 1998 to 2012. Ground water sampling has occurred intermittently during this time on the following dates (not all wells were sampled on each sampling date):

Year	Months
1998	January
1999	June
2002	July-August, September-October, December
2003	February
2004	January, April, July, October
2005	January, April, July
2007	February
2008	March, June
2009	January, March, June, August
2012	January

As part of the remedial design process, ground water samples were collected so that EPA could delineate the plume illustrated in the 2010 MOA (Figure 5). The ground water remedy is in the construction phase. Table 9 presents the years during which contaminant exceedances were observed in ground water monitoring wells. Sampling from monitoring wells installed for potential use in pilot-scale treatability study is not discussed here. Contaminants that were sampled for are included across the top of the table and include PCE, TCE, 1,2-DCE, vinyl chloride, chloroform, nickel and fluoride. This table is meant to provide an understanding of the history of ground water contaminants at the Site. An analysis of trends in ground water contaminant concentrations will be performed during

the next FYR. Exceedances in well MW-6 are not believed to be from the Site because of a ground water flow divide in the intermediate zone (Appendix G). However, well MW-15 is on the Site side of the divide. Well MW-15 will continue to be monitored.

Table 9: Historical Ground Water Data Exceedances in Monitoring Wells by Year

	PCE	TCE	1,2-DCE	Vinyl chloride	Chloroform	Nickel	Fluoride
On-site monitoring wells							
MW2D	NE	NE	1999 2002 2004 2005	2004	NE	1999	2008
MW2B	NE	2009	NE	NE	NE	NE	NE
DER4S	NE	NE	NE	NE	NE	NE	1998 1999 2002 2004 2005 2007 2012
DER4I	NE	NE	NE	NE	NE	NE	1998 1999 2007 2009 2012
MW11D	1999 2002 2004	1999 2002 2004 2005	1999 2002 2004 2005 2008	NE	NE	1999 2002	NE
MW11B	NE	NE	NE	NE	NE	NE	NS
Off-site monitoring wells							
MW12I	NE	NE	2002 2004 2007 2008 2009	2002 2004 2007 2009	NE	NE	NS
MW12D	NE	NE	2007 2008 2012	2012	NE	NE	NS
MW4S	NE	NE	NE	NE	NE	1999 2002 2004 2005	NE
MW4I	NE	1998	1999	NE	NE	NE	NE
MW4D	NE	1998	1998 1999	NE	NE	1998	NE
DER7D	NE	NE	2002	NE	NE	NE	NE
MW15I	2002	1999 2002 2007 2008 2012	1999 2012	NE	NE	NE	NS

	PCE	TCE	1,2-DCE	Vinyl chloride	Chloroform	Nickel	Fluoride
MW15D	NE	2009 2012	NE	NE	NE	NE	NS
MW6I	NE	1998 1999 2002 2004 2005 2007 2008 2009 2012	1998 2002 2004 2005 2009 2012	NE	NE	NE	NS
MW6S	NE	NE	NE	NE	NE	NE	NS
MW6D	NE	1999 2002 2007 2008 2012	NE	NE	NE	NE	NS
PW17	NE	1999	NE	NE	NE	NE	NS

NE – No exceedance
NS – No sample

Pilot Treatability Study
Results from the pilot treatability study conducted from December 2008 through August 2009 were discussed in the Final Design Report (2009). The results demonstrated that in-situ bioremediation was more effective at addressing the VOC contamination than in-situ chemical oxidation amendments. Trends observed from one of the injection wells (MW30D) are shown in Table 10 below. Analytical results from the pilot study are included as table 4-11 in the 2009 Remedial Design (RD).

Table 10: Results from the Pilot Treatability Study[1]

MW30D	PCE	TCE	1,2-DCE
January 2009 (1 month post injection)	Slight improvement	Slight improvement	Significant improvement
March 2009 (3 months post injection)	-	Slight improvement	-
June 2009 (6 months post injection)	-	Significant improvement	Significant improvement
August 2009 (8 months post injection)	-	Increase in TCE	Increase in 1,2-DCE

[1] Results are described in the 2009 Final Design Report

EPA determined that the observations from the treatability study indicated that the bioamendments are effective at reducing VOC contamination, but have a six- to eight-month effectiveness period.

Vapor Intrusion

In support of the evaluation of risk associated due to vapor intrusion, multiple samples were collected from three media (air, soil, ground water). Twenty soil gas samples were collected from beneath the concrete slab within the Trans Circuits building and analyzed for VOCs (see Figure 4). Given the building's configuration in 2011, these samples indicated the risk associated with these levels was within the acceptable range.

In late 2011, the building underwent renovation for a different business use and the configuration is different requiring a lower air exchange rate for modeling. In an EPA memorandum dated December 21, 2011, vapor intrusion pathways were reevaluated using a more stringent air exchange rate than had previously been used given that the building would now be enclosed and air-conditioned. Resulting risk is shown below:

- Based on 2,200 micrograms per cubic meter ($\mu g/m^3$) PCE, the maximum concentration detected, the resulting risk was determined to be 7.5×10^{-6}.
- Based on 1,600 $\mu g/m^3$ TCE, the maximum concentration detected, the resulting risk was determined to be 1.5×10^{-6}.
- Based on 19 $\mu g/m^3$ PCE, the maximum concentration detected in the office area (with lower roof), the resulting risk was determined to be 1.7×10^{-6}.

All three modeled risks remained within the acceptable risk range for Superfund cleanups based on the current use.

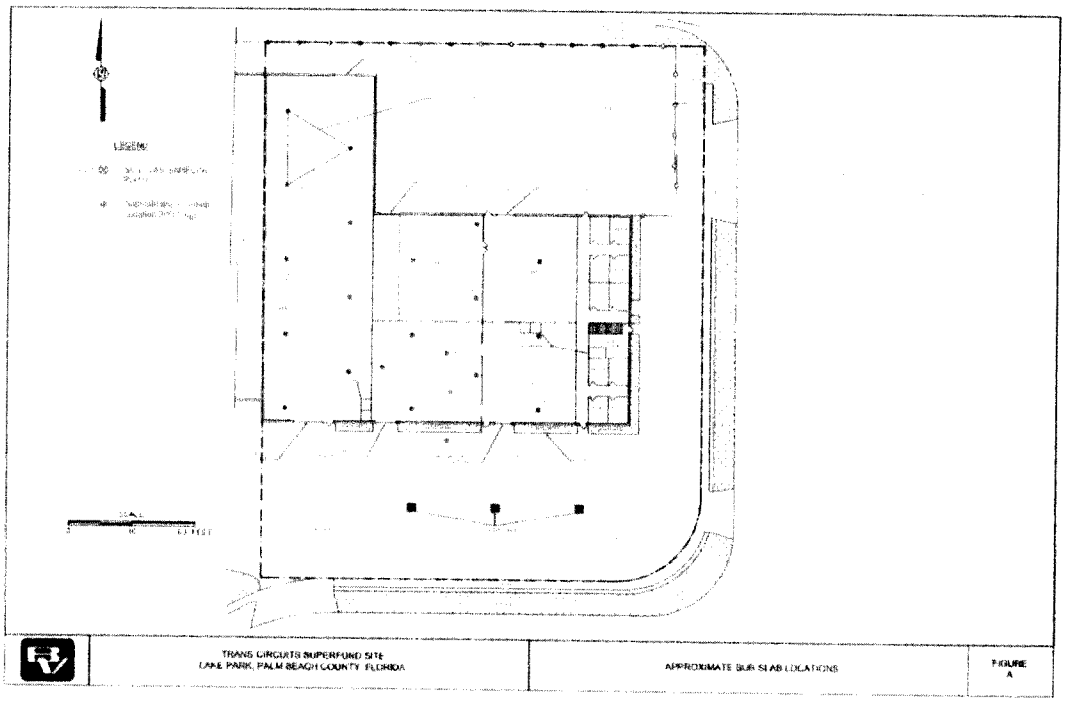
In response to a concern about potential undiscovered subslab sources of VOCs, soil and ground water samples were collected in the spring of 2012 from three locations in the building and one location immediately outside of the building in the immediate vicinity of the highest subslab soil gas detections (see Figure 4). VOCs were not detected in any of the soil samples and the shallowest ground water sample had very small detections of three VOCs which showed a modeled risk within the acceptable risk range.

Periodically EPA revises toxicity values and these values can affect the calculations of Johnson & Ettinger (J&E) modeling results. In May 2012, EPA revised the toxicity values for Site VOCs. The maximum soil gas analytical results were re-run through the J&E model with the revised toxicity values and the building parameters reflecting the revised configuration and air exchange rate. These results indicated an unacceptable risk.

Vapor intrusion evaluations rely upon multiple lines of evidence to make decisions. For the Trans Circuits vapor intrusion evaluation, there are multiple but conflicting lines of evidence. The soil gas samples show an unacceptable risk but the soil and ground water samples indicate an acceptable risk. Therefore, it is recommended that an air sampling investigation be performed prior to the next Five Year Review that focuses on the main room where the highest subslab analytical results were collected. It is recommended that this investigation collect subslab and indoor air samples from the room in question and outdoor/ambient air samples immediately outside the room in question. The indoor air

results should be evaluated under a traditional human health risk process taking in to consideration the analytical results from the ambient outside area and subslab area.

Figure 4: Approximate Sub-Slab Locations



6.5 Site Inspection

The Site inspection was performed on January 25, 2012, by the following participants: Bill Denman and L'Tonya Spencer of EPA Region 4, Scott Burfield, plant manager of Florida Aero Precision, Dan Reardon of Alltech Environmental, and Treat Suomi and Kirby Webster of Skeo Solutions. The completed site inspection checklist is included in Appendix D. Photographs of site features, including monitoring wells and access controls, are included in Appendix E.

Mr. Burfield updated site inspection participants regarding his company's preparations for the reuse of the on-site building. These activities include repainting the inside of the building, installing secure fencing around the perimeter of the Site, and installing several monitoring cameras for monitoring perimeter safety around the building. Florida Aero Precision currently has 36 employees. The new facility will add an additional 15 skilled labor jobs, mostly machinists. Mr. Burfield indicated that the site property provided an ideal location because of the building's high ceiling and the large parking lot. Mr. Burfield expects that the company's new facility will be operational in early 2012. Site inspection participants toured the new facility and where the company's new offices will be located once renovations are complete. They also viewed the bank of screens for camera monitoring and the new countertop for the building's reception area.

Participants also viewed the area behind the building, where several locked and labeled flush-mounted wells were observed. Site inspection participants discussed where removal actions occurred in the past, the location of the settling pond, the upcoming installation of new wells for the ground water bioremediation remedy, and the location of upcoming soil sampling. Black sampling barrels were observed in the rear of the building where recent samples were being stored. All monitoring wells observed were locked and labeled, with the exception of one well with a cap that would not close. Mr. Denman explained that EPA is going to flush mount all wells in the near future for visual improvement and the appropriateness of the well type for this stage of the remediation.

After the site inspection, participants stopped in the JAS Marine building adjacent to the Site to visit Mr. Strauss, owner of JAS Marine, a business adjacent to the Site. Mr. Strauss was out of the office on a service call. Site participants drove to Twiggs Learning Tree (a child care center) to interview Mr. Twiggs, owner of Twiggs Learning Tree, located adjacent to monitoring wells for the Site, and to Lake Park Public Works Department to interview Mr. Pittman, an employee at the Lake Park Public Works Department.

On January 25, 2012, Skeo Solutions visited the designated local site repository at the Riviera Beach Public Library, located at 600 West Blue Heron Boulevard, Riviera Beach, Florida 30404. The site repository contained eight volumes of administrative records pertaining to the Site through November 21, 2000, and two discs labeled Administrative Record (w/Search) Administrative Record (w/Search) (Operable Unit 1) (April 2001) and

Administrative Record (w/Search) Explanation of Significant Differences (October 2010). The repository appears to be complete, with the exception of the 2007 FYR.

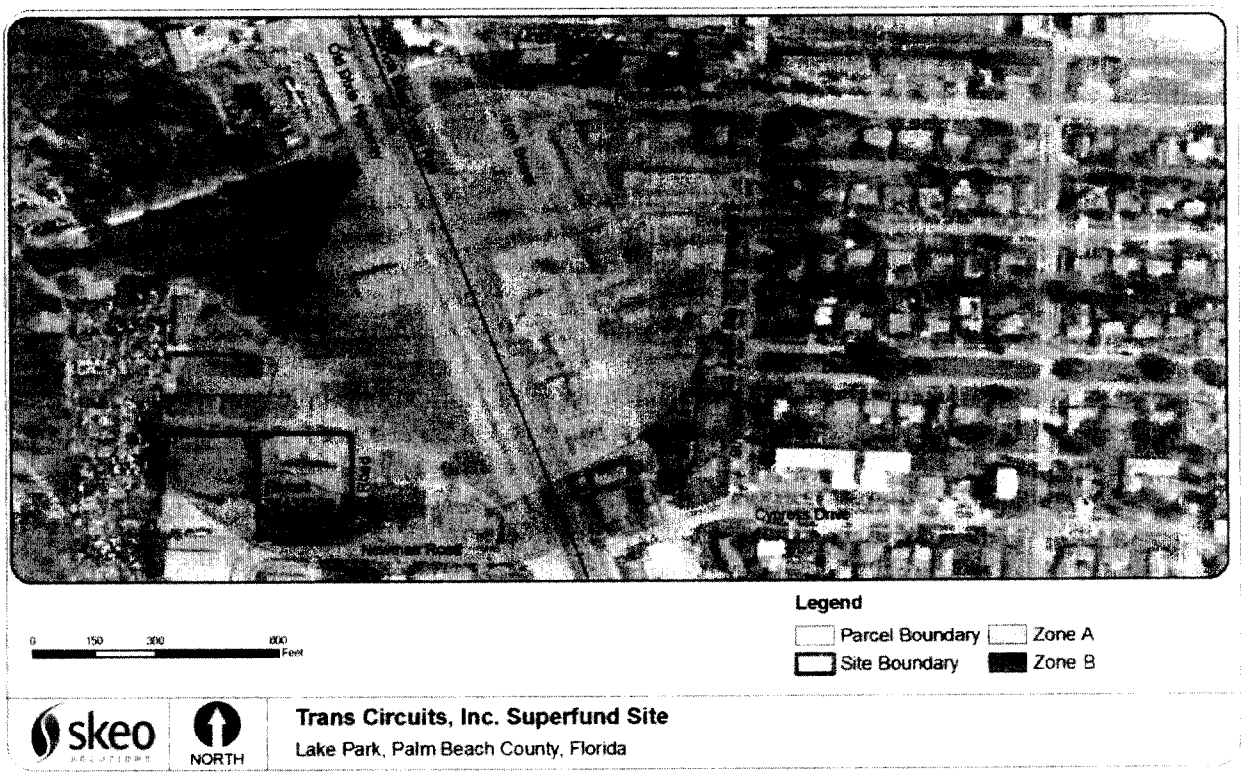
Table 11 list the institutional controls associated with areas of interest at the Site.

Table 11: Institutional Control (IC) Summary Table

Site Ground Water and Soil					
Media	**ICs Needed**	**ICs Called for in the Decision Documents**	**Impacted Parcel(s)**	**IC Objective**	**Instrument in Place**
Ground Water	Yes	Yes	36-43-42-20-00-000-5120	Restrict installation of ground water wells.	An MOA signed in 2010 restricts ground water well permitting in Zones A and B of the delineated ground water plume.
Soil	No[4]	No	36-43-42-20-00-000-5120	None	None

[4] No ICs will be needed if soils exceeding unrestricted use criteria for site related benzo(a)pyrene – toxicity equivalent (BaP-TE) exceedances are removed as discussed in the 2010 ESD.

Figure 5: Ground Water Plume Delineation Based on MOA



6.6 Interviews

During the FYR process, interviews were conducted with parties impacted by the Site, including the current landowners, and regulatory agencies involved in site activities or aware of the Site. The purpose of the interviews was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. Some of the interviews were conducted during the site inspection on January 25, 2012, while others were received via email. Interviews are summarized below. Complete interviews are included in Appendix C.

Bill Denman: Mr. Denman is EPA's RPM for the Site. Mr. Denman explained that cleanup activities at the Site were delayed for two years awaiting remedial action funding. Funding has since been received and the cleanup is proceeding at an acceptable pace. He does not believe the Site has a significant impact on the surrounding community. He is not aware of any complaints or issues regarding site-related environmental issues or remedial activities since the implementation of the cleanup. Preliminary results show the pilot study had a positive impact, which leads him to believe that full-scale implementation will significantly reduce contaminant concentrations. He is comfortable with the status of the institutional controls at the Site but believes it is likely that they will need to revert back to the previous institutional control plan, which was to restrict future use of the Site to commercial and industrial land uses. Mr. Denman has not received any community concerns regarding the Site since the previous FYR.

Scott Burfield: Mr. Burfield is the plant manager of Florida Aero Precision. He explained that he has watched the Site over the past 20 years. Once the fence was put up around the Site, he saw a vast improvement – there had been a lot of issues with trespassers. While vandalism was a major issue, now that the fence has been put up and Mr. Burfield has installed security cameras, he has not had any problems. Mr. Burfield feels informed by EPA. He does not own a private well.

Kelsey Helton: Ms. Helton is FDEP's project manager for the Site. She explained that soil removal to commercial SCTLs in the former waste water pond area has been completed and the State is pleased to see that the commercial reuse of the site property is ongoing. FDEP is looking forward to the implementation of the ground water remedy in 2012. FDEP believes that a determination of the presence of dense non-aqueous phase liquid (DNAPL) or a vadose zone source needs to be made. FDEP is concerned that the fieldwork proposed in the Remedial Action Monitoring Plan may not be adequate to identify or eliminate the likelihood of a vadose zone source, yet FDEP looks forward to receipt and evaluation of the data. FDEP believes that a final decision on the need for institutional controls needs to be made and implemented. She recommended confirmation that no new potable wells are in use in the area of the ground water plume.

Ms. Helton explained that FDEP has participated in a technical review of EPA's ground water bioremediation design. FDEP agrees with a bioremediation alternative to address the ground water contamination. FDEP is currently working with EPA to develop and implement the Site's Remedial Action Monitoring Plan, which includes installation of

additional monitoring wells to support the upcoming bid procurement and implementation of the ground water remedy. Ms. Helton explained that implementation of institutional controls related to on-site land use has not yet occurred. A final decision on SCTLs and the need for institutional controls needs to be made and appropriate actions taken.

FDEP has recommended modified active gas sampling (MAGS) as a tool for evaluating the presence of a VOC vadose zone source. Field work proposed in the Site's Remedial Action Monitoring Plan includes discrete soil sampling in the vadose zone and ground water sampling at specific depth intervals down to 200 feet below land surface beneath and immediately adjacent to the former Trans Circuits facility building. While FDEP remains concerned that discrete soil sampling may not be adequate to identify or eliminate the likelihood of a vadose zone source, FDEP looks forward to receipt and evaluation of the data.

Mr. Twiggs: Mr. Twiggs is the owner of Twiggs Learning Tree, a nearby business. Mr. Twiggs is aware of the Site but does not know much about it. He explained that his clients – the parents at his child care center – have been curious about the black barrels stored on site. Mr. Twiggs is not sure whether he needs to be regularly informed of the Site's status, but he appreciated knowing that he could give EPA RPM Bill Denman's phone number to anyone who needed more information. Mr. Twiggs has a well for his irrigation system and his business is connected to the municipal water supply.

Richard Pittman: Mr. Pittman works for Lake Park Public Works Department. He is not aware of the Site, and does not feel informed about its current status. He explained that the best way to share information is by sending a hard copy to the Town Manager. Mr. Pittman was not aware of any changes that may affect the protectiveness of the Site's remedy.

7.0 Technical Assessment

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

The review of documents, ARARs, risk assumptions and the site inspection indicate that the Site's remedy is being constructed in accordance with the requirements of the decision documents and is expected to be protective once it is complete. A removal action in 2004 removed soil in the waster water pond area with benzo(a)pyrene – toxicity equivalent (BaP-TE) concentrations exceeding commercial criteria. The ground water remedy is in the construction phase and is anticipated to be protective once complete. While the remedy is being conducted, the 2010 MOA between EPA and the South Florida Water Management District ensures that there are no completed exposure pathways that will affect human health. Seven private wells identified in the 2000 PHA were sampled in 2000 and again in 2002. Analytical results showed that ground water from these wells did not contain site-related chemicals or other contaminants at levels of concern. As of 2012, only three of these wells remain in use. These are located more than a half mile from the Site in the opposite direction of ground water flow and not within the boundary of the Site's contaminant plume. In August 2012, the PBCHD initiated another well survey in the area around the Site to ensure the Site continues not to impact any private wells. Private wells identified in the survey will be sampled. An updated well survey will be conducted within the next year.

The plume map developed for the 2010 MOA indicates that the ground water plume is to the northeast of the Site. The 2010 ESD changed the soil cleanup standards to residential cleanup standards; remedy implementation is ongoing based on this change. If residential cleanup standards cannot be attained, institutional controls need to be put in place. Fencing and security cameras are in place around the site property to minimize access and vandalism.

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

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of remedy selection are still valid. Ground water cleanup levels were based on federal National Primary Drinking Water Regulations and Florida GCTL values, and soil cleanup values were based on SCTLs. Any changes in toxicity factors would not call into question the protectiveness of the remedy because the cleanup levels for ground water were based on the MCLs. Therefore, the cleanup levels remain valid.

In late 2011 vapor intrusion pathways were reevaluated using a more stringent air exchange rate than had previously been used given that the building would now be enclosed and air-conditioned. All three modeled risks remained within the acceptable risk range for Superfund cleanups based on the current use. In May 2012, EPA revised the toxicity values for Site VOCs. The maximum soil gas analytical results were re-run through the J&E model with the revised toxicity values and the building parameters

reflecting the revised configuration and air exchange rate. These results indicated an unacceptable risk.

Vapor intrusion evaluations rely upon multiple lines of evidence to make decisions. For the Trans Circuits vapor intrusion evaluation, there are multiple but conflicting lines of evidence. The soil gas samples show an unacceptable risk but the soil and ground water samples indicate an acceptable risk. Therefore, it is recommended that an air sampling investigation be performed prior to the next FYR that focuses on the main room where the highest subslab analytical results were collected. It is recommended that this investigation collect subslab and indoor air samples from the room in question and outdoor/ambient air samples immediately outside the room in question. The indoor air results should be evaluated under a traditional human health risk process taking in to consideration the analytical results from the ambient outside area and subslab area.

The 2001 ROD identified two COPCs for soil and 17 COPCs for ground water. Of these contaminants, remediation goals were selected for those COPCs detected above federal or state regulations at the time of the signing of the ROD, as well as vinyl chloride in ground water. Arsenic was identified as a COPC. However, at the time of the signing of the ROD, arsenic was not detected above state or federal regulations. However, as identified in the previous FYR and below in this FYR report, arsenic cleanup standards for ground water and soil, MCLs and SCTLs, respectively, have become more stringent since the signing of the ROD in 2001 (see Table 12 and Table 13 below). Despite the more stringent standards, previous sampling of arsenic in ground water and soil indicates that these standards are still met, as described in detail below. Data tables are included in Appendix F.

Sixteen monitoring wells were sampled for arsenic in ground water between 2007 and 2012. These monitoring wells were installed for potential use in the pilot-scale treatability study. There were no exceedances of the current, more stringent, arsenic MCLs observed.

Results from the Expanded Site Investigation (ESI) show an arsenic value of 2.9 mg/kg in sample TC-SS-10 on July 30, 1997, and Table 3-2 of the Remedial Design Report shows results from sampling conducted in 2002. There were no exceedances of the current, more stringent, residential SCTLs in the 16 samples collected.

Table 12: Arsenic Ground Water COPC Changes

Ground Water COPC	2001 ROD MCL (µg/L)	Current MCL (µg/L)[a]	Change
Arsenic	50	10	More stringent

a. National Primary Drinking Water Standards available at: http://water.epa.gov/drink/contaminants/index.cfm (accessed 2/15/12)

Table 13: Arsenic Soil COPC Changes

Soil COPC	2001 ROD SCTL (mg/kg)	Current SCTL (mg/kg)[a]	Change
Arsenic	3.7	12 industrial 2.1 residential	Less stringent More stringent

a. Florida SCTLs available at: http://www.dep.state.fl.us/legal/Rules/waste/62-777/62-777_TableII_SoilCTLs.pdf (accessed 2/15/12)

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

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

7.4 Technical Assessment Summary

The review of documents, ARARs, risk assumptions and the site inspection indicate that the Site's remedy is being constructed in accordance with the requirements of the decision documents and is expected to be protective once it is completed.

The 2001 ROD contained soil cleanup goals based on industrial use. In 2004, EPA completed the excavation of onsite soil to attain industrial cleanup standards. In 2010 EPA issued an ESD which called for additional soil sampling in areas that previously showed exceedances of residential cleanup standards and excavation of the contaminated soil if necessary to meet UU/UE criteria. If residential cleanup standards are unable to be achieved, institutional controls will be necessary to restrict future use of the Site. The ground water pilot study was completed in 2009, during the RD and EPA is working to fully implement the selected ground water remedy in 2012.

EPA is in the process of evaluating the vapor intrusion pathway. Vapor intrusion evaluations rely upon multiple lines of evidence to make decisions. For the Trans Circuits vapor intrusion evaluation, there are multiple but conflicting lines of evidence. Using recently updated VOC toxicity values, the soil gas samples collected in 2009 in a small room in the southern portion of the building show an unacceptable risk but the soil and ground water samples collected in 2012 indicate an acceptable risk. Therefore additional evaluation is needed to resolve these conflicting lines of evidence.

Seven private wells were identified in the 2000 Public Health Assessment (PHA). These wells were sampled in 2000 and again in 2002. Analytical results showed that ground water from these wells did not contain site-related chemicals or other contaminants at levels of concern. In 2012, only three of these wells continue to be used. These three wells are located over a half mile from the Site in the opposite direction of the ground water flow and not within the boundary of the Site's contaminant plume. Based on these

facts, it was determined to be unnecessary to resample the wells. In August 2012, the PBCHD initiated another well survey in the area around the Site to ensure the Site continues not to impact any private wells. Private wells identified in the survey will be sampled.

8.0 Issues

Table 14 summarizes the current site issues.

Table 14: Current Site Issues

Issue	Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)
The vapor intrusion pathway needs to be further evaluated due to conflicting lines of evidence and a change in the use of the building.	No	Yes

9.0 Recommendations and Follow-up Actions

Table 15 provides recommendations to address the current site issues.

Table 15: Recommendations to Address Current Site Issues

Issue	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Yes or No)	
					Current	Future
The vapor intrusion pathway needs to be further evaluated due to conflicting lines of evidence and a change in the use of the building.	Conduct another sampling event in the room in question. Reevaluate the vapor intrusion based on these sample results.	EPA/State	EPA/State	09/18/2014	No	Yes

10.0 Protectiveness Statement

The remedy at the Site is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The soil remedy implemented to date is protective of the industrial use currently supported by the Site and an MOA is in place restricting use of ground water. The vapor intrusion pathway is being further evaluated to resolve the conflicting results from previous sampling events and to take into account the changes in building configuration and new VOC toxicity values which were updated in May 2012.

11.0 Next Review

The Site requires ongoing FYRs as long as waste is left on site that does not allow for unrestricted use and unlimited exposure. The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

Community Involvement Plan. Trans Circuit, Inc., Site, Lake Park, Palm Beach County, Florida. Prepared for U.S. Environmental Protection Agency, Region 4 by Black & Veatch Special Projects Corp. June 2000.

Emergency and Rapid Response Services. Prepared by WRS Infrastructure & Environment, Inc. for Environmental Protection Agency, Region 4. July 1, 2004.

Explanation of Significant Differences. Trans Circuits, Inc. Superfund Site, Lake Park, Palm Beach County, Florida. U.S. Environmental Protection Agency, Region 4. September 2010.

Final Design Report, Revision 0. Trans Circuit Superfund Site, Lake Park, Palm Beach County, Florida. Prepared for U.S. Environmental Protection Agency, Region 4 by Black & Veatch Special Projects Corp. December 2009.

Final Expanded Site Inspection/Remedial Investigation. Trans Circuits, Inc., Lake Park, Palm Beach County, Florida. Prepared for U.S. Environmental Protection Agency, Region 4 by Black & Veatch Special Projects Corp. October 30, 1998.

Final SFWMD-EPA Memorandum of Agreement. Environmental Protection Agency and South Florida Water Management District. March 11, 2010.

First Five-Year Review for Trans Circuits, Inc. Lake Park, Palm Beach County, Florida. Prepared by E2 Inc. for U.S. Environmental Protection Agency, Region 4. September 2007.

OU1 Record of Decision. Trans Circuits, Inc. Lake Park, Florida. U.S. Environmental Protection Agency Region 4. April 12, 2001.

Public Health Assessment. Trans Circuits, Inc. Site, Lake Park, Palm Beach County, Florida. Bureau of Environmental Epidemiology. November 2010.

Remedial Action Report Revision 1. Raw Water Pump Station and Transmission Line. Trans Circuits Superfund Site. Lake Park, Palm Beach County, Florida. September 14, 2006.

Status Letter. U.S. Environmental Protection Agency. November 10, 2011.

Test America Analytical Testing Corporation. January 23, 2004.

Test America Analytical Testing Corporation. January 27, 2004.

Trans Circuit Covenant Not to Sue. U.S. Environmental Protection Agency. November 9, 2011.

Vapor Intrusion Risk Calculation Memorandum. U.S. Environmental Protection Agency. December 21, 2011.

Appendix B: Press Notice

THE PALM BEACH DAILY NEWS

Published Daily from the third Sunday in September through the third Sunday in May; Bi-weekly June through September.
Palm Beach, Palm Beach County, Florida

[redacted]

STATE OF FLORIDA
COUNTY OF PALM BEACH

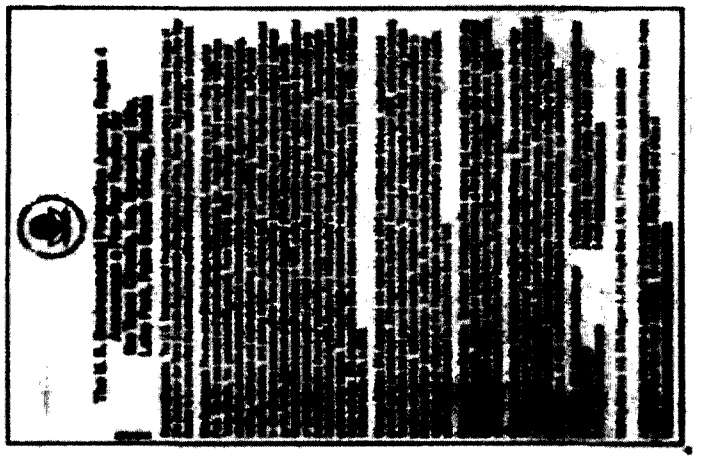
Before the undersigned authority personally appeared [redacted] who on oath says that she is [redacted] of the Palm Beach Daily News, a daily and a Bi-weekly newspaper published at Palm Beach in Palm Beach County, Florida; that the attached copy of advertisement, being a [redacted] in the matter of [redacted] was published in said newspaper in the issue of [redacted].

[redacted] Advertising Director

Sworn to and subscribed before me this 21st day of Jan 2002.

Notary Public

[redacted]



Appendix C: Interview Forms

Trans Circuits, Inc. Superfund Site **Five-Year Review Interview Form**

Site Name: **Trans Circuits, Inc.** **EPA ID No.:** **FLD091471904**
Interviewer Name: **None** **Affiliation:**
Subject Name: **Bill Denman** **Affiliation:** **EPA RPM**
Subject Contact Information:
Time: **Date:**
Interview Location:

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **EPA Remedial Project Manager**

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

   The cleanup activities were stalled for two years awaiting remedial action funding. Now that the funding has been received, the cleanup is proceeding at an acceptable pace.

2. What have been the effects of the Site on the surrounding community, if any?

   No significant impact. The site property was redeveloped and when the past owner left, another company purchased the property.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?

   No.

4. What is your assessment of the current performance of the remedy in place at the Site?

   Preliminary results show the pilot study conducted during the remedial design had a positive impact which leads me to believe full-scale implementation will significantly reduce contaminant concentrations.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   Yes. However, it is likely that we will revert back to the previous IC plan, which was to restrict future use of the site to commercial/industrial land uses.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.

   I have not received any community concerns regarding the site since the previous FYR.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   None. Now that funding has been received, significant progress in reducing the contaminant concentrations in the ground water will likely be achieved.

Trans Circuits, Inc. Superfund Site **Five-Year Review Interview Form**

Site Name: Trans Circuits, Inc. **EPA ID No.:** FLD091471904
Interviewer Name: **Affiliation:**
Subject Name: **Affiliation:**
Kelsey Helton FDEP
Subject Contact Information: 850-245-8969
Time: **Date:** March 7, 2012
Interview Location:

Interview Format (circle one): In Person Phone Mail Other: email

Interview Category: State Agency

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

   Soil removal of known PAH contamination in the former wastewater pond to commercial SCTLs has been completed. We are pleased to see that commercial reuse of the property has been ongoing. We look forward to implementation of the groundwater remedy in 2012. The question of a DNAPL or vadose zone source needs to be resolved in order to have a complete assessment of the site. A final decision on the need for ICs needs to be made and implemented.

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

   The soil remedy has been completed and is protective of current land use. Ground water remedial design has been completed but remedy has not been implemented. Recommend confirmation that no new potable wells are in use in the area of the plume.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

   No.

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

   FDEP has participated in technical review of the EPA's groundwater bioremediation design, in review of EPA's ESD which included a change from insitu chemox to insitu bioremediation for the groundwater remedy and evaluation of additional soil removal to facilitate unrestricted use at the site (no institutional controls). FDEP agrees with a bioremediation alternative to address ground water. EPA issued the ESD and completed the ground water remedial design. FDEP is currently working with EPA in development and implementation of the Remedial Action Monitoring Plan which includes installation of additional monitoring wells to support the upcoming bid procurement and implementation of the groundwater remedy.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

   No.

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

   Implementation of institutional controls related to on-site land use has not occurred. As commercial reuse at the site is ongoing and the immediate area is commercial, it is unlikely that the property's use will be residential. However, a final decision on the soil cleanup target levels and need for institutional controls needs to be made and appropriate actions completed.

7. Are you aware of any changes in projected land use(s) at the Site?

   FDEP understands that land use at the site remains commercial and that the current occupant of the building has changed.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   As previously recommended by FDEP, a determination of the presence of DNAPL or a vadose zone source needs to be made. FDEP has recommended MAGs as the tool for evaluating the presence of a VOC vadose zone source. Field work proposed in the Remedial Action Monitoring Plan includes discrete soil sampling in the vadose zone and ground water sampling at specific depth intervals down to 200 feet below land surface beneath and immediately adjacent to the former Trans Circuits facility building. While FDEP remains concerned that discrete soil sampling may not be adequate to identify or eliminate the likelihood of a vadose zone source, FDEP looks forward to receipt and evaluation of the data.

Trans Circuits, Inc. Superfund Site **Five-Year Review Interview Form**

Site Name: Trans Circuits, Inc. **EPA ID No.:** FLD091471904
Interviewer Name: Treat Suomi **Affiliation:** Skeo Solutions
Subject Name: Scott Burfield **Affiliation:** Florida Aero Precision
Time: 9:15 A.M. **Date:** 01/25/2012
Interview Location: Parking lot of the Site

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Current Owner

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   I have watched it for the last 20 years.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   It was fine after Lake Park had them put the fence up. Before that, it was a mess. I'm moving a lot of equipment over here to expand my business. The bank had owned it. Florida Aero Precision bought it from the bank.

3. What have been the effects of this Site on the surrounding community, if any?

   I would not know.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   Yes, they took the air conditioners out and they were living inside. I am repainting the ceilings due to the smoke. Since the fence and cameras went up, I have not had any problems.

5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

   I do not know. I feel informed. They have so far. I have been receiving a lot of emails.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   No private well.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

No.

Trans Circuits, Inc. Superfund Site **Five-Year Review Interview Form**

Site Name: **Trans Circuits, Inc.** **EPA ID No.:** **FLD091471904**
Interviewer Name: **Treat Suomi** **Affiliation:** **Skeo Solutions**
Subject Name: **Mr. Twiggs** **Affiliation:** **Owner of Twiggs Learning Tree**

Time: **11:00 A.M.** **Date:** **01/25/2012**
Interview Location: **Twiggs Learning Tree**

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **Nearby Business Owner**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   I am aware of something but not a whole lot.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   I have had no contact with anyone. People have been curious, watching, wondering what is going on because they see the barrels. People are very skeptical of barrels because of the child care center here.

3. What have been the effects of this Site on the surrounding community, if any?
   NA
4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?
   NA
5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

   No. I do not know whether I need to be involved. People want to know if their kids are safe and I will tell them they are safe and give them Bill Denman's contact information if they would like more information.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   Yes, I have a well for the irrigation system that will cover this property and the next property. Drinking water comes from the municipal water system.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

No.

Trans Circuits, Inc. Superfund Site **Five-Year Review Interview Form**

Site Name: **Trans Circuits, Inc.** **EPA ID No.:** **FLD091471904**
Interviewer Name: **L'Tonya Spencer** **Affiliation:** **EPA**
Subject Name: **Richard Pittman** **Affiliation:** **Lake Park Public Works**
Time: **11:30 A.M.** **Date:** **01/25/2012**
Interview Location: **Location Information Here**

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **Local Government**

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   No.

2. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   No.

3. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No. The best way to convey information is to send a hard copy to the town manager, Maria Davis.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

   No, I am not aware of any.

5. Are you aware of any changes in projected land use(s) at the Site?

   If there is a change of land use, I am not aware of it.

6. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

7. Do you have any comments, suggestions or recommendations regarding the project?

   No.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST	
I. SITE INFORMATION	
Site Name: Trans Circuits, Inc.	**Date of Inspection: January 25, 2012**
Location and Region: Lake Park, Florida, Region 4	**EPA ID: FLD091471904**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature: 85° and sunny**
Remedy Includes: (Check all that apply) ☐ Landfill cover/containment ☐ Access controls ☐ Institutional controls ☐ Ground water pump and treatment ☐ Surface water collection and treatment ☒ Other: Ground water bioremediation and soil excavation	☐ Monitored natural attenuation ☐ Ground water containment ☐ Vertical barrier walls
Attachments: ☒ Inspection team roster attached	☐ Site map attached
II. INTERVIEWS (check all that apply)	
1. **O&M Site Manager** _____ Name _____ Title mm/dd/yyyy Date Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____ Problems, suggestions ☐ Report attached: _____	
2. **O&M Staff** _____ Name _____ Title mm/dd/yyyy Date Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____ Problems/suggestions ☐ Report attached: _____	

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

Agency Lake Park Public Works
Contact Mr. Richard Pittman ____ 1/25/12 ____
Name Title Date Phone No.
Problems/suggestions ☐ Report attached: Yes

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

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

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

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

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

Mr. Twiggs, Owner of Twiggs Learning Tree

Scott Burfield, Current owner of the Site

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

1. **O&M Documents**

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

Remarks: No O&M activities are currently conducted on-site

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: ____

4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Ground Water Monitoring Records**	☒ Readily available	☐ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
	IV. O&M COSTS			
1.	**O&M Organization**			
	☐ State in-house	☐ Contractor for state		
	☐ PRP in-house	☐ Contractor for PRP		
	☐ Federal facility in-house	☐ Contractor for Federal facility		
	☐ _____			

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks: _____

B. Other Access Restrictions

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

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

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

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ mm/dd/yyyy _____

Name Title Date Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: _____

D. General

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

Remarks: _____

2. **Land Use Changes On Site** ☐ N/A

Remarks: None, the Site is in an industrial area.

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

Remarks: None, surrounding area is also industrial.

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

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

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

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

Arial extent: _____ Depth: _____

Remarks: _____

2.	**Cracks**	☐ Location shown on site map	☐ Cracking not evident
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable	☐ N/A
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay

Remarks: _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement

Arial extent: _____ Depth: _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation

Material type:_____ Arial extent: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion

Arial extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Arial extent: _____ Depth: _____

Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions

☐ Location shown on site map Arial extent: _____

Size: _____

Remarks: _____

6. **Excessive Vegetative Growth** Type: _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Arial extent: _____

Remarks: _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

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

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

Remarks: _____

2. **Gas Monitoring Probes**

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

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

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

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

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

Remarks: _____

4. **Extraction Wells Leachate**

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

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

Remarks: _____

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

Remarks: _____

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

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

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

Remarks: _____

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

Remarks: _____

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

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

☐ Siltation not evident

Remarks: _____

2.	**Erosion**	Area extent: _____	Depth: _____
	☐ Erosion not evident		
	Remarks: _____		
3.	**Outlet Works**	☐ Functioning	☐ N/A
	Remarks: _____		
4.	**Dam**	☐ Functioning	☐ N/A
	Remarks: _____		
H. Retaining Walls		☐ Applicable	☐ N/A
1.	**Deformations**	☐ Location shown on site map	☐ Deformation not evident
	Horizontal displacement: _____		Vertical displacement: _____
	Rotational displacement: _____		
	Remarks: _____		
2.	**Degradation**	☐ Location shown on site map	☐ Degradation not evident
	Remarks: _____		
I. Perimeter Ditches/Off-Site Discharge		☐ Applicable	☐ N/A
1.	**Siltation**	☐ Location shown on site map	☐ Siltation not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	**Vegetative Growth**	☐ Location shown on site map	☐ N/A
	☐ Vegetation does not impede flow		
	Area extent: _____		Type: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	**Discharge Structure**	☐ Functioning	☐ N/A
	Remarks: _____		
VIII. VERTICAL BARRIER WALLS		☐ Applicable	☒ N/A
1.	**Settlement**	☐ Location shown on site map	☐ Settlement not evident
	Area extent: _____		Depth: _____
	Remarks: _____		

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

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

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

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

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

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

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

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

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

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

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

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

Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

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

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

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

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of ground water treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

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

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

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

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

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemicals and equipment properly stored

Remarks: _____

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

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

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

Remarks: All wells were locked and labeled, with the exception of one well whose top would not close.

D. Monitoring Data

1. **Monitoring Data**

☐ Is routinely submitted on time ☐ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation			
1. **Monitoring Wells** (natural attenuation remedy)			
☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
☐ All required wells located	☐ Needs maintenance		☒ N/A
Remarks: _____			

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

The ground water remedy has not yet been implemented.

B. Adequacy of O&M

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

_____

C. Early Indicators of Potential Remedy Problems

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

_____

D. Opportunities for Optimization

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

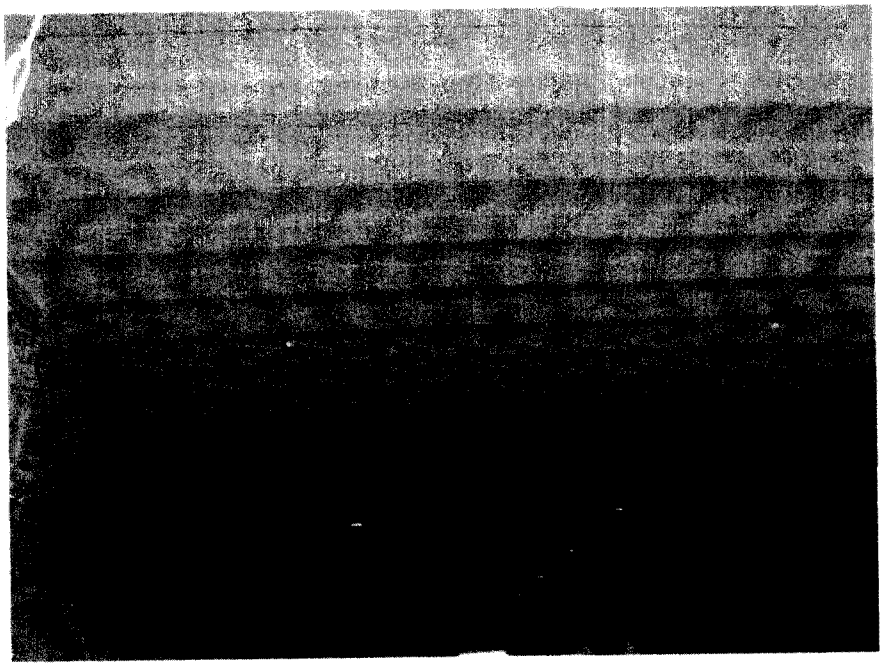
_____

Site Inspection Team:

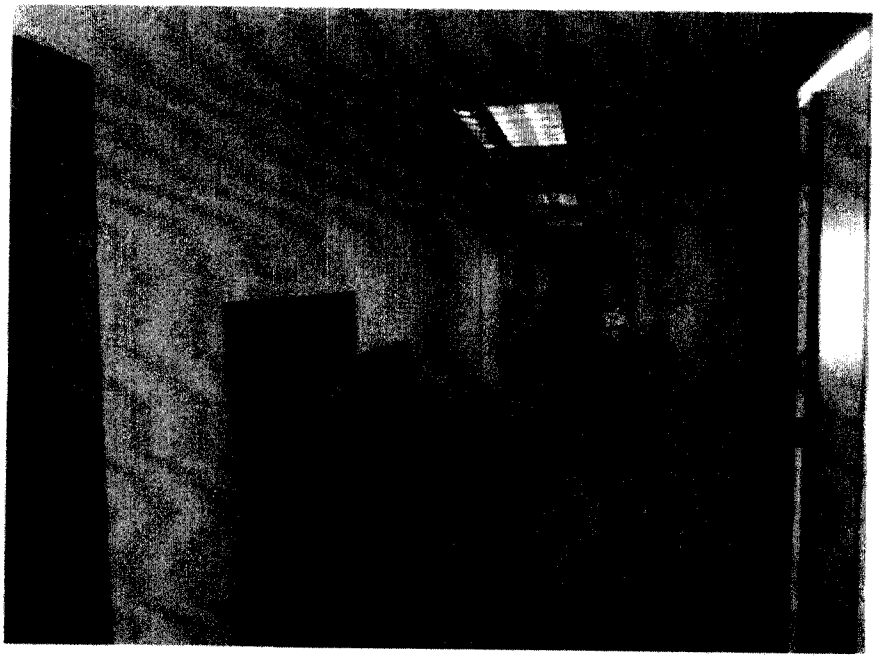
Bill Denman, EPA Region 4
L'Tonya Spencer, EPA Region 4
Scott Burfield, Florida Aero Precision
Dan Reardon, Alltech Environmental
Treat Suomi, Skeo Solutions
Kirby Webster, Skeo Solutions

Appendix E: Photographs from Site Inspection Visit

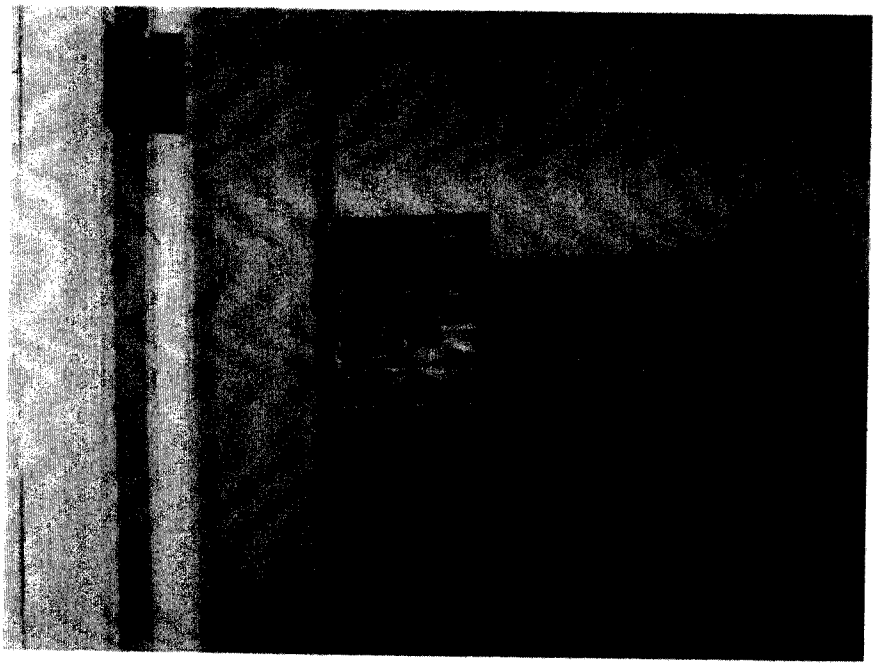
The site building and front parking lot from Newman Street



Newly painted ceiling inside the warehouse on site



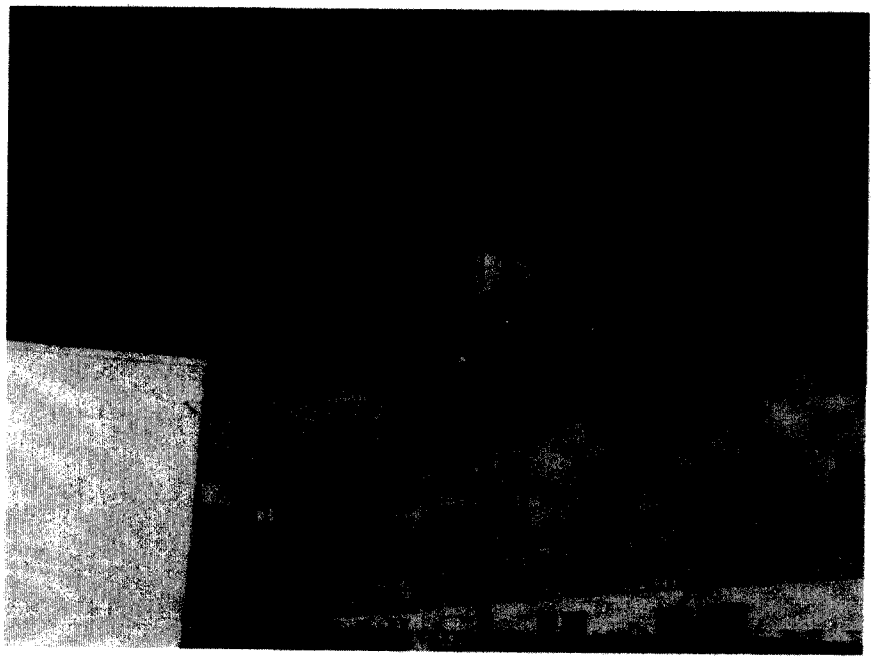
Location of new offices for Florida Aero Precision inside on-site building



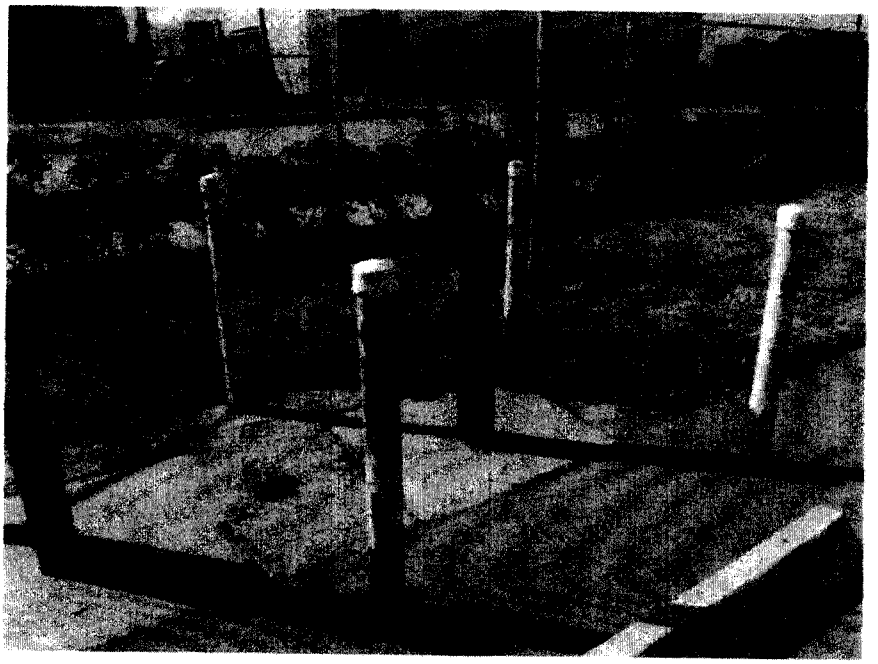
Bank of surveillance video from cameras located around the building

Behind the building, black barrels from sampling event

Flush-mounted monitoring well behind the building



Floodlights mounted in the rear of the on-site building to reduce trespassing and vandalism



Monitoring wells in front of the building, will be replaced with flush-mounted wells

Appendix F: Data

Soil Data: Table 4-22 from 2009 Final Design Report

Soil Depth A (0 to 6 inches) Units in ug/kg	FDEP Residental SCTLs	Florida Case Study # 3	SB101 8/12/2009 SB101A_081209	SB102 8/12/2009 SB102A_081209	SB103 8/12/2009 SB103A_081209	SB104 8/12/2009 SB104A_081209	SB105 8/12/2009 SB105A_081209
SV Organics, OC Pesticides, OP Pesticides							
Acenaphthene	2,400,000		34 U	79	34 U	35 U	37 U
Acenaphthylene	1,800,000		34 U	35 U	34 U	35 U	37 U
Anthracene	21,000,000		34 U	98	34 U	35 U	37 U
Benzo(a)anthracene	100		110	1200	66	35 U	130
Benzo(a)pyrene	100		160	1500	83	38	150
Benzo(b)fluoranthene	100		240	1800	110	51	210
Benzo(g,h,i)perylene	2,500,000		53	280	34 U	35 U	37 U
Benzo(k)fluoranthene	100		34 U	1400	84	47	180
Chrysene	1		240	2100	130	54	180
Dibenz(a,h)anthracene	1,000		74	600	37	35 U	59
Fluoranthene	3,200,000		320	3100	200	96	200
Fluorene	2,600,000		34 U	81	34 U	35 U	37 U
Indeno(1,2,3-cd)pyrene	100		140	1200	73	36	140
Phenanthrene	2,200,000		120	1600	92	51	38
Pyrene	2,400,000		330	3100	190	90	270
Semi Volatile Organics Calculated							
BaP Equivalent Detects Calculated		800	195.24	1816.1	101.57	43.624	185.98
PAH Detect Sum			1787	18138	1065	463	1557

Soil Depth B (6 to 12 inches) Units in ug/kg	FDEP Residental SCTLs	Florida Case Study # 3	SB101 8/12/2009 SB101B_081209	SB102 8/12/2009 SB102B_081209	SB103 8/12/2009 SB103B_081209	SB104 8/12/2009 SB104B_081209	SB105 8/12/2009 SB105B_081209
SV Organics, OC Pesticides, OP Pesticides							
Acenaphthene	2,400,000		34 U	34 U	35 U	34 U	52
Acenaphthylene	1,800,000		34 U	34 U	35 U	34 U	150
Anthracene	21,000,000		34 U	34 U	35 U	34 U	210
Benzo(a)anthracene	100		34 U	70	35 U	34 U	1500
Benzo(a)pyrene	100		34 U	80	35 U	34 U	1500
Benzo(b)fluoranthene	100		34 U	110	35 U	34 U	1800

Benzo(g,h,i)perylene	2,500,000		34 U	34 U	35 U	34 U	260
Benzo(k)fluoranthene	100		34 U	110	35 U	34 U	1600
Chrysene	1		34 U	130	35 U	34 U	1800
Dibenz(a,h)anthracene	1000		34 U	35	35 U	34 U	440
Fluoranthene	3,200,000		34 U	220	35 U	34 U	2100
Fluorene	2,600,000		34 U	34 U	35 U	34 U	37
Indeno(1,2,3-cd)pyrene	100		34 U	71	35 U	34 U	1100
Phenanthrene	2,200,000		34 U	100	35 U	34 U	330
Pyrene	2,400,000		34 U	180	35 U	34 U	2600
Semi Volatile Organics Calculated							
BaP Equivalent Detects Calculated		800		99.23			1847.8
PAH Detect Sum				1106			15479

Soil Depth C (1 to 2 feet) Units in ug/kg	FDEP Residental SCTLs	Florida Case Study # 3	SB101 8/12/2009 SB101C_081209	SB101 8/12/2009 SB9101C_081209	SB102 8/12/2009 SB102C_081209	SB103 8/12/2009 SB103C_081209	SB104 8/12/2009 SB104C_081209	SB105 8/12/2009 SB105C_081209
SV Organics, OC Pesticides, OP Pesticides								
Acenaphthene	2,400,000		34 U	35 U	34 U	34 U	34 U	34 U
Acenaphthylene	1,800,000		34 U	35 U	34 U	34 U	34 U	34 U
Anthracene	21,000,000		34 U	35 U	34 U	34 U	34 U	34 U
Benzo(a)anthracene	100		34 U	35 U	34 U	34 U	34 U	94
Benzo(a)pyrene	100	800	34 U	35 U	34 U	34 U	34 U	120
Benzo(b)fluoranthene	100		34 U	35 U	34 U	34 U	34 U	150
Benzo(g,h,i)perylene	2,500,000		34 U	35 U	34 U	34 U	34 U	34 U
Benzo(k)fluoranthene	100		34 U	35 U	34 U	34 U	34 U	130
Chrysene	1		34 U	35 U	34 U	34 U	34 U	120
Dibenz(a,h)anthracene	1,000		34 U	35 U	34 U	34 U	34 U	46
Fluoranthene	3,200,000		34 U	35 U	44	34 U	34 U	200
Fluorene	2,600,000		34 U	35 U	34 U	34 U	34 U	34 U
Indeno(1,2,3-cd)pyrene	100		34 U	35 U	34 U	34 U	34 U	98
Phenanthrene	2,200,000		34 U	35 U	34 U	34 U	34 U	71
Pyrene	2,400,000		34 U	35 U	41	34 U	34 U	240
Semi Volatile Organics Calculated								
BaP Equivalent Detects Calculated		800						145.82
PAH Detect Sum					85			1269

Soil Depth D (2 to 3 feet) Units in ug/kg	FDEP Residental SCTLs	Florida Case Study # 3	SB101 8/12/2009 SB101D_081209	SB102 8/12/2009 SB102D_081209	SB103 8/12/2009 SB103D_081209	SB104 8/12/2009 SB104D_081209	SB105 8/12/2009 SB105D_081209
SV Organics, OC Pesticides, OP Pesticides							
Acenaphthene	2,400,000		34 U	34 U	34 U	34 U	34 U
Acenaphthylene	1,800,000		34 U	34 U	34 U	34 U	34 U
Anthracene	21,000,000		34 U	34 U	34 U	34 U	34 U
Benzo(a)anthracene	100		34 U	34 U	34 U	34 U	34 U
Benzo(a)pyrene	100		34 U	34 U	34 U	34 U	34 U
Benzo(b)fluoranthene	100		34 U	34 U	34 U	34 U	34 U
Benzo(g,h,i)perylene	2,500,000		34 U	34 U	34 U	34 U	34 U
Benzo(k)fluoranthene	100		34 U	34 U	34 U	34 U	34 U
Chrysene	1		34 U	34 U	34 U	34 U	34 U
Dibenz(a,h)anthracene	1,000		34 U	34 U	34 U	34 U	34 U
Fluoranthene	3,200,000		34 U	34 U	34 U	34 U	34 U
Fluorene	2,600,000		34 U	34 U	34 U	34 U	34 U
Indeno(1,2,3-cd)pyrene	100		34 U	34 U	34 U	34 U	34 U
Phenanthrene	2,200,000		34 U	34 U	34 U	34 U	34 U
Pyrene	2,400,000		34 U	34 U	34 U	34 U	34 U
Semi Volatile Organics Calculated							
BaP Equivalent Detects Calculated		800					
PAH Detect Sum							

Notes:

SB - Soil location

ug/kg - Micrograms per kilogram

U - The analyte was not detected at or above the reporting limit.

FDEP Residential SCTLs Florida Department of Environmental Protection, Chapter 62-777 Florida Administrative Code. Contaminant Cleanup Target Levels, Amended April 17, 2005.

Florida Case Study # 3 "Polycyclic Aromatic Hydrocarbons (PAHs) in Urban Soil: A Florida Risk Assessment Perspective," International Journal of Soil, Sediment, and Water: Volume 1: Issue 2, Article 2 (Teaf, 2008). Information regarding west-central Florida soils adjacent to and beneath asphalt parking lot, benzo(a)pyrene equivalents a mean of 0.4 parts per million and 95 percent upper confidence limit of 0.8 parts per million. Shading indicates an exceedance of the Florida Case Study #3 95 percent upper confidence limit of 0.8 parts per million.

Historical Ground Water Data

Table A
Historical Summary of Ground Water for Chemicals of Concern
Trans Circuits Superfund Site
Lake Park, Palm Beach County, Florida

Sample Location and Screened Interval	Date	CHEMICALS OF CONCERN								
		VOLATILES (ug/L)							OTHER (ug/L)	
		PCE (3)	TCE (3)	cis 1,2-DCE (NE)	trans 1,2-DCE (NE)	Total 1,2-DCE (70)	Vinyl Chloride (1)	Chloroform (6)	Nickel (100)	Fluoride (2000)
ON-SITE MONITORING WELLS										
MW2D 138.00 to 147.72 feet below land surface (bls)	1/15/98	10U	10U	NA	NA	16	10U	10U	6J	2500U
	6/29/99	56U	56U	NA	NA		56U	56U		NA
	9/14/02	10U	10U	220	55		1J	10U	40	NA
	1/13/2004 A	10U	10U	NA	NA		1J	10U	NA	NA
	1/13/2004 B	1U	1U	120	16		0.67J	1U	NA	NA
	1/13/2004 C	1U	1U	140	21		0.93J	1U	NA	NA
	4/6/2004 A	1U	1U	84	11		1U	1U	NA	NA
	4/6/2004 B	1U	1U	90A	0.46		0.58AJ	1U	NA	NA
	4/6/2004 C	1U	1U	140	23			1U	NA	NA
	7/13/2004 A	1U	1U	47A	4.6A	51.6	1U	1U	NA	NA
	7/13/2004 B	1U	1U	59	5.6	64.6	1U	1U	NA	NA
	7/13/2004 C	2U	2U	110	17		2U	2U	NA	NA
	10/8/2004 A	1U	1U	32A	3.3A	35.2	1U	1U	NA	NA
	10/8/2004 B	1U	1U	49	4.6	55.6	0.27J	1U	NA	NA
	10/8/2004 C	2U	2U	110	15		0.68J	2U	NA	NA
	1/11/2005 A	1U	1U	20	1.7	21.7	0.11J	1U	NA	NA
	1/11/2005 B	1U	1U	28	2.7	30.7	0.18J	1U	NA	NA
	1/11/2005 C	10U	10U	68	9.8		0.65J	1U	NA	NA
	4/19/2005 A	10U	10U	8J	10UJ	18	10U	10U	NA	NA
	4/19/2005 B	10U	10U	14J	10UJ	24	10U	10U	NA	NA
	4/19/2005 C	10U	10U	21	10UJ	31	10U	10U	NA	NA
	7/25/2005 A	1.0U	1.0U	3.2	1.0U	4.2	1.0U	1.0U	NA	NA
	7/25/2005 B	1.0U	1.0U	10	0.72J	10.72	1.0U	1.0U	NA	NA

	C	1.0U	1.0U	16	1.3	17.3	1.0U	1.0U	NA	NA
	2/15/07	0.50U	0.50U	57	7.2	64.2	0.56	0.50U	6J	NA
	6/12/08	5U	5U	25	1.9J	26.9J	5U	NA	11	
	1/12/09	0.50U	0.50U	6.2	0.38J	6.58J	0.50U	0.50U	40U	550J
	3/10/09	0.50U	0.50U	17	1.3	18.3	0.50U	0.50U	2.0J	694UJ
	6/2/09	0.50U	0.50U	14	0.98	14.98	0.50U	0.50U	10U	440
	6/2/2009 DUP	0.50U	0.50U	13	0.86	13.86	0.50U	0.50U	10U	440
	8/10/09	0.50U	0.50U	14	0.87	14.87	0.50U	0.50U	10U	420 J
	1/18/12	0.50U	0.50U	3.4	0.50U	3.9	0.50U	0.50U	40U	380
MW2S 257.70 to 269.45 feet bls	9/10/02	10U	10U	3J	10U	13	10U	10U	10U	280
	2/15/07	0.5UJ	0.5UJ	1UJ	2UJ	3	0.5UJ	0.5UJ	4.4J	270
	6/13/08	5U	5U	1.2J	5U	6.2J	5U	NA	10U	230J
	1/13/09	1.3		8.4	0.46J	8.86	0.50U	0.50U	40U	180
	3/11/09	0.25J	1.1	4.0	0.31J	4.31	0.50U	0.50U	1.9J	120
	6/2/09	0.50U	0.50U	1.8	0.50U	1.85	0.50U	0.50U	10U	200
	8/13/09	0.50U	0.50U	1.2	0.50U	1.7	0.50U	0.50U	10U	200
	8/13/2009 DUP	0.50U	0.50U	1.2	0.50U	1.7	0.50U	0.50U	10U	200
	1/19/12	0.50U	0.50U	1.2	0.15J	1.35	0.50U	0.50U	40U	250
	1/19/2012 DUP	0.50U	0.50U	1.1	0.11	1.21	0.50U	0.50U	40U	230
DER4S 40 to 60 feet bls	1/14/98	10U	10U	NA	NA	10U	10U	10U	19J	
	6/30/99	10U	10U	NA	NA	10U	10U	10U	8.2J	
	10/1/02	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	0.50U	40U	
	1/14/04	NA	NA	NA	NA	NA	NA	NA	NA	
	7/13/04	NA	NA	NA	NA	NA	NA	NA	NA	
	1/11/05	NA	NA	NA	NA	NA	NA	NA	NA	
	2/13/07	NA	NA	NA	NA	NA	NA	NA	NA	
	1/24/12	NA	NA	NA	NA	NA	NA	NA	NA	
DER4I 100 to 120 feet bls	1/14/98	10U	10U	NA	NA	22	10U	10U	24J	
	6/30/99	10U	10U	NA	NA	20	10U	10U	8.4J	
	9/17/02	10U	10U	5J	10U	15	10UJ	10U	3.2U	NA
	2/13/07	NA	NA	NA	NA	NA	NA	NA	NA	
	6/3/09	NA	NA	NA	NA	NA	NA	NA	NA	
	1/24/12	NA	NA	NA	NA	NA	NA	NA	NA	

	1/24/2012 DUP	NA	NA	NA	NA	NA	NA	NA	NA	
MW11D 184.70 to 194.48 feet bls	6/29/99			NA	NA		71U	71U		310
	9/13/02			NA	NA		10U	10U		NA
	12/19/02	NA		NA	NA		NA	NA	99	NA
	2/20/03	10U	10U	NA	NA	10U	10U	10U	NA	NA
	1/12/2004 A	1U		110	8.9		0.52J	1U	NA	NA
	1/12/2004 B	0.83J		100	6.2		1U	1U	NA	NA
	1/12/2004 C			200	7.1		1U	1U	NA	NA
	1/14/04	NA	NA	NA	NA	NA	NA	NA	13A	NA
	4/5/2004 A	1U		94	7		1U	1U	NA	NA
	4/5/2004 B	0.85J		100	5.8		1U	1U	NA	NA
	4/5/2004 C	2.8		200	4.8		2U	2U	NA	NA
	7/12/2004 A	2U		78	4.5		2U	2U	NA	NA
	7/12/2004 B	2U		82	3.9		2U	2U	NA	NA
	7/12/2004 C	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/13/04	NA	NA	NA	NA	NA	NA	NA	10U	NA
	10/8/2004 A	2U		66	3.8	69.8	2U	2U	NA	NA
	10/8/2004 B	2U		70	3.4		2U	2U	NA	NA
	10/8/2004 C	2J		190	3J		5U	5U	NA	NA
	1/10/2005 A	1U		73A	4.6A		0.33AJ	1U	NA	NA
	1/10/2005 B	0.21J		86	3.8		0.18J	1U	NA	NA
	1/10/2005 C	0.56J		120	3.3		2U	2U	NA	NA
	1/12/05	NA	NA	NA	NA	NA	NA	NA	20	NA
	4/18/2005 A	10U		76	4J		10U	10U	NA	NA
	4/18/2005 B	10U		80	4		10U	10U	NA	NA
	4/18/2005 C	10U		270J	5J		10U	10U	NA	NA
	7/25/2005 A	1.0U		60	3.1	63.1	1.0U	1.0U	NA	NA
	7/25/2005 B	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/2005 C	0.40J		140	2.0		2.0U	2.0U	NA	NA
	2/13/07	0.57U	1.7	26	1.5J	27.5	0.50U	0.50U	19UJ	NA
	3/14/08	1.0U	0.18J	84	9.3		1.0U	1.0U	NA	NA
	6/15/08	5.0U	5.0U	81	8.4		5.0U	5.0U	NA	NA
	6/5/09	0.50U	0.50U	5.7	0.42J	6.12	0.50U	0.50U	NA	NA

	1/20/12	0.50U	0.19J	10	1.7	11.7	0.50U	0.50U	40U	210
MW11B 263.26 to 272.39 feet bls	8/23/02	10U	10U	10U	10U	10U	10U	10U	11U	NA
	1/13/2004 A	1U	1U	1U	1U	1U	1U	1U	NA	NA
	1/13/2004 B	1U	1U	1U	1U	1U	1U	1U	NA	NA
	1/13/2004 C/C DUP	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	NA/NA	NA/NA
	4/6/2004 A	1U	1U	1U	1U	1U	1U	1U	NA	NA
	4/6/2004 B	1U	1U	1U	1U	1U	1U	1U	NA	NA
	4/6/2004 C/C DUP	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	NA/NA	NA/NA
	7/12/2004 A	1U	1U	1U	1U	1U	1U	1U	NA	NA
	7/12/2004 B	1U	1U	1U	1U	1U	1U	1U	NA	NA
	7/12/2004 C/C DUP	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	NA/NA	NA/NA
	10/8/2004 A	1U	1U	0.39J	1U	1.39	1U	1U	NA	NA
	10/8/2004 B	1U	1U	0.21J	1U	1.21	1U	1U	NA	NA
	10/8/2004 C/C DUP	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	NA/NA	NA/NA
	1/10/2005 A	1U	1U	0.38J	1U	1.38	1U	1U	NA	NA
	1/10/2005 B	1U	1U	0.31J	1U	1.31	1U	1U	NA	NA
	1/10/2005 C/C DUP	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	1U/1U	NA/NA	NA/NA
	4/18/2005 A	0.50U	0.084J	0.49J	0.50U	0.99	0.50U	0.50U	NA	NA
	4/18/2005 B	0.50U	0.087J	0.44J	0.50U	0.94	0.50U	0.50U	NA	NA
	4/18/2005 C/C DUP	0.50U/0.50U	0.50U/0.078J	0.41J/0.37J	0.50U/0.50U	0.91/0.87	0.50U/0.50U	0.50U/0.50U	NA/NA	NA/NA
	7/25/2005 A	1.0U	0.078J	0.37J	0.50U	0.87	0.50U	0.50U	NA	NA
	7/25/2005 B	1.0U	1.0U	0.44U	1.0U	1.44	1.0U	1.0U	NA	NA
	7/25/2005 C/C DUP	1.0U/1.0U	1.0U/1.0U	0.18J/1.0U	1.0U/1.0U	1.18/1.0U	1.0U/1.0U	1.0U/1.0U	NA/NA	NA/NA
	2/13/07	0.50U	0.50U	1.0U	2.0U	2.0U	0.50U	0.50U	NA	NA
OFFSITE MONITORING WELLS										
MW12I 138.12 to 147.84 feet bls	6/23/99	10U	10U	NA	NA	33	10UJ	10U	14J	NA
	9/15/02	10U	10U	190	14			10U	21	NA
	1/14/2004 A	1U	1U	110	13			1U	NA	NA
	1/14/2004 B	1U	1U	100	13			1U	NA	NA
	1/14/2004 C	1U	1U	100	12			1U	NA	NA
	4/6/2004 A	1U	1U	47	6.9	53.9	0.69J	1U	NA	NA
	4/6/2004 B	1U	1U	67	9			1U	NA	NA
	4/6/2004 C	1U	1U	66	8.9		1	1U	NA	NA

	7/12/2004 A	1U	1U	51	6.3	57.3	0.57J	1U	NA	NA
	7/12/2004 B	1U	1U	74	8.6		0.94J	1U	NA	NA
	7/12/2004 C	1U	1U	74	8.6		0.85J	1U	NA	NA
	10/9/2004 A	1U	0.22J	53	6.2	59.2	0.65J	1U	NA	NA
	10/9/2004 B	1U	0.11J	69	7.3		0.87J	1U	NA	NA
	10/9/2004 C	1U	1U	76	8.2		0.99J	1U	NA	NA
	1/11/2005 A	1U	1U	29	4.1	33.1	0.15J	1U	NA	NA
	1/11/2005 B	1U	1U	37	5.5	42.5	1U	1U	NA	NA
	1/11/2005 C	1U	1U	39	5.8	44.8	1U	1U	NA	NA
	4/19/2005 A	10U	10U	32	4J	36	10U	10U	NA	NA
	4/19/2005 B	10U	10U	35	5J	40	10U	10U	NA	NA
	4/19/2005 C	10U	10U	38	5J	43	10U	10U	NA	NA
	7/26/2005 A	1.0U	1.0U	22	3.1	25.1	1.0U	1.0U	NA	NA
	7/26/2005 B	1.0U	1.0U	31	4.2	35.2	0.29J	1.0U	NA	NA
	7/26/2005 C	1.0U	1.0U	31	4.0	35.0	1.0U	1.0U	NA	NA
	2/16/07	0.50U	0.50U	180J	20			0.50U	NA	NA
	6/19/08	5.0U	5.0U	110	13		5.0U	5.0U	NA	NA
	6/4/09	1.0U	1.0U	130	17			1.0U	NA	NA
	1/23/12	0.50U	0.50U	0.50U	0.50U	1	0.50U	0.50U	NA	NA
MW12D 187.26 to 197.27 feet bls	6/23/99	10U	10U	NA	NA	10U	10U	10U	2.0U	NA
	9/15/02	0.50U	0.50U	9.6	0.25J	9.85	0.50U	0.50U	5.9	NA
	2/14/07	0.5U	0.5U	190J	5.9		0.7	0.5U	NA	NA
	6/19/08	5.0U	5.0U	130	3.3J		5.0U	5.0U	NA	NA
	6/4/09	0.50U	0.50U	57	0.75	57.75	0.50U	0.50U	NA	NA
	1/23/12	0.50U	0.50U	170	15			0.50U	NA	NA
MW4S 57.83 to 67.55 feet bls	1/16/98	10U	10U	NA	NA	1J	10U	10U	17J	500U
	6/22/99	NA	NA	NA	NA	NA	NA	NA		NA
	10/1/02	NA	NA	NA	NA	NA	NA	NA		NA
	1/14/04	NA	NA	NA	NA	NA	NA	NA		NA
	7/13/04	NA	NA	NA	NA	NA	NA	NA		NA
	1/11/05	NA	NA	NA	NA	NA	NA	NA		NA
	2/14/07	0.5U	0.5U	1U	2U	3	0.50U	0.50U	53	NA
	1/22/12	NA	NA	NA	NA	NA	NA	NA	0.04	N

MW4I 112.98 to 122.70 feet bls	1/16/98	10U		NA	NA	1J	10U	10U	52	500U
	6/22/99	10U	10U	NA	NA		10UJ	10U	36J	NA
	9/10/02	10U	10U	3J	10U	13	10U	10U	56	NA
	2/14/07	0.5U	0.5U	3.8	0.39J	4.19	0.5U	0.5U	65	NA
	1/22/12	NA	NA	NA	NA	NA	NA	NA	58	NA
	1/22/2012 DUP	NA	NA	NA	NA	NA	NA	NA	62	NA
MW4D 138.39 to 149.10 feet bls	1/16/98	10U		NA	NA		10U	10U		2500U
	6/22/99	10U	3J	10U	10U		10U	10U	90	NA
	10/1/02	1.0U	1.0U	48	11	59	1.0U	1.0U	56	NA
DER7D 120 to 140 feet bls	1/17/98	10U	10U	NA	NA	18	10U	10U	7J	500U
	6/23/99	10U	10U	NA	NA	63	10UJ	10U	2.0U	NA
	9/30/02	2U	2U	NA	NA		2U	2U	NA	NA
	1/14/2004 A	1U	1U	12A	0.62AJ	12.6	1U	1U	NA	NA
	1/14/2004 B	1U	1U	25	1.4	26.4	1U	1U	NA	NA
	1/14/2004 C	1U	1U	30	1.5	31.5	1U	1U	NA	NA
	4/7/2004 A	1U	1U	13	0.71J	13.7	1U	1U	NA	NA
	4/7/2004 B	1U	1U	26	1.4	27.4	1U	1U	NA	NA
	4/7/2004 C	1U	1U	31	1.5	32.5	1U	1U	NA	NA
	7/13/2004 A	1U	1U	14	0.74J	14.7	1U	1U	NA	NA
	7/13/2004 B	1U	1U	20	1.3	21.3	1U	1U	NA	NA
	7/13/2004 C	1U	1U	30A	1.4A	31.4	1U	1U	NA	NA
	10/9/2004 A	1U	0.54J	13	0.56J	13.56	1U	1U	NA	NA
	10/9/2004 B	1U	0.27J	27	1.2	28.2	1U	1U	NA	NA
	10/9/2004 C	1U	0.36J	36	1.6	37.6	0.14J	1U	NA	NA
	1/11/2005 A	1U	0.55J	16	0.62J	16.62	1U	1U	NA	NA
	1/11/2005 B	1U	0.35J	33	1.3	34.3	1U	1U	NA	NA
	1/11/2005 C	1U	0.44J	62	2.1	64.1	0.27J	1U	NA	NA
	4/19/2005 A	10U	10U	8J	10U	18	10U	10U	NA	NA
	4/19/2005 B	10U	10U	24	10U	34	10U	10U	NA	NA
	4/19/2005 C	10U	10U	51	10U	61	10U	10U	NA	NA
	7/26/2005 A	1.0U	1.3	8.3	0.28J	6.58	1.0U	1.0U	NA	NA
	7/26/2005 B	1.0U	0.68J	12	0.58J	12.58	1.0U	1.0U	NA	NA

	C	1.0U	0.44J	30	1.1	31.1	1.0U	1.0U	NA	NA
	2/18/07	0.50U	1.5	23	0.53J	23.53	0.50U	0.50U	NA	NA
MW15I 138.42 to 148.14 feet bls	6/29/99	3J		NA	NA		10U	3J	4.6UJ	NA
	9/18/02			44	1J	45J	10UJ	10U	1.4U	NA
	1/14/2004 A	1U	1U	18	1U	18	1U	1U	NA	NA
	1/14/2004 B	1U	1U	19	1U	19	1U	1U	NA	NA
	1/14/2004 C	1U	1U	18	1U	18	1U	1U	NA	NA
	4/6/2004 A	1U	1U	18	1U	18	1U	1U	NA	NA
	4/6/2004 B	1U	1U	19	1U	19	1U	1U	NA	NA
	4/6/2004 C	1U	1U	19A	1U	19	1U	1U	NA	NA
	7/13/2004 A	1U	1U	17	1U	17	1U	1U	NA	NA
	7/13/2004 B	1U	1U	18	0.88J	18.9	1U	1U	NA	NA
	7/13/2004 C	1U	1U	18	1U	18	1U	1U	NA	NA
	10/9/2004 A	1U	0.12J	23	0.50J	23.5	0.13J	1U	NA	NA
	10/9/2004 B	1U	1U	22	0.40J	22.4	0.11J	1U	NA	NA
	10/9/2004 C	1U	1U	22	0.48J	22.46	1U	1U	NA	NA
	1/11/2005 A	1U	1U	17	0.17J	17.17	1U	1U	NA	NA
	1/11/2005 B	1U	0.12J	17	0.16J	17.16	1U	1U	NA	NA
	1/11/2005 C	1U	0.13J	16	1U	17	1U	1U	NA	NA
	4/19/2005 A	10U	10U	16	10U	26	10U	10U	NA	NA
	4/19/2005 B	10U	10U	22	10U	32	10U	10U	NA	NA
	4/19/2005 C	10U	10U	19	10UJ	29	10U	10U	NA	NA
	7/26/2005 A	1.0U	1.0U	18	1.0U	19.0	1.0U	1.0U	NA	NA
	7/26/2005 B	1.0U	1.0U	18	1.0U	19.0	1.0U	1.0U	NA	NA
	7/26/2005 C	1.0U	1.0U	18	1.0U	19.0	1.0U	1.0U	NA	NA
	2/18/07	2.7		22	0.92	22.9	0.50U	0.50U	NA	NA
	6/18/08	1.0J		19	5.0U	24	5.0U	5.0U	NA	NA
	6/5/09	0.50U	0.98	15	0.50U	15.5	0.50U	0.50U	NA	NA
	1/21/12	0.50U	0.50U	250	5.2		0.93	0.50U	NA	NA
	1/21/2012 DUP	0.50U		28	0.91	28.91	0.13J	0.50U	NA	NA
MW16D 186.05 to 195.78 feet bls	6/29/99	10U	10U	NA	NA	10U	10U	6J	13J	NA
	9/18/02	0.50U	0.50U	0.50U	0.50U	1	0.50U	0.50U	0.60U	NA
	2/17/07	0.5U	1.4	4.8	2U	6.8	0.5UJ	0.5U	NA	NA

	6/5/09	0.65		16	0.50U	16.6	0.50U	0.50U	NA	NA
	1/21/12	1.0		27	0.81	27.81	0.50U	0.50U	NA	NA
	1/15/98	10U		NA	NA		NA	NA	5J	NA
	6/25/99	10U		NA	NA	52	10U	10U	1.1J	NA
	9/17/02	10UJ		97	5		10UJ	10UJ	1.6U	NA
	1/13/2004 A	1U		72	4.7		1U	1U	NA	NA
	1/13/2004 B	1U		77	5.3		1U	1U	NA	NA
	1/13/2004 C	1U		81	5.9		1U	1U	NA	NA
	4/7/2004 A	1U		81	5.7		1U	1U	NA	NA
	4/7/2004 B	1U		84	5.8		1U	1U	NA	NA
	4/7/2004 C	1U		96	6.9		1U	1U	NA	NA
	7/13/2004 A	2U		92	6		2U	2U	NA	NA
	7/13/2004 B	2U		110	7.4		2U	2U	NA	NA
	7/13/2004 C	2U		130	8.4		2U	2U	NA	NA
MW6I 113.12 to 122.84 feet bls	10/9/2004 A	2U		110	6.7		2U	2U	NA	NA
	10/9/2004 B	2U		130	7.7		0.25J	2U	NA	NA
	10/9/2004 C	2U		120	7.1		2U	2U	NA	NA
	1/10/2005 A	2U		96	6.3		2U	2U	NA	NA
	1/10/2005 B	4U		98	6.5		4U	4U	NA	NA
	1/10/2005 C	4U		110	6.6		4U	4U	NA	NA
	4/19/2005 A	10U		110	8J		10U	10U	NA	NA
	4/19/2005 B	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4/19/2005 C	10U		120	8J		10U	10U	NA	NA
	7/26/2005 A	2.0U		93	6.2		2.0U	2.0U	NA	NA
	7/26/2005 B	2.0U		99	6.5		2.0U	2.0U	NA	NA
	7/26/2005 C	4.0U		99	6.1		4.0U	4.0U	NA	NA
	2/17/07	1.2		63	2.8	65.8	0.50U	0.50U	NA	NA
	6/18/08	5.0U		36	1.2J	37.2J	5.0U	5.0U	NA	NA
	6/5/09	1.0U		110J	6		1.0U	1.0U	NA	NA
	1/21/12	0.50U		190	9.6		0.50U	0.50U	NA	NA
MW6S 58.05 to 67.77 feet bls	1/15/98	10U	10U	NA	NA	10U	10U	10U	12J	NA
	6/25/99	10U	10U	NA	NA	2J	10U	10U	1.0U	NA
	9/17/02	0.50U	0.50U	2.2	0.18J	2.38	0.50U	0.50U	0.6U	NA

	4/19/2005 A	10U	10U	10U	10U	10U	10U	10U	NA	NA
	4/19/2005 B	10U	10U	10U	10U	10U	10UJ	10U	NA	NA
	4/19/2005 C	10U	10U	10U	10U	10U	10UJ	10U	NA	NA
	7/26/2005 A	0.97J	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	NA	NA
	7/26/2005 B	0.35J	1.0U	0.16J	1.0U	1.16	1.0U	1.0U	NA	NA
	7/26/2005 C	1.0U	1.0U	0.65J	1.0U	1.65	1.0U	1.0U	NA	NA
	2/17/07	0.50U	0.50U	0.66J	2.0U	2.66	0.50U	0.50U	NA	NA
MW6D 138.22 to 147.95 feet bls	1/15/98	10U	10U	NA	NA	44	10U	10U	5J	NA
	6/25/99	10U		NA	NA	54	10U	10U	1.0J	NA
	9/19/02	10UJ		10J	10UJ	20	10UJ	10UJ	2.1U	NA
	4/19/2005 A	10U	10U	10U	10U	10U	10U	10U	NA	NA
	4/19/2005 B	10U	10U	10U	10U	10U	10U	10U	NA	NA
	4/19/2005 C	10U	10U	10U	10U	10U	10U	10U	NA	NA
	7/26/2005 A	0.34J	2.8	2.2	1.0U	3.2	1.0U	1.0U	NA	NA
	7/26/2005 B	1.0U	2.0	1.8	1.0U	2.8	1.0U	1.0U	NA	NA
	7/26/2005 C	1.0U	0.63J	0.82J	1.0U	1.82	1.0U	1.0U	NA	NA
	2/17/07	0.50U		38	1.9J	39.9	0.50U	0.50U	NA	NA
	6/18/08	5.0U		42	0.99J	42.99J	5.0U	5.0U	NA	NA
	6/5/09	0.13J	0.16J	1.0	0.50U	1.5	0.50U	0.50U	NA	NA
	1/21/12	0.50U		46	1.2	47.2	0.50U	0.50U	NA	NA
PW17 205 to 245 feet bls	1/15/98	10U	10U	NA	NA	9J	10U	10U	2J	NA
	6/24/99	10U		NA	NA	25	10U	10U	2.0U	NA
	7/17/02	0.50U	1.6	19	0.47J	19.47	0.50U	0.50U	5.0U	NA
	10/11/04	1U	2.7A	26A	0.22AJ	26.22	1U	1U	NA	NA
	1/11/05	1U	2.4A	22A	0.24AJ	22.24	1U	1U	NA	NA
	4/19/05	0.50U	1	23	0.50U	23.5	0.50U	0.50U	NA	NA
	7/26/05	1.0U	0.47J	22	0.16J	22.16	1.0U	1.0U	NA	NA
	2/15/07	0.50U	0.55J	25	0.53J	25.53	0.50U	0.50UJ	NA	NA

ug/L Micrograms per liter
A, B, C Diffusion bag depth placement in increasing depth order
J Estimated value
U Material was analyzed for but not detected. The number is the minimum quantitation limit
A Average value
DUP Duplicate sample.
bls Below land surface.
NA Not analyzed
NE Not established.
MW Monitoring well.

PW	Municipal well.
()	U.S. Environmental Protection Agency Region 4, Record of Decision, Summary of Remedial Action Alternative Trans Circuits Site, Cleanup Levels, Lake Park, Palm Beach County, Florida, Signed April 12, 2001 (EPA, 2001b).
	Orange shading indicates an intermediate well.
	Blue shading indicates a deep well.
	Pattern and bold numbers indicate a concentration above ROD cleanup levels.
	Yellow shading indicates A diffusion bag depth.
	Green shading indicates B diffusion bag depth.
	Light blue shading indicates C diffusion bag depth.

Surface Soil Results – Tables 3-2, 3-3 and 3-4 from the ESI

Table 3-2
RD Surface Soil Analytical Results - Depth A - 0 To 6 Inches
Trans Circuits - Lake Park, Palm Beach County, Florida

Parameters (µg/kg)	FDEP SCTLs	EPA Cleanup Levels	Source					
			TC-SS01-A 07/16/2002	TC-SS901-A 07/16/2002	TC-SS02-A 07/16/2002	TC-SS03-A 07/16/2002	TC-SS04-A 07/16/2002	TC-SS05-A 07/16/2002
Extractable Organics (µg/kg)								
Benzaldehyde	18,000,000	NE	--	--	47J	--	--	--
Caprolactam	NE	NE	--	--	490	--	--	--
Naphthalene	270,000	NE	--	--	55J	--	--	--
Acenaphthene	18,000,000	NE	--	--	100J	--	--	--
Dibenzofuran	5,000,000	NE	--	--	120J	--	--	--
Fluorene	28,000,000	NE	--	--	110J	--	--	58J
Phenanthrene	300,000,000	NE	950	720	1,600	240J	180J	290J
Anthracene	260,000,000	NE	68J	58J	120J	--	--	--
Carbazole	190,000	NE	69J	58J	100J	--	--	--
Fluoranthene	48,000,000	NE	2,300	1,800	1,900	690	490	300J
Pyrene	37,000,000	NE	3,200	2,100	2,600	830	660	370J
Benzo(a)anthracene/ TEF (0.1)	5,000	NE	980/98.0	730/73.0	730/73.0	280J/28.0J	180J/18.0J	130J/13.0J
Chrysene/TEF (0.001)	450,000	NE	1400/1.400	1100/1.100	920/0.920	460/0.460	310J/0.310J	180J/0.180J
Benzo(b)fluoranthene/ TEF (0.1)	4,800	NE	1,900/190.0	1,500/150.0	1,100/110.0	580/58.0	460/46.0	210J/21.0J
Benzo(k)fluoranthene/ TEF (0.01)	52,000	NE	670/6.70	510/5.10	410J/4.10J	210/2.10	160J/1.60J	77J/0.77J
Benzo(a)pyrene/TEF (1.0)	500	NE	1,200/1,200	920/920	710/710	400J/400J	260J/260J	150J/150J
Indeno(1,2,3-cd)pyrene/TEF (0.1)	5,300	NE	860/86.0	590/59.0	380J/38.0J	250J/25.0J	170J/17.0J	91J/9.1J
Dibenzo(a,h)anthracene/ TEF (1.0)	500	NE	250J/250J	180/180	120J/120J	76J/76J	54J/54J	--
Benzo(ghi)perylene	41,000,000	NE	930	630	400J	270	170J	92J
Total CPAHs [BaP(TEF)]	NE	500	1832	1388	1056	590	397	194
Miscellaneous Extractable Organics (µg/kg)								
Petroleum product	NE	NE	N	N				
Benzo(e)pyrene	NE	NE						
Unidentified Compounds/#	NE	NE						
Metals (mg/kg)								
Aluminum	NE	NE	860	830	590	780	510	710
Antimony	240	NE	0.73	0.70	--	--	--	--
Arsenic	3.7	NE	1.6	3.7	0.76	0.75	0.6	0.49
Barium	87,000	NE	6.6	7.1	5.7	4.9	3.4	8.1
Calcium	NE	NE	36,000	39,000	48,000	78,000	65,000	140,000

Chromium	420	NE	5.6	5.0	3.2	2.9	3.2	3.6
Cobalt	110,000	NE	0.35	0.35	--	--	--	--
Copper	76,000	NE	320	330	210	62	44	--
Iron	480,000	NE	2,600	1,700	900	800	670	660
Lead	920	NE	100	97	32	15	10	1.5
Magnesium	NE	NE	240	260	270	320	260	470
Manganese	22,000	NE	26	16	12	6.9	6.9	6.7
Nickel	28,000	NE	18	17	4.3	3.4	--	--
Sodium	NE	NE	130	150	190	310	--	770
Strontium	NE	NE	140	150	170	340	220	620
Tin	660,000	NE	64	61	22	9.5	6.9	--
Titanium	NE	NE	10	9.3	6.8	4.2	4.1	3.0
Vanadium	7,400	NE	3.8	3.9	3.1	3.6	3.2	4.4
Yttrium	NE	NE	1.8	1.7	1.8	2.1	1.5	2.4
Zinc	560,000	NE	63	61	25	7.6J	6.9	3.1

µg/kg - Micrograms per kilogram.

mg/kg - Milligrams per kilogram.
SCTLs - Florida Department of Environmental Protection (FDEP), Soil Cleanup Target Levels, Commercial /Industrial Soil Values (SCTLs), effective August 5, 1999 (FDEP, 1999b)

NE - Not established.

- - Indicates the material was analyzed for but not detected above the sample quantitation limit (SQL).
/TEF () - Indicates a carcinogenic polynuclear aromatic hydrocarbon (CPAH) that has been multiplied by the toxicity equivalency factor (TEF) in parenthesis to determine the compound's relative potency to a benzo(a)pyrene (BaP) concentration.

Total CPAHs [BaP(TEF)] - a sum of the CPAH benzo(a)pyrene (BaP) equivalent concentrations.

J - Estimated value.

N - Presumptive evidence of presence of material.

A - Average value.

Shading indicates a value greater than the Florida SCTL or greater than the EPA Cleanup Level.

Table 3-3
RD Surface Soil Analytical Results - Depth B - 6 To 12 Inches
Trans Circuits - Lake Park, Palm Beach County, Florida

Parameters (µg/kg)	FDEP SCTLs	EPA Cleanup Levels	Source				
			TC-SS01-B 07/16/2002	TC-SS02-B 07/16/2002	TC-SS03-B 07/16/2002	TC-SS04-B 07/16/2002	TC-SS05-B 07/16/2002
Extractable Organics (µg/kg)							
Benzaldehyde	18,000,000	NE	--	--	--	--	--
Caprolactam	NE	NE	--	--	--	--	--
Naphthalene	270,000	NE	--	--	--	--	--
Acenaphthene	18,000,000	NE	--	--	--	--	--
Dibenzofuran	5,000,000	NE	--	--	--	--	--
Fluorene	28,000,000	NE	--	--	--	--	--

Phenanthrene	300,000,000	NE	710	330J	190J	720	--
Anthracene	260,000,000	NE	56J	--	--	--	--
Carbazole	190,000	NE	55J	--	--	--	--
Fluoranthene	48,000,000	NE	1,900	660	600	1,400	--
Pyrene	37,000,000	NE	2,300	770	790	1,800	--
Benzo(a)anthracene/ TEF (0.1)	5,000	NE	770/77.0	240J/24.0J	240J/24.0J	550/55.0	--
Chrysene/TEF (0.001)	450,000	NE	1,100/1.100	390J/0.390J	380J/0.380J	830/0.830	--
Benzo(b)fluoranthene/ TEF (0.1)	4,800	NE	1,600/160.0	510J/51.0J	610/61.0	1,200/120.0	--
Benzo(k)fluoranthene/ TEF (0.01)	52,000	NE	500/5.00	200J/2.00J	150J/1.50J	330J/3.30J	--
Benzo(a)pyrene/TEF (1.0)	500	NE	1,000/1,000	330J/330J	350J/350J	710/710	--
Indeno(1,2,3-cd)pyrene/TEF (0.1)	5,300	NE	620/62.0	200J/20.0J	220J/22.0J	440J/44.0J	--
Dibenzo(a,h)anthracene/ TEF (1.0)	500	NE	170J/170J	58J/58J	60J/60J	130J/130J	--
Benzo(ghi)perylene	41,000,000	NE	640	210J	250J	470J	--
Total CPAHs [BaP(TEF)]	NE	500	1475	485	519	1063	--
Miscellaneous Extractable Organics (µg/kg)							
Petroleum product	NE	NE					
Benzo(e)pyrene	NE	NE	2,000JN				
Unidentified Compounds/#	NE	NE					
Metals (mg/kg)							
Aluminum	NE	NE	660	840	860	640	640
Antimony	240	NE	--	--	--	--	--
Arsenic	3.7	NE	1.3	0.66	0.56	1.3	0.73
Barium	87,000	NE	4.3	6.8	5.9	4.7	1.4
Calcium	NE	NE	64,000	140,000	91,000	97,000	2,900
Chromium	420	NE	3.5	3.1	3.3	3.4	3.2
Cobalt	110,000	NE	--	--	--	--	--
Copper	76,000	NE	200	50	73	41	--
Iron	480,000	NE	960	1,000	850	710	800
Lead	920	NE	37	12	17	8.6	1.2
Magnesium	NE	NE	320	500	300	310	46
Manganese	22,000	NE	7.3	14	6.3	5.1	2.3
Nickel	28,000	NE	19	--	2.9	2.6	0.57
Sodium	NE	NE	260	500	380	510	--
Strontium	NE	NE	230	430	350	400	24
Tin	660,000	NE	31	4.8	9.2	6.0	--
Titanium	NE	NE	3.9	2.8	3.7	3.3	6.6
Vanadium	7,400	NE	2.9	6.0	3.9	3.4	1.8
Yttrium	NE	NE	1.5	2.4	2.2	2.2	1.4
Zinc	560,000	NE	8.1J	--	6.3J	3.2	0.79

µg/kg - Microgramsper kilogram.

mg/kg - Milligrams per kilogram.
SCTLs - Florida Department of Environmental Protection (FDEP), Soil Cleanup Target Levels, Commercial /Industrial Soil Values (SCTLs), effective August 5, 1999 (FDEP, 1999b)

NE - Not established.

- - Indicates the material was analyzed for but not detected above the sample quantitation limit (SQL).
/TEF () - Indicates a carcinogenic polynuclear aromatic hydrocarbon (CPAH) that has been multiplied by the toxicity equivalency factor (TEF) in parenthesis to determine the compound's relative potency to a benzo(a)pyrene (BaP) concentration.

Total CPAHs [BaP(TEF)] - a sum of the CPAH benzo(a)pyrene (BaP) equivalent concentrations.

J - Estimated value.

N - Presumptive evidence of presence of material.

A - Average value.

Shading indicates a value greater than the Florida SCTL or greater than the EPA cleanup level.

Table 3-4
RD Surface Soil Analytical Results - Depth C - 1 To 2 Feet
Trans Circuits - Lake Park, Palm Beach County, Florida

Parameters (µg/kg)	FDEP SCTLs	EPA Cleanup Levels	Source				
			TC-SS01-C 07/16/2002	TC-SS02-C 07/16/2002	TC-SS03-C 07/16/2002	TC-SS04-C 07/16/2002	TC-SS05-C 07/16/2002
Extractable Organics (µg/kg)							
Benzaldehyde	18,000,000	NE	--	--	--	--	--
Caprolactam	NE	NE	--	--	--	--	--
Naphthalene	270,000	NE	--	--	--	--	--
Acenaphthene	18,000,000	NE	56J	--	--	--	--
Dibenzofuran	5,000,000	NE	50J	--	--	--	--
Fluorene	28,000,000	NE	57J	--	--	--	--
Phenanthrene	300,000,000	NE	1,300	230J	180J	1,100	--
Anthracene	260,000,000	NE	74J	--	--	79J	--
Carbazole	190,000	NE	92J	--	--	82J	--
Fluoranthene	48,000,000	NE	2,600	570	330J	2,600	--
Pyrene	37,000,000	NE	3,000	740	350J	3,700	--
Benzo(a)anthracene/ TEF (0.1)	5,000	NE	930/93.0	240J/24.0J	140J/14.0J	1,200/120.0	--
Chrysene/TEF (0.001)	450,000	NE	1,400/1.400	370J/0.370J	200J/0.200J	1,700/1.700	--
Benzo(b)fluoranthene/ TEF (0.1)	4,800	NE	1,900/190.0	520J/52.0J	270J/27.0J	2,500/250.0	--
Benzo(k)fluoranthene/ TEF (0.01)	52,000	NE	640/6.40	170J/1.70J	90J/0.90J	820/8.20	--
Benzo(a)pyrene/TEF (1.0)	500	NE	1,200/1,200	320J/320J	170J/170J	1,500/1,500	--
Indeno(1,2,3-cd)pyrene/TEF (0.1)	5,300	NE	750/75.0	190J/19.0J	120J/12.0J	920/92.0	--
Dibenzo(a,h)anthracene/ TEF (1.0)	500	NE	220J/220J	57J/57J	--	270J/270J	--
Benzo(ghi)perylene	41,000,000	NE	750	210J	120J	970	--

Total CPAHs [BaP(TEF)]	NE	500	1786	474	224	2242	--
Miscellaneous Extractable Organics (µg/kg)							
Petroleum product	NE	NE					
Benzo(e)pyrene	NE	NE	1,000JN			1,000JN	
Unidentified Compounds/#	NE	NE					600J/1
Metals (mg/kg)							
Aluminum	NE	NE	650	830	--	580	500
Antimony	240	NE	--	--	--	--	--
Arsenic	3.7	NE	0.68	0.62	0.81AJ	0.62	0.64
Barium	87,000	NE	4.1	7.4	8.7AJ	5.5	0.75
Calcium	NE	NE	63,000	110,000	140,000AJ	100,000	2,400
Chromium	420	NE	2.6	3.7	3.2A	3.7	2.7
Cobalt	110,000	NE	--	--	--	--	--
Copper	76,000	NE	170	76	23AJ	100	--
Iron	480,000	NE	600	790	880AJ	660	600
Lead	920	NE	34	18	4.8A	27	--
Magnesium	NE	NE	300	320	410AJ	480	36
Manganese	22,000	NE	6.1	7.5	8.1AJ	6.6	2.5
Nickel	28,000	NE	16	2.4	--	13	0.5
Sodium	NE	NE	260	610	--	420	--
Strontium	NE	NE	240	470	570AJ	340	15
Tin	660,000	NE	34	14	--	18	--
Titanium	NE	NE	3.6	3.1	--	3.4	5.3
Vanadium	7,400	NE	2.4	3.7	5.1AJ	3.1	1.4
Yttrium	NE	NE	1.5	2.1	2.4A	2.0	0.82
Zinc	560,000	NE	14J	--	--	7.9	2.3

µg/kg - Micrograms per kilogram.

mg/kg - Milligrams per kilogram.
SCTLs - Florida Department of Environmental Protection (FDEP), Soil Cleanup Target Levels, Commercial /Industrial Soil Values (SCTLs), effective August 5, 1999 (FDEP, 1999b)

NE - Not established.

- - Indicates the material was analyzed for but not detected above the sample quantitation limit (SQL).
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Total CPAHs [BaP(TEF)] - a sum of the CPAH benzo(a)pyrene (BaP) equivalent concentrations.

J - Estimated value.

N - Presumptive evidence of presence of material.

A - Average value.

Shading indicates a value greater than the Florida SCTL or greater than the EPA cleanup level.

Appendix G: Potentiometric Surface / Cleanup Exceedances – Intermediate Zone