

**FIRST FIVE-YEAR REVIEW REPORT FOR
LANDIA CHEMICAL COMPANY SUPERFUND SITE
POLK COUNTY, FLORIDA**



AUGUST 2017

Prepared by

**U.S. Environmental Protection Agency
Region 4
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Date



11068572

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BHC	Benzene Hexachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EPA	United States Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FFF	Florida Favorite Fertilizer
FYR	Five-Year Review
GCTL	Groundwater Cleanup Target Level
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
IC	Institutional Control
Landia	Landia Chemical Company
MCL	Maximum Contaminant Level
MOA	Memorandum of Agreement
µg/dL	Micrograms per Deciliter
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
NCP	National 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 and Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SVOC	Semi-volatile Organic Compound
SCTL	Soil Cleanup Target Level
SWFWMD	Southwest Florida Water Management District
TEQ	Total Dioxin Equivalent Concentration
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

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

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

This is the first FYR for the Landia Chemical Company Superfund site (the Site). The triggering action for this statutory review is the on-site construction start date of the operable unit (OU) 1 remedial action. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of two OUs. This FYR addresses both OUs. OU1 addresses soil contamination. OU2 addresses groundwater contamination.

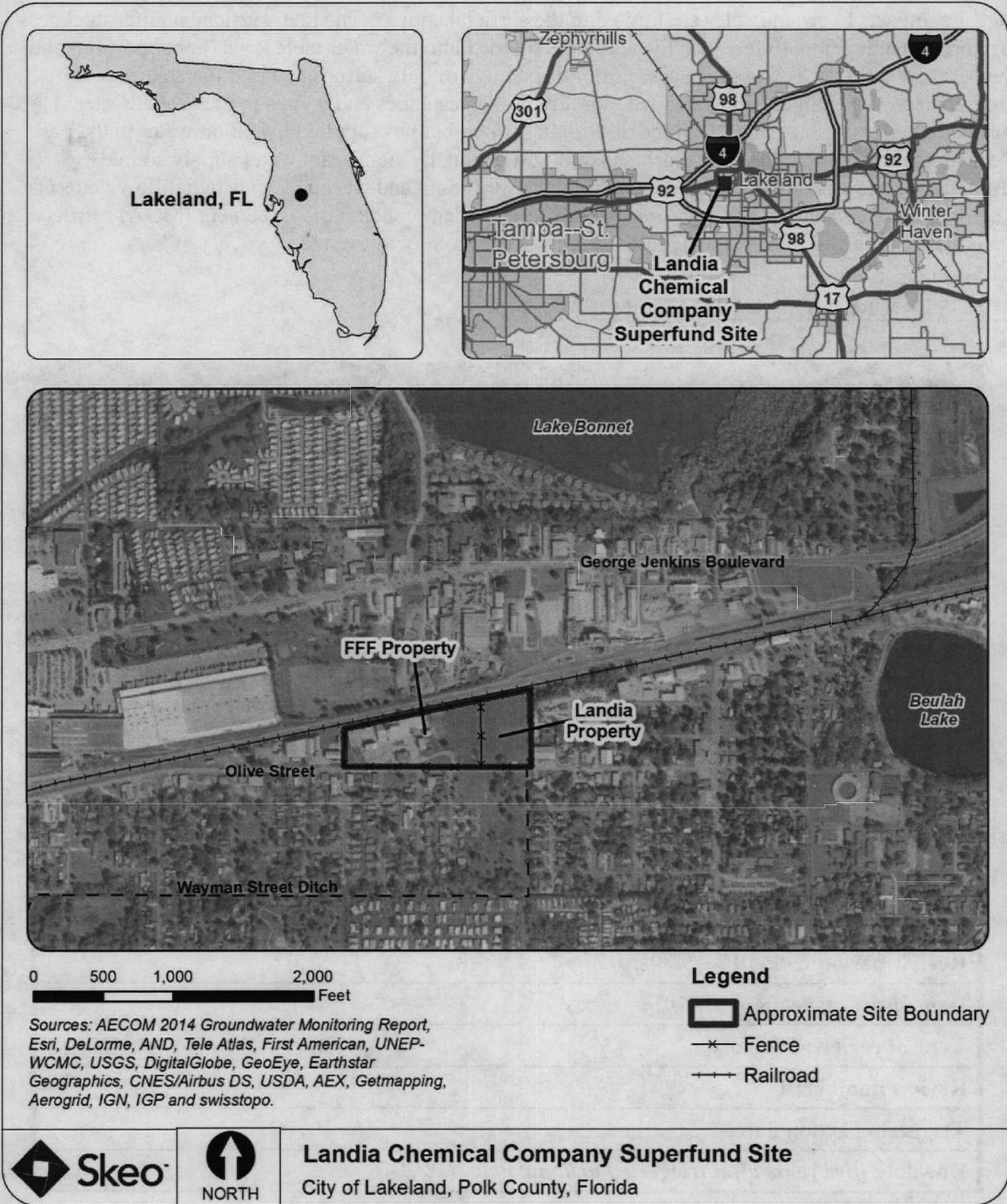
EPA remedial project manager (RPM) Shelby Johnston led the FYR. Participants included EPA community involvement coordinator L'Tonya Spencer, Miranda McClure from the Florida Department of Environmental Protection (FDEP), and Johnny Zimmerman-Ward and Kirby Webster from EPA contractor Skeo. The Potentially Responsible Party (PRP) was notified of the initiation of the five-year review. The review began on 2/9/2017. Appendix A includes a list of documents reviewed as part of this FYR.

Site Background

The 13-acre Site is located in Lakeland, Polk County (Figure 1). It comprises two adjacent properties – the former Landia Chemical Company (Landia) property and the former Florida Favorite Fertilizer (FFF) property. Surrounding land use is industrial and residential. The Landia property is located at 1405 Olive Street. From 1945 to 1987, three different companies operated pesticide blending and formulating operations on the Landia portion of the Site. A former stormwater runoff pond received wastes from the drum washdown area. Landia applied wastes to the land. Landia also used portions of the property formerly owned by FFF for the storage of bulk sulfur. Past operations resulted in the release of various pesticides, metals and volatile organic compounds (VOCs) into the environment. Remedial actions related to OU 1 were initiated on February 28, 2011, and the final construction inspection was completed on December 1, 2011. The Landia property is currently in ecological reuse and vegetated with grasses, trees and flowers that provide pollinator habitat. Chain-link fencing and locked gates restrict access to the property.

The FFF property is located at 1607 Olive Street. From the mid-1930s until 2006, FFF used portions of the property to store bulk fertilizer products, including nutrients. In 2006, a new owner, Sylvite Southeast, LTD, began conducting operations that include fertilizer blending and mixing. Sylvite continues to operate its facility on site. Chain-link fencing and locked gates restrict access to the property. Appendix B summarizes current site status measures.

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.

Semi-annual groundwater monitoring has been conducted at the Site since 2005. Groundwater beneath the Site includes a surficial aquifer and a deeper aquifer separated by a confining unit. Data indicated that site impacts to groundwater are limited to the surficial aquifer. The total surficial aquifer thickness is approximately 30 to 40 feet, and the aquifer is divided into the water table zone (upper portion) and the basal zone (lower portion). Releases from the storage of bulk sulfur increased the acidity of the groundwater, which likely enhanced the mobility of the pesticides and metals in the groundwater. The surficial aquifer is not used as a source of drinking water, but has supplied irrigation water in the past. Beneath the confining unit is the Floridan aquifer, a regionally significant water supply source. Groundwater flow is downward and lateral to the north, south and west in a semi-radial flow pattern. Regional groundwater flow is to the west-southwest. A Memorandum of Agreement (MOA) restricts water usage in the area. Appendix C provides a site chronology of events.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Landia Chemical Company		
EPA ID: FLD042110841		
Region: 4	State: Florida	City/County: Lakeland/Polk
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? No	
REVIEW STATUS		
Lead agency: EPA		
Author name: Shelby Johnston (EPA) and Kirby Webster and Johnny Zimmerman-Ward (Skeo)		
Author affiliation: EPA and Skeo		
Review period: 2/9/2017 – 9/30/2017		
Date of site inspection: 3/7/2017		
Type of review: Statutory		
Review number: 1		
Triggering action date: 2/28/2011		
Due date (five years after triggering action date): 2/28/2016		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The EPA, FDEP and the Site's potentially responsible parties (PRPs) have conducted many investigations and two removal actions at the Site to determine the nature and extent of contamination. These investigations included soil, sediment, surface water and groundwater sampling and installation of permanent groundwater monitoring wells. The current PRP Group includes PCS Joint Ventures, Inc., BASF and Agrico Chemical Company.

The first known environmental sampling at the Site took place in 1983, conducted by NUS Corporation under contract with the EPA. Later in 1983, FDEP investigated the Wayman Street Ditch (Figure 1). FDEP issued a warning notice to Landia after discovery of pesticide compounds in the ditch.

The Site's 2003 Human Health Risk Assessment (HHRA) identified unacceptable risk from current exposure to surface soil in the industrial area by an on-site worker which exceeded the EPA's upper bound of the acceptable cancer risk range (1×10^{-4} to 1×10^{-6}). The HHRA found that the cancer risk from probable exposures to surface soil, sediment and surface water in the residential area exceeded 1×10^{-6} , but was within EPA's acceptable risk range in some areas. No current exposure pathways were identified for groundwater under current conditions because groundwater in the area was not being used as potable water. However, the EPA identified potential risks associated with future groundwater exposure by selecting contaminants of concern (COCs) based on a comparison of federal and state drinking water standards. In the absence of established drinking water standards, the EPA used Florida groundwater cleanup target levels (GCTLs). For chemicals that did not have established federal or state drinking water standards, or GCTLs, Region 4 used health-based levels. Table 1 presents the summary of COCs identified in soil and groundwater based on the 2003 HHRA and the drinking water criteria comparison, respectively.

The 2002 Screening Level Risk Assessment concluded that remedial action to address soil COCs based on human health risks would also address ecological risks. The 2003 Screening Level Risk Assessment did not identify site-related risks in surface water or sediment.

Table 1: Site COCs, by Media

COC	Soil	Groundwater
VOCs		
1,2,4-Trichlorobenzene	-	X
2-Chlorophenol	-	X
Hexachlorobenzene	X	-
Methylene chloride (Dichloromethane)	-	X
Xylenes (total)	X	X
Pesticides		
Aldrin	X	-
alpha- BHC	X	X
beta-BHC	X	X
Chlordane	X	X

COC	Soil	Groundwater
delta-BHC	X	X
4,4'- Dichlorodiphenyldichloroethane (DDD)	X	X
4,4'-Dichlorodiphenyldichloroethylene (DDE)	X	X
4,4-Dichlorodiphenyltrichloroethane (DDT)	X	X
Dieldrin	X	X
gamma-BHC (lindane)	X	X
Heptachlor	X	-
Heptachlor epoxide	X	-
Toxaphene	X	X
Semi-volatile Organic Compounds (SVOCs)		
Dioxin (TEQ)	X	-
4-Nitrophenol	X	X
2,4-Dichlorophenol	-	X
Inorganic Compounds		
Arsenic	X	X
Cadmium	X	X
Chromium	X	X
Lead	X	X
Nitrate	-	X
Nitrite	-	X
<i>Notes:</i> X = COC present TEQ = total dioxin equivalent concentration BHC = benzene hexachloride - = not considered a COC in this environmental medium		

Response Actions

In 1983, Landia coordinated the removal of impacted sediments from the first 1,000 feet of the Wayman Street Ditch – 135 tons of sediment were removed from the ditch and 10 tons were removed from the Landia property. In 1992, an underground pipeline located near the railroad in the northeast corner of the FFF property and operated by Central Florida Pipeline ruptured. About 6,200 gallons of Jet-A fuel spilled onto the Landia property, between buildings on the western portion of the property and in the property's southwestern corner. After a site assessment, about 4,500 gallons of the petroleum product and 10 cubic yards of soil were removed. In 2000, about 2,650 tons of soil were removed from the Landia property and 1,600 tons of soil were removed from the FFF property. In addition, about 510 tons of soil and sediment were removed from the off-site areas and the ditch (Figure 2). This action finished in early 2001.

It should be noted that the subject of dioxin was extensively discussed between the EPA, FDEP and the PRP group in 2003. On March 11, 2003, a meeting between the EPA, FDEP and the PRP group was held to discuss the dioxin issue. As a result of the meeting, the PRP group completed a "Dioxin Risk Evaluation" for the Landia Site that was submitted to the EPA in May 2003. The evaluation concluded

the five dioxin samples collected by FDEP in 1999 matched the congener mix reported in urban background soils. It was also noted that the total dioxin equivalent quotient (TEQ) concentrations found in the 1999 soil samples were comparable to the TEQ ranges found in urban background. The one sample of the five which exceeded the TEQ was removed during the Emergency Removal Action (2000-2001) even though the results were within the range of literature background concentration for urban setting. On July 2, 2003, the PRP group submitted a response to the EPA regarding FDEP's June 13 comments concluding there was no evidence of a measureable release of pentachlorophenol and therefore additional sampling and analysis for pentachlorophenol or dioxins was not warranted. However, the PRP group did conduct additional sampling at the request of FDEP. This additional sampling was conducted and reported in the Dioxin Analysis and Results report submitted to the EPA on December 10, 2003. A dioxin-delineated area was identified on the former FFF property which ultimately would be part of the OU1 Remedial Action. The off-site dioxin was determined not be associated with Landia and thus the OU1 Remedial Action references do not list a residential clean up level for dioxin.

The EPA finalized the Site's listing on the Superfund program's National Priorities List (NPL) in May 2000. EPA selected a final remedy for soil and an interim groundwater remedy in the Site's 2007 Record of Decision (ROD).

The Site's 2007 ROD defined remedial action objectives (RAOs) for OU1 (soil):

- Prevent direct contact with and/or ingestion of soil containing site-related COCs at concentrations above health-based action levels.
- Prevent or minimize future migration of COCs in soil to groundwater that would result in groundwater concentrations above drinking water standards.

The 2007 ROD also defined RAOs for OU2 (groundwater):

- Prevent direct contact and/or ingestion of groundwater containing site-related COCs at concentrations above health-based drinking water standards.
- Prevent or minimize further migration of the contaminant plume by reducing the concentrations of groundwater contamination in the areas of highest site-related groundwater concentrations above drinking water standards.

The 2007 ROD also identified several remedy components:

- Excavation and off-site disposal of all remaining soil with site-related contaminants above selected, health-based cleanup criteria or at levels that continue to impact the groundwater. Table 2 shows soil cleanup goals from the ROD.
- In-situ chemical oxidation (in source area) and in-situ biodegradation (in selected areas) used together to treat the areas of the most contaminated groundwater after the OU1 remedy is in place and the removal of contaminated soil is completed.
- A performance monitoring plan to evaluate the effectiveness of the soil remedy and the groundwater interim action on groundwater contaminant concentrations.
- Institutional controls to prevent exposure to contaminants, including groundwater use restrictions, restrictive covenants added to deeds for the Landia and FFF properties, and engineering controls to prevent exposure to soil contaminants.

Table 2: COC Cleanup Goals

COC	Off-Site Soil Residential* (mg/kg)	On-Site Soil Industrial (mg/kg)	On-Site Soil Basis	Groundwater Cleanup Standard (µg/L)	Groundwater Basis
1,2,4-Trichlorobenzene	-	-	-	70	MCL
2,4-Dichlorophenol	-	-	-	20	Region 4 Health-Based Cleanup Level
2-Chlorophenol	-	-	-	35	GCTL
4,4'-DDD	4.2	7	Site-Specific Leachability SCTL	0.1	GCTL
4,4'-DDE	-	15	Industrial SCTL	0.1	GCTL
4,4'-DDT	2.9	11	Default Leaching SCTL	0.1	GCTL
4-Nitrophenol	-	1.12	Site-Specific Leachability SCTL	56	GCTL
Aldrin	0.06	0.3	Industrial SCTL	-	-
alpha-BHC	0.1	0.009	Site-Specific Leachability SCTL	0.006	GCTL
alpha-Chlordane	2.8	14	Industrial SCTL	-	-
Arsenic	2.1	12	Industrial SCTL	10	MCL
beta-BHC	-	0.03	Site-Specific Leachability SCTL	0.02	GCTL
Cadmium	-	17	Site-Specific Leachability SCTL	5	MCL
Chlordane (technical)	2.8	14	Industrial SCTL	2	MCL
Chromium	-	38	Default Leaching SCTL	100	MCL
delta-BHC	-	25.6	Site-Specific Leachability SCTL	2.1	GCTL
Dieldrin	0.06	0.04	Site-Specific Leachability SCTL	0.002	GCTL
Dioxin (TEQ)	-	0.00003	Industrial SCTL	-	-
gamma-BHC (lindane)	-	0.5	Site-Specific Leachability SCTL	0.2	GCTL
Heptachlor	0.2	1	Industrial SCTL	-	-
Heptachlor epoxide	0.1	0.5	Industrial SCTL	-	-
Hexachlorobenzene	-	1.2	Industrial SCTL	-	-

COC	Off-Site Soil Residential ^a (mg/kg)	On-Site Soil Industrial (mg/kg)	On-Site Soil Basis	Groundwater Cleanup Standard (µg/L)	Groundwater Basis
Lead	400	1,400	Industrial SCTL	15	MCL
Methylene chloride (Dichloromethane)	-	-	-	5	MCL
Nitrate	-	-	-	10,000	MCL
Nitrite	-	-	-	1,000	MCL
Toxaphene	0.9	4.5	Industrial SCTL	3	MCL
Xylenes (total)	-	156.4	Site-Specific Leachability SCTL	3,500	Region 4 Health-Based Cleanup Level

Notes:
a. Residential Soil Cleanup Target Levels (SCTLs) found in FAC 62-777.
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
BHC = benzene hexachloride
GCTL = Florida groundwater cleanup target level
MCL = maximum contaminant level
SCTL = soil cleanup target level
TEQ = total dioxin equivalent concentration
- = not a COC in the media

Source: Table 5 of the 2007 ROD

Status of Implementation

OUI – Soil Source Removal

The 2011 Remedial Design Workplan described remedial action activities. PRP contractors conducted on-site activities from February 2011 through early August 2011. Throughout the OU1 remedial design and action activities, data collected identified mass flux of the contamination from the vadose zone as a significant driving force of the OU2 pesticide groundwater plume. Because of this, several enhancements to the final remedy for OU1 were conducted during the implementation of the remedial action. These included installation of drainage controls, soil covers including an evapotranspiration cover, and pH neutralization during excavation.

Excavation

Because of the presence of elevated mass of COCs below the average low water table (in the 3-5 foot below land surface zone) and the effect of stormwater infiltration in the high mass area, the scope of the OU1 remedy described in the ROD (excavation of impacted soil in the 0-3 foot below land surface zone) was expanded to include additional excavation below the water table and implementation of cover and drainage controls to manage stormwater infiltration. Sequencing of excavation was as follows: 1) off-site areas south of Olive Street, 2) FFF property, and 3) Landia property. Contractors removed soil from previously sampled grids in one-foot intervals (Figure 2). Contractors excavated a total of 21,714 cubic yards of soil from the on-site and off-site excavation areas. This volume includes 15,702 cubic yards of contaminated soil and 6,012 cubic yards of overburden. Each excavation was backfilled to the original grade using any clean overburden material identified during the excavation and backfill material from the Hillsborough Borrow Pit.

pH Neutralization

Neutralization of the acidic groundwater plume was included as part of the OU1 remedial action, because at least part of the aquifer neutralization process can be achieved as contaminated surface soils are removed and the upper aquifer is exposed for the addition of treatment chemicals. Neutralization materials were also added to clean backfill.

Final Surface Cover

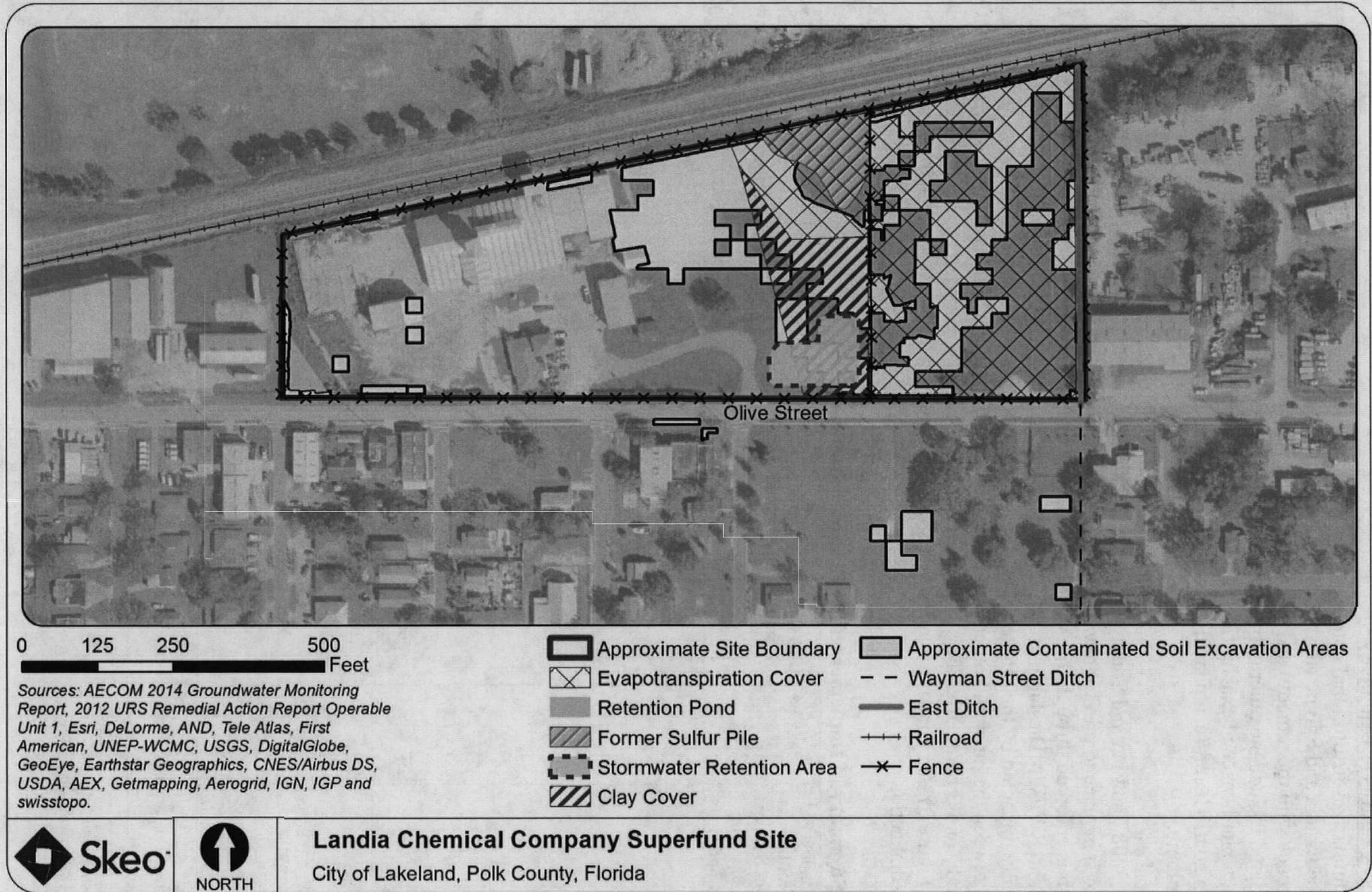
The final cover consists of an evapotranspiration cover on the Landia property and a combination of a clay cover and an evapotranspiration cover on the FFF property (Figure 2). On the Landia property, all buildings were demolished and pavements removed to facilitate grading and final surface cover placement.

OU2 – Groundwater

The EPA approved the OU2 remedial design in April 2014, however the interim remedy has not been implemented. The interim remedy consisted of in-situ chemical oxidation followed by enhanced bioremediation for pesticides and in-situ bioremediation for nitrates to treat areas with the highest levels of contaminated groundwater approximately two years after chemical oxidation. The intent of the interim action was to reduce the levels of nitrates in the groundwater to levels that can naturally attenuate. The primary area of treatment was to include the northwestern portion of the FFF property. After the EPA approved the Remedial Action Workplan in the fall of 2014, contractors installed additional monitoring wells. Post soil removal action, the 2014 groundwater sampling results from of the existing and new wells indicated that decreasing concentrations of the nitrate plume may be occurring more rapidly than expected. In February 2015, the EPA approved a request to postpone molasses injection activities so that additional data could be collected and evaluated. Semi-annual groundwater monitoring has been conducted since 2006. As indicated above, the nitrate plume is responding to attenuation factors that are reducing the nitrate concentrations with time. Both sampling results and groundwater modeling simulations indicate that the alpha-BHC plume is stable or shrinking and will not intercept Lake Bonnet. An updated decision for groundwater remediation has not yet been determined.

It is evident that the OU1 remedial actions, including soil removal, have been beneficial in decreasing concentrations of the nitrate plume, but it is premature to determine if the system is exhibiting natural attenuation or if this decrease is primarily due to the OU1 remedial action. Several more years of monitoring data will be needed to evaluate the potential effectiveness of natural attenuation as a long-term groundwater remedial option.

Figure 2: Site Detail Map



Disclaimer: This 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.

Institutional Control (IC) Summary

Table 3 summarizes institutional controls at the Site. Declarations of Restrictive Covenants have been filed for the Landia and Sylvite (former FFF) properties to restrict land use (including no residential use or interference with the remedy) and groundwater use. The nitrate plume and pesticide plume are comingled and include the outer perimeter of groundwater contamination. When compared to other pesticides, alpha-benzene hexachloride (alpha-BHC) is detected most frequently at concentrations above its cleanup goal. Therefore, alpha-BHC concentrations are depicted on figures to show extent of the pesticide plume.

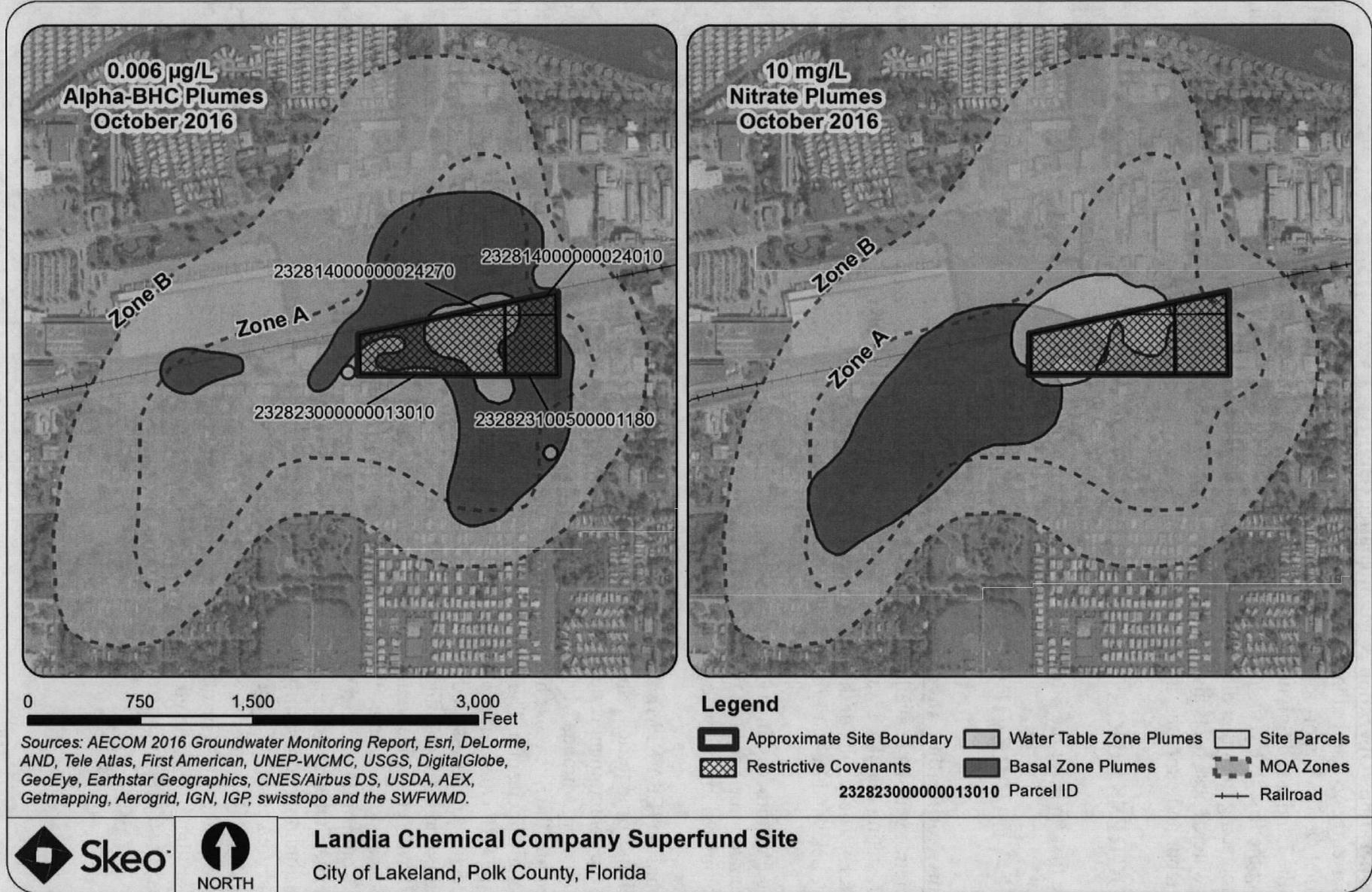
In August 2008, the EPA and Southwest Florida Water Management District (SWFWMD) put an MOA (Appendix J) in place to prevent new water well construction in the area of the groundwater plumes. This action is enforced through the well construction permitting process administered by SWFWMD. The EPA and SWFWMD established an inner and outer boundary of the area of groundwater impacted or potentially impacted by the Site. The inner boundary is 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. The MOA Zone A and Zone B boundaries are available on the SWFWMD Water Management Information System website¹ (Figure 3). All known irrigation wells in the vicinity of the Site were abandoned as part of the OU1 remedial action.

Table 3: Summary of Implemented Institutional Controls (ICs)

Media, Engineered Controls and Areas that Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil	Yes	Yes	Landia 2328140000 00024010, 2328231005 00001180	Restrict groundwater use and land use and require maintenance of evapotranspiration cap.	Declaration of Restrictive Covenant filed September 15, 2015 First Amendment to Declaration of Restrictive Covenant filed October 5, 2016
			Sylvite 2328140000 0002470, 2328230000 00013010	Restrict groundwater use and land use.	Declaration of Restrictive Covenant filed October 5, 2016
Groundwater	Yes	Yes	Area of Plume	Restrict groundwater use.	MOA September 11, 2008
Notes: Declaration of Restrictive Covenant available at: http://ori2.polk-county.net/SearchNG_Application/ .					

¹ Available online at: <http://www18.swfwmd.state.fl.us/WMISMap/WMISMap/WMISMap.aspx?function=quickmap&layer=erp&appid=650586>

Figure 3: Institutional Control Map



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

Systems Operations/Operation & Maintenance (O&M)

There is currently no stand-alone O&M plan for the Site, but O&M activities are occurring as outlined in the Remedial Design Report for OU 1 (September 2010) and in the restrictive covenants included in the deeds for the Landia and Sylvite properties. Annual costs for O&M activities are about \$290,000 per year during the first five years or \$1.45 million total for the five years. These costs include landscaping services, replacing trees that die, maintaining the cap integrity, cap inspections, fence repairs and irrigation water. These costs also include groundwater sampling of 68 wells twice per year, including sampling labor and expenses, lab costs, disposal, data management and reporting.

III. PROGRESS SINCE THE LAST REVIEW

This is the first FYR for the Site.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by a newspaper posting in *The Ledger, in Lakeland, Florida*, on 5/24/2017, stating that there was a FYR and inviting the public to submit any comments to EPA (Appendix E). The results of the review and the report will be made available at the Site's information repository, Lakeland Public Library, located at 100 Lake Morton Drive in Lakeland, Florida

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The results of these interviews are summarized below. Completed interview forms are included in Appendix I.

Shelby Johnston (EPA RPM) is not aware of any effects of the Site on the surrounding community or any complaints or inquiries related to the Site. The groundwater sampling analysis has continued to show that the contaminant concentrations are decreasing as a result of the soil remedial action and the cover installation. Miranda McClure (FDEP) stated that site inspections onsite show that the cap is well maintained and the Site reuse has ecological and aesthetic value. Progress has been made regarding the soil and sediment cleanup. The groundwater remedy has not been implemented. FDEP recommends the EPA and the PRP consider implementing the groundwater remedy. Amy Mixon and Jeff Wagner from PRP contractor AECOM stated that the remedy has eliminated the potential for direct contact with site contaminants and is functioning as designed. The appearance of the Site has improved dramatically since 2010, with ecological reuse replacing dilapidated buildings. The evapotranspiration cover is taking hold as roots systems mature. The PRP Group (including PCS Joint Ventures, Inc., BASF and Agrico Chemical Company) indicated that remedial activities have eliminated the risk to potential receptors and addressed site COCs, as anticipated. They stated that the appearance of the Site is greatly improved and that the surrounding community has noticed this improvement in site conditions post remedy. Skeo staff called local area businesses and residents to conduct interviews as part of this FYR. Two interviews were completed. Both interviewees were aware of the former site. One person felt that there are odors associated with the Site. The other said that the Site currently looks good, although appearances are not always everything. They noted that trespassing is common in the area. Fences on the property are sometimes cut so people can traverse across it.

Data Review

This section discusses the current status of OU2 groundwater contamination, since the interim remedy has not yet been implemented. Groundwater monitoring is conducted to evaluate the effectiveness of the OU1 remedial action, evaluate ongoing progress with declining nitrate concentrations and provide recommendations for future groundwater monitoring actions.

Groundwater monitoring currently consists of semiannual sampling of 26 water table zone wells and 42 basal zone monitoring wells, with additional wells sampled periodically. The wells are sampled for OU2 COCs (Table 2), which include pesticides, VOCs, semi-volatile organic compounds (SVOCs), nitrates and some metals, as well as natural attenuation parameters. The annual reports summarize the sampling data. The reports focus on alpha-BHC and nitrate concentrations in the water table and basal zone monitoring wells following the OU1 remedial action. Concentration trend plots are included and formatted to coincide with EPA guidance for evaluating monitored natural attenuation. The plots will also be used to evaluate the feasibility of monitored natural attenuation as a final remedy for OU2.

The nitrate and pesticide plumes are comingled. When compared to other pesticides, alpha-BHC is detected most frequently at concentrations above its cleanup goal. Therefore, alpha-BHC concentrations are depicted on figures to show extent of the pesticide plume. Figure 3 shows the nitrate and alpha-BHC plumes in October 2016. In addition to pesticide and nitrate exceedances at the Site, metals including arsenic and cadmium also exceeded cleanup goals at the Site.

Infiltration Analysis

Water levels are measured in wells under the cap and compared to water levels in wells without infiltration control. Results indicate that the cap influences the local water table by reducing water infiltration, which lowers the groundwater levels beneath the cap area. As the vegetation matures, infiltration reduction is expected to continue to influence groundwater levels beneath the immediate cap area.

Nitrate Plume

Additional data collection preceded the proposed groundwater interim actions. This new data collection took place in the source area of the nitrate plume, and included surficial and basal zone monitoring wells. This area had previously lacked monitoring wells and nitrate concentrations in this area were unknown. Following an initial round of sampling that better defined the nitrate plume, these monitoring wells became part of the Site's semiannual monitoring network. Subsequent sampling events showed nitrate results indicating a decreasing trend occurring across the plume. Due to this trend, the planned OU2 remedial action activities have been postponed with the EPA approval. Evaluation of degradation and breakdown constituents will continue for the Site.

Pesticide Plume

Time series plume representations shown in the monitoring reports appear to indicate that the alpha-BHC plumes in the water table and basal zones are stable. To address the EPA's concern that the impacted water originating from the Site might eventually reach Lake Bonnet, the PRP contractor used two- and three-dimensional models to evaluate the fate and transport of alpha-BHC at the Site. The 2016 annual report indicates that work completed to date on both models shows the alpha-BHC plume is stable or shrinking and will not intercept Lake Bonnet.

Metals Plume

In the water table zone wells, a reduction in metals concentrations was observed following the 2011 OU1 remedial action. In 2015, arsenic concentrations appeared to rebound. There has been little change in metals concentrations over time in the basal zone monitoring well network.

Site Inspection

The site inspection took place on 3/7/2017. In attendance were EPA RPM Shelby Johnston, Miranda McClure from FDEP, Jeff Wagner and Amy Mixon from PRP contractor AECOM, Pete Marovich from Sylvite, Laurel Lockett representing BASF, Dana Mehlman representing PCS, and Kirby Webster and Johnny Zimmerman-Ward from EPA contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy. Appendix D includes the site inspection checklist. Appendix F includes site inspection photos.

Site inspection participants met at the former FFF property. Sylvite's pesticide operations remain active on the property. Participants discussed historical site activities, the FYR process and recent cleanup activities at the Site. Participants viewed the location of Sylvite's pesticide operations, locations of soil excavations, the clay cover area and the vegetated Landia property. Trees, plants and flowers are widespread across the fenced Landia property. Vegetation is well-established and trees are growing well. A wide variety of trees are present. Plants have been planted specifically for pollinator habitat. Butterflies, birds and ducks were present on site. Site participants drove through the surrounding communities to view off-site monitoring wells and the Wayman Street Ditch.

Skeo staff visited the Site's information repository, Lakeland Public Library, located at 100 Lake Morton Drive in Lakeland. Site-related documents were available. The most recent documents available were from 2014.

V. TECHNICAL ASSESSMENT

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

Question A Summary:

The OU1 remedy is functioning as intended by the decision documents. The OU1 soil remedy consists of excavation and off-site disposal of contaminated soil, and institutional controls for the FFF and Landia properties. The remedy has been implemented. Groundwater data indicate the soil remedy is functioning as intended. Additionally, the soil remedy appears to have had a beneficial, unexpected impact on groundwater contamination. Declaration of Restrictive Covenants are in place to restrict land use. Fencing restricts access to both properties and caps are in place. The Site is well maintained, although there is currently no O&M Plan documenting required activities.

The OU2 remedy has not yet been implemented. The OU2 groundwater remedy consisted of in-situ chemical oxidation and in-situ biodegradation to treat areas of highly contaminated groundwater after the OU1 remedy was in place. It also included performance monitoring to evaluate the effectiveness of the soil remedy and the groundwater interim action on groundwater contaminant concentrations. Additionally, the remedy included institutional controls to restrict groundwater use. The groundwater injections have not yet occurred. Unexpected favorable groundwater monitoring results were observed related to the nitrate plume after the OU1 remedy was implemented. In February 2015, the EPA

approved a request to postpone molasses injection activities so that additional data could be collected and evaluated. An updated decision for groundwater remediation has not yet been determined. An MOA is in place between the EPA and SWFWMD restricting groundwater use. The MOA is included as Appendix J. Declaration of Restrictive Covenants are also in place to restrict groundwater use on site. A plan needs to be put in place for making a final decision regarding the groundwater remedy.

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

Question B Summary:

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy are still valid. OU1 and OU2 RAOs included prevention of direct contact with contaminated soil and groundwater, prevention and minimization of future migration of COCs in soil to groundwater, and prevention and minimization of plume migration. Remedial actions taken thus far have met RAOs. Appendix G includes a detailed applicable or relevant and appropriate requirements (ARARs) review. Appendix H includes a risk-based review which accounts for any changes in EPA’s default exposure assumptions and toxicity values. Results from these reviews indicate that cleanup goals remain health-protective and thus valid with current EPA Region 4 recommendations. The Florida cleanup levels utilized in the 2007 ROD are more stringent than the current default RSLs for dioxin in soil using EPA’s 2012 reference dose for 2,3,7,8-tetrachlorodibenzo-p-dioxin.

While the main contamination plumes are composed of non-volatile compounds, volatile compounds exist in groundwater. A vapor intrusion screening level risk evaluation was completed on volatile compounds in the water table zone (the shallowest) of the surficial aquifer to determine if the potential for vapor intrusion exists. Table 4 shows maximum concentrations of VOCs in 2016 and the screening level risk assessment. The vapor intrusion screening evaluation shows that there is currently no unacceptable risk from vapor intrusion. This pathway should be periodically evaluated to ensure there is no unacceptable risk until the groundwater remedy is determined and implemented.

Table 4: Vapor Intrusion Screening Level Evaluation

VOC	2016 Maximum Groundwater Detection (µg/L) ^a	Residential Vapor Intrusion Screening Level ^b (µg/L)	
		1 x 10 ⁻⁶ Risk	HQ = 1
1,2,4-Trichlorobenzene	0.65 (April, FF-4R)	--	0.02
Benzene	6.8 (April, GX-1SW)	4.3 x 10 ⁻⁶	0.05
Chlorobenzene	26 (April, FF-4R)	--	0.06
Methylene chloride	ND	NA	NA
Xylenes	120 (April, LC-105-SW)	--	0.31

Notes:

a. From Table 6 and 8 of the 2016 Annual Monitoring Report.

b. EPA’s Vapor Intrusion Screening Levels located at: <https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls> (May 2016, accessed 6/20/2017).

HQ = hazard quotient

VOC	2016 Maximum Groundwater Detection ($\mu\text{g/L}$) ^a	Residential Vapor Intrusion Screening Level ^b ($\mu\text{g/L}$)	
		1 x 10 ⁻⁶ Risk	HQ = 1
ND = not detected NA = not applicable -- = carcinogenic target risk could not be calculated for this contaminant $\mu\text{g/L}$ = micrograms per liter			

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

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

VI. ISSUES/RECOMMENDATIONS

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

OTHER FINDINGS

Several additional recommendations were identified during the FYR. These recommendations do not affect current and/or future protectiveness.

- Determine a final groundwater remedy once the impact from the soil removal remedial action has been better determined.
- Prepare an O&M Plan documenting required site activities, and update it as appropriate.
- Periodically evaluate the vapor intrusion pathway until the groundwater remedial action is determined and implemented.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement	
<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU1 is protective of human health and the environment; remedial activities have addressed exposure pathways that could result in unacceptable risks.	

Protectiveness Statement

Operable Unit:
OU2

Protectiveness Determination:
Protective

Protectiveness Statement:

The interim remedy at OU2 is protective of human health and the environment utilizing the MOA and Restrictive Covenants to prevent access to the exposure pathways that could result in unacceptable risks to the groundwater plume as defined by the ongoing groundwater monitoring program.

VIII. NEXT REVIEW

The next FYR Report for the Landia Chemical Company Superfund site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

2012 Annual Groundwater Monitoring Report. Landia Chemical Company Site. Lakeland, Florida. Prepared for Agrico Chemical Company, PCS Joint Ventures, Inc., and BASF Corporation by URS Corporation. June 5, 2013.

2013 Annual Groundwater Monitoring Report. Landia Chemical Company Site. Lakeland, Florida. Prepared for Agrico Chemical Company, PCS Joint Ventures, Inc., and BASF Corporation by URS Corporation. June 24, 2014.

2014 Annual Groundwater Monitoring Report. Landia Chemical Company Site. Lakeland, Florida. Prepared for Agrico Chemical Company, PCS Joint Ventures, Inc., and BASF Corporation by AECOM. May 21, 2015.

2015 Annual Groundwater Monitoring Report. Landia Chemical Company Site. Lakeland, Florida. Prepared for Agrico Chemical Company, PCS Joint Ventures, Inc., and BASF Corporation by AECOM. June 16, 2016.

Final Construction Report Operable Unit One. Landia Chemical Company Site. Lakeland, Florida. Prepared for Agrico Chemical Company, PCS Joint Ventures, Inc., and BASF Corporation by URS Corporation. January 16, 2012.

Human Health Risk Assessment for the Landia Site, Lakeland, Florida. Prepared by ENSR Corporation. July 2003.

Landia Remedial Investigation Report. Landia Site. Lakeland, Florida. Volume 1 of 4. Prepared for ARCADIS by PCS Joint Ventures, Inc. and Agrico Chemical Company. February 2003.

Record of Decision. Summary of the Final Remedial Alternative Selection for the Soil and an Interim Remedial Alternative Selection for the Groundwater at the Landia Chemical Company Site, Lakeland, Polk County, Florida. Prepared by the United States Environmental Protection Agency. September 22, 2007.

Remedial Action Report Operable Unit One. Landia Chemical Company Site. Lakeland, Florida. URS. March 1, 2012.

Remedial Action Workplan Operable Unit Two. Former Landia Chemical Company Site. URS. May 11, 2014.

Screening Level Ecological Risk Assessment. Landia Site. Lakeland, Florida. Prepared by ENSR Consulting and Engineering by PCS Joint Ventures, Inc. and Agrico Chemical Company. November 2003.

APPENDIX B – CURRENT SITE STATUS

Environmental Indicators

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

Are Necessary Institutional Controls in Place?

All Some None

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

Yes No

Has the Site Been Put into Reuse?

Yes No

The FFF property is in continued use and the Landia property has ecological use.

APPENDIX C – SITE CHRONOLOGY

Table C-1: Site Chronology

Event	Date
Site owner conducted limited removal action focused on sediment and soil from the Wayman Street Ditch and some on-site soil	Mid-1980s
The EPA discovered site contamination	June 1, 1983
The EPA began the Site's remedial investigation and feasibility study (RI/FS) to site PRPs	September 25, 1998
PRPs took over combined RI/FS from the EPA	October 22, 1999
The EPA listed the Site on the NPL	May 11, 2000
PRP began emergency removal action to remove on-site and off-site soil and sediment in Wayman Street Ditch	September 5, 2000
PRPs completed soil and sediment removal	February 16, 2001
The EPA signed the ROD (final OU1 ROD and interim OU2 ROD)	September 27, 2007
EPA and SWFWMD entered into a MOA restricting the use of groundwater near the contamination plume	September 11, 2008
The PRPs completed OU2 RI/FS	June 19, 2009
The PRPs began OU1 remedial action	February 28, 2011
The PRPs completed OU1 remedial action	April 30, 2012
Groundwater monitoring indicated unexpected improvements	September 2014
EPA approved groundwater monitoring in place of groundwater remedy to observe concentration trends	February 2015

<input type="checkbox"/> O&M manual	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> As-built drawings	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Maintenance logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
2. Site-Specific Health and Safety Plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Contingency plan/emergency response plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
3. O&M and OSHA Training Records	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
4. Permits and Service Agreements			
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Other permits: _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
5. Gas Generation Records	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
6. Settlement Monument Records	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
7. Groundwater Monitoring Records	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: _____			
8. Leachate Extraction Records	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
9. Discharge Compliance Records			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Water (effluent)	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
10. Daily Access/Security Logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
IV. O&M COSTS			
1. O&M Organization			
<input type="checkbox"/> State in-house	<input type="checkbox"/> Contractor for state		
<input type="checkbox"/> PRP in-house	<input checked="" type="checkbox"/> Contractor for PRP		
<input type="checkbox"/> Federal facility in-house	<input type="checkbox"/> Contractor for Federal facility		
<input type="checkbox"/> _____			
2. O&M Cost Records			

VI. GENERAL SITE CONDITIONS		
A. Roads <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1. Roads Damaged	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
Remarks: _____		
B. Other Site Conditions		
Remarks: _____		
VII. LANDFILL COVERS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
A. Landfill Surface		
1. Settlement (low spots)	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident
Area extent: _____		Depth: _____
Remarks: _____		
2. Cracks	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Cracking not evident
Lengths: _____	Widths: _____	Depths: _____
Remarks: _____		
3. Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Area extent: _____		Depth: _____
Remarks: _____		
4. Holes	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Holes not evident
Area extent: _____		Depth: _____
Remarks: _____		
5. Vegetative Cover	<input checked="" type="checkbox"/> Grass	<input checked="" type="checkbox"/> Cover properly established
<input checked="" type="checkbox"/> No signs of stress	<input checked="" type="checkbox"/> Trees/shrubs (indicate size and locations on a diagram)	
Remarks: _____		
6. Alternative Cover (e.g., armored rock, concrete)		<input checked="" type="checkbox"/> N/A
Remarks: _____		
7. Bulges	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident
Area extent: _____		Height: _____
Remarks: _____		
8. Wet Areas/Water Damage	<input checked="" type="checkbox"/> Wet areas/water damage not evident	
<input type="checkbox"/> Wet areas	<input type="checkbox"/> Location shown on site map	Area extent: _____
<input type="checkbox"/> Ponding	<input type="checkbox"/> Location shown on site map	Area extent: _____
<input type="checkbox"/> Seeps	<input type="checkbox"/> Location shown on site map	Area extent: _____
<input type="checkbox"/> Soft subgrade	<input type="checkbox"/> Location shown on site map	Area extent: _____
Remarks: _____		
9. Slope Instability	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
<input checked="" type="checkbox"/> No evidence of slope instability		

Area extent: _____		
Remarks: _____		
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
Remarks: _____		
2. Bench Breached	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
Remarks: _____		
3. Bench Overtopped	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
Remarks: _____		
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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)	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
Area extent: _____		Depth: _____
Remarks: _____		
2. Material Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
Material type: _____		Area extent: _____
Remarks: _____		
3. Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
Area extent: _____		Depth: _____
Remarks: _____		
4. Undercutting	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
Area extent: _____		Depth: _____
Remarks: _____		
5. Obstructions	Type: _____	<input type="checkbox"/> No obstructions
<input type="checkbox"/> Location shown on site map	Area extent: _____	
Size: _____		
Remarks: _____		
6. Excessive Vegetative Growth	Type: _____	
<input type="checkbox"/> No evidence of excessive growth		
<input type="checkbox"/> Vegetation in channels does not obstruct flow		
<input type="checkbox"/> Location shown on site map	Area extent: _____	
Remarks: _____		
D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		

1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive	
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
Remarks: _____				
2.	Gas Monitoring Probes	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked		<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	<input type="checkbox"/> Evidence of leakage at penetration			
Remarks: _____				
3.	Monitoring Wells (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked		<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	<input type="checkbox"/> Evidence of leakage at penetration			
Remarks: _____				
4.	Extraction Wells Leachate	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked		<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	<input type="checkbox"/> Evidence of leakage at penetration			
Remarks: _____				
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed	<input type="checkbox"/> N/A
Remarks: _____				
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
1.	Gas Treatment Facilities	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse	
	<input type="checkbox"/> Flaring			
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance		
Remarks: _____				
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Needs maintenance		
	<input type="checkbox"/> Good condition			
Remarks: _____				
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A	
	<input type="checkbox"/> Good condition			
Remarks: _____				
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks: _____				
2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks: _____				
G. Detention/Sedimentation Ponds		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	Siltation	Area extent: _____	Depth: _____	<input type="checkbox"/> N/A

<input checked="" type="checkbox"/> Siltation not evident		
Remarks: _____		
2. Erosion	Area extent: _____	Depth: _____
<input checked="" type="checkbox"/> Erosion not evident		
Remarks: _____		
3. Outlet Works	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____		
4. Dam	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____		
H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1. Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement: _____		Vertical displacement: _____
Rotational displacement: _____		
Remarks: _____		
2. Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: _____		
I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1. Siltation	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
Area extent: _____		Depth: _____
Remarks: _____		
2. Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Vegetation does not impede flow		
Area extent: _____		Type: _____
Remarks: _____		
3. Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Area extent: _____		Depth: _____
Remarks: _____		
4. Discharge Structure	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks: _____		
VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1. Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
Area extent: _____		Depth: _____
Remarks: _____		
2. Performance Monitoring	Type of monitoring: _____	
<input type="checkbox"/> Performance not monitored		
Frequency: _____	<input type="checkbox"/> 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) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
3. Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs maintenance Remarks: _____
4. Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
5. Treatment Building(s) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks: _____
6. Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks: _____
D. Monitoring Data
1. Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality
2. Monitoring Data Suggests: <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining
E. Monitored Natural Attenuation
1. Monitoring Wells (natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input checked="" type="checkbox"/> 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). <u>The soil remedy included removing source material and disposing of the material off site. This removal resulted in significant reduction of groundwater contamination. The interim groundwater remedy of injections has not been performed at this time. The groundwater remedy will be re-evaluated when enough data are available to enable selection of the remedy. The PRPs have installed a clay cap in an area with remaining dioxin. They have also planted trees for the evapotranspiration cover which may be part of the future groundwater remedy.</u>
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.

No issues were observed related to the implementation and scope of O&M procedures.

C. Early Indicators of Potential Remedy Problems

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

No issues or observations indicated potential for remedy problems.

D. Opportunities for Optimization

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

No opportunities to optimize monitoring or operation of the remedy were observed.

APPENDIX E – PRESS NOTICE

**U.S. Environmental Protection Agency, Region 4
Announces the First Five-Year Review for
the Landia Chemical Company Superfund Site,
Lakeland, Polk County, Florida**

Purpose/Objective: The EPA is conducting the first Five-Year Review of the remedy for the Landia Chemical Company Superfund site (the Site) in Lakeland, 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 13-acre Site consists of two properties. From 1945 to 1987, three companies operated pesticide blending and formulating operations on the Landia Chemical Company (LLC) property. Beginning in 1935, fertilizer blending occurred on the Florida Favorite Fertilizer (FFF) property. Historical operations contaminated soil and groundwater. The EPA placed the Site on the Superfund program's National Priorities List (NPL) in 2000. Major contaminants at the Site include pesticides, metals and volatile organic compounds.

Cleanup Actions: The EPA divided the Site into two operable units (OUs) to address the soil and groundwater contamination. The EPA selected the final remedy for soil (OU1) in the Site's 2007 Record of Decision (ROD). It included excavation and off-site disposal of contaminated soil as well as institutional and engineering controls to prevent exposure to soil contaminants. The EPA selected an interim action for groundwater (OU2) in the Site's 2007 ROD. It included the use of chemicals or living organisms to break down contaminants and institutional controls to prevent exposure to contaminants. These controls included groundwater use restrictions.

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 first of the Five-Year Reviews for the Site will be completed September 2017.

EPA invites Community Participation in the Five-Year Review Process: The EPA is conducting this Five-Year Review to evaluate the effectiveness of the Site's remedy and to ensure that the remedy remains protective of human health and the environment. As part of the Five-Year Review process, 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:

Shelby Johnston, EPA Remedial Project Manager Phone: (404) 562-8287 Email: johnston.shelby@epa.gov	L'Tonya Spencer, EPA Community Involvement Coordinator Phone: (404) 562-8463 (800) 564-7577 (toll-free) Email: spencer.latonya@epa.gov
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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, Lakeland Public Library, located at 100 Lake Morton Drive in Lakeland, Florida, and online at <https://www.epa.gov/superfund/landia-chemical-company>.

L3728 5-24-2017

APPENDIX F – SITE INSPECTION PHOTOS



Vegetated, clay-capped area on FFF property.



Stormwater retention pond near FFF/Landia property border.



Monitoring well LC-102C on Landia property – fence between FFF and Landia properties on left.



Pollinator habitat on Landia property.



Trees and plants on Landia property.



Trees and well on Landia property.



Drainage on Landia property that leads to Wayman Street Ditch.



Pond in southwest corner of FFF property that was excavated to remove source material.



Sylvite buildings on the FFF property.

APPENDIX G – DETAILED ARARs REVIEW

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.

Soil/Sediment ARARs

There are currently no chemical-specific ARARs establishing acceptable concentrations for contaminants in soil or sediment.

Groundwater ARARs

The 2007 ROD identified chemical-specific ARARs for the interim groundwater remedy. Table G-1 compares 2007 ROD cleanup goals to current federal and state standards. There have been no changes to cleanup goals since the signing of the ROD, except for 2,4-dichlorophenol. The cleanup goal for 2,4-dichlorophenol was determined based on EPA Region 4 health-based cleanup levels, because the Florida GCTL was based on organoleptic or aesthetic values. In addition, the cleanup goal for xylene is more stringent than the federal and state maximum contaminant level (MCL). The cleanup goal of 3,500 micrograms per liter ($\mu\text{g/L}$) reflects the EPA Region 4 health-protective remedial level for total xylenes in groundwater. The health-based cleanup goals for xylene and 2,4-dichlorophenol are further assessed in Appendix H.

Table G-1: ARAR Groundwater Review

COC	2007 Cleanup Levels ($\mu\text{g/L}$) ^a	2017 Federal ARARs ($\mu\text{g/L}$) ^b	2017 State ARARs ($\mu\text{g/L}$) ^c	Change
1,2,4-Trichlorobenzene	70	70	70	No change
2,4-Dichlorophenol	20	--	0.3	More stringent
2-Chlorophenol	35	--	35	No change
4,4'-DDD	0.1	--	0.1	No change
4,4'-DDE	0.1	--	0.1	No change
4,4-DDT	0.1	--	0.1	No change
4-Nitrophenol	56	--	56	No change
alpha-BHC	0.006	--	0.006	No change
Arsenic	10	10	10	No change
beta-BHC	0.02	--	0.02	No change
Cadmium	5	5	5	No change
Chlordane (technical)	2	2	2	No change
Chromium	100	100	100	No change
delta-BHC	2.1	--	2.1	No change
Dieldrin	0.002	--	0.002	No change
gamma-BHC (lindane)	0.2	0.2	0.2	No change
Lead	15	15	15	No change
Methylene chloride (Dichloromethane)	5	5	5	No change
Nitrate	10,000	10,000	10,000	No change
Nitrite	1,000	1,000	1,000	No change
Toxaphene	3	3	3	No change
Xylenes (total)	3,500	10,000	10,000	Less Stringent
<i>Notes:</i>				
a. 2007 ROD, Table 5.				

COC	2007 Cleanup Levels (µg/L) ^a	2017 Federal ARARs (µg/L) ^b	2017 State ARARs (µg/L) ^c	Change
b.	Primary Drinking Water Standards available at: https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations (accessed 3/22/2017).			
c.	Florida Administrative Code, 62-550.310, Table 1 Primary Drinking Water Standards, available at: http://www.dep.state.fl.us/water/drinkingwater/standard.htm (accessed 3/22/2017). Florida GCTLs available at: http://www.dep.state.fl.us/waste/quick_topics/publications/wc/brownfields/CompTables/GroundwaterandSurfaceWaterCleanupTargetLevels.pdf (accessed 4/7/2017).			

APPENDIX H – SCREENING LEVEL RISK EVALUATION

To help determine if soil and groundwater cleanup goals remain valid, this FYR compared the cleanup goals against EPA’s current regional screening levels (RSLs) for soil. RSLs incorporate current toxicity values and standard default exposure factors.

Groundwater

The screening-level risk evaluation of the health-based groundwater cleanup goals indicates that the xylene cleanup goal is equivalent to a hazard quotient (HQ) greater than 1.0 (Table H-1). Based on the current toxicity assessment and standard drinking water and showering exposure assumptions, EPA Region 4 recommends a concentration of 3,500 µg/L as a health-protective remedial level for total xylenes in groundwater. The cleanup goal for xylene of 3,500 µg/L remains valid because it is equivalent to the health-protective remedial level recommended by EPA Region 4.

Table H-1: Groundwater Cleanup Goal Risk Evaluation

COC	2007 ROD Remedial Goal (µg/L) ^a	EPA Residential Tapwater RSL ^b (µg/L)		Residential Risk Level	
		1 x 10 ⁻⁶ Risk	HQ = 1	Cancer Risk ^c	Noncancer HQ ^d
2,4-Dichlorophenol	20	NA	46	--	0.4
Xylene	3,500	NA	190	--	18

Notes:

- Table 5 of the 2007 ROD.
- Current RSLs, dated May 2016, are available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016> (accessed 4/10/17).
- Cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1 x 10⁻⁶ risk:

$$\text{cancer risk} = (\text{remedial goal} \div \text{cancer RSL}) \times 10^{-6}$$
- The noncancer HQ was calculated using the following equation:

$$\text{HQ} = (\text{remedial goal} \div \text{noncancer RSL})$$

NA = the EPA has not established carcinogenic toxicity values for these COCs.
 -- = carcinogenic target risk could not be calculated for this contaminant.

Soil

Table H-2 compares 2007 ROD residential remedial goals to current RSLs for residential use. Table H-3 compares 2007 ROD industrial remedial goals to current industrial RSLs. The screening-level risk evaluation of the residential ROD cleanup goals (Table H-2) for soil demonstrate that the cleanup goals remain valid because the concentrations are equivalent to cancer risk levels that are within or below the EPA’s risk management range of 1 x 10⁻⁴ to 1 x 10⁻⁶ and do not exceed the noncancer HQ of 1.0. Further, the lead cleanup goal is consistent with the EPA’s recommended screening level of 400 milligrams per kilogram (mg/kg) for residential exposure. The screening-level risk evaluation of industrial cleanup goals for soil demonstrates that, except for lead, the screening levels are within the EPA’s risk management range and below the noncancer HQ of 1.0. The lead cleanup goal is less stringent than the industrial RSL. However, the cleanup goal was based on FDEP’s 2005 soil cleanup target level (SCTL), which uses region-specific assumptions in the adult blood-lead model. Although the lead RSLs have not been updated since May 2016, the EPA is in the process of revising its policy for health protective levels of soil lead. EPA-Office of Land Emergency Management

Headquarters has issued an updated guidance/policy for soil lead that recognizes a lower blood lead target range, but allows some flexibility by the Regions (December 2016); EPA Region 4 is still working on its implementation of the EPA Headquarters policy. For both residential and commercial/industrial scenarios, existing cleanup levels for lead are deemed protective in the interim, but once the EPA Region 4 implementation policy is final, lead in soils may need to be further evaluated.

Table H-2: Residential Soil Cleanup Goal Risk Evaluation

COC	2007 ROD Remedial Goal (mg/kg) ^a	EPA Residential Soil RSL ^b (mg/kg)		Residential Risk Level	
		1 x 10 ⁻⁶ Risk	HQ = 1	Cancer Risk ^c	Noncancer HQ ^d
4,4'-DDD	4.2	2.3	NA	1.8 x 10 ⁻⁶	--
4,4-DDT	2.9	1.9	37	1.5 x 10 ⁻⁶	0.08
Aldrin	0.06	0.039	2.3	1.5 x 10 ⁻⁶	0.03
alpha-BHC	0.1	0.086	510	1.2 x 10 ⁻⁶	0.0002
alpha-Chlordane	2.8	1.7	35	1.6 x 10 ⁻⁶	0.08
Arsenic	2.1	0.68	35	3.1 x 10 ⁻⁶	0.06
Chlordane (technical)	2.8	1.7	35	1.6 x 10 ⁻⁶	0.08
Dieldrin	0.06	0.034	3.2	1.8 x 10 ⁻⁶	0.02
Heptachlor	0.2	0.13	39	1.5 x 10 ⁻⁶	0.005
Heptachlor epoxide	0.1	0.07	1	1.4 x 10 ⁻⁶	0.1
Lead	400	400 ^e		--	
Toxaphene	0.9	0.49	NA	1.8 x 10 ⁻⁶	NA

Notes:

- a. Table 5 of the 2007 ROD.
- b. Current RSLs, dated May 2016, are available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016> (accessed 4/10/2017).
- c. Cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1 x 10⁻⁶ risk:

$$\text{cancer risk} = (\text{remedial goal} \div \text{cancer RSL}) \times 10^{-6}$$
- d. The noncancer HQ was calculated using the following equation:

$$\text{HQ} = (\text{remedial goal} \div \text{noncancer RSL})$$
- e. RSL is based on a blood-lead model. It is not based on carcinogenic or noncarcinogenic effects.
 NA = the EPA has not established a toxicity value for this COC.
 -- = cancer risk or noncancer HQ could not be calculated for this contaminant.

Table H-3: Industrial Soil Cleanup Goal Risk Evaluation

COC	2007 ROD Remedial Goal (mg/kg) ^a	EPA Industrial Soil RSL ^b (mg/kg)			Industrial Risk Level	
		1 x 10 ⁻⁶ Risk	HQ = 1	Cancer Risk ^c	Noncancer HQ ^d	
4,4'-DDD	7	9.6	NA	7.2 x 10 ⁻⁷	--	
4,4'-DDE	15	9.3	NA	1.6 x 10 ⁻⁶	--	
4,4-DDT	11	8.5	520	1.3 x 10 ⁻⁶	0.02	
4-Nitrophenol	1.12	NA	NA	--	--	
Aldrin	0.3	0.18	35	1.7 x 10 ⁻⁶	0.009	
alpha-BHC	0.009	0.36	6,600	2.5 x 10 ⁻⁸	0.000001	
alpha-Chlordane	14	7.7	450	1.8 x 10 ⁻⁶	0.03	
Arsenic	12	3.0	480	4.0 x 10 ⁻⁶	0.03	
beta-BHC	0.03	1.3	NA	2.3 x 10 ⁻⁸	--	
Cadmium	17	9,300	980	1.8 x 10 ⁻⁹	0.02	
Chlordane (technical)	14	7.7	450	1.8 x 10 ⁻⁶	0.03	
Chromium	38	6.3	3,500	6 x 10 ⁻⁶	0.01	
delta-BHC	25.6	NA	NA	--	--	
Dieldrin	0.04	0.14	41	2.9 x 10 ⁻⁷	0.001	
Dioxin (TEQ)	0.00003	0.000022	0.00072	1.4 x 10 ⁻⁶	0.04	
gamma-BHC (lindane)	0.5	2.5	300	2 x 10 ⁻⁷	0.002	
Heptachlor	1	0.63	580	1.6 x 10 ⁻⁶	0.002	
Heptachlor epoxide	0.5	0.33	15	1.5 x 10 ⁻⁶	0.03	
Hexachlorobenzene	1.2	0.96	930	1.3 x 10 ⁻⁶	0.001	
Lead	1,400 ^e	800		NA		
Toxaphene	4.5	2.1	NA	2.1 x 10 ⁻⁶	--	
Xylenes (total)	156.4	NA	2,500	--	0.06	

Notes:

- Table 5 of the 2007 ROD.
- Current RSLs, dated May 2016, are available at: <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016> (accessed 4/10/2017).
- Cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1 x 10⁻⁶ risk:

$$\text{cancer risk} = (\text{remedial goal} \div \text{cancer RSL}) \times 10^{-6}$$
- The noncancer hazard index was calculated using the following equation:

$$\text{hazard index} = (\text{remedial goal} \div \text{noncancer RSL})$$
- Cleanup goal calculated using FDEP inputs into the adult lead model following EPA's 2003 lead risk guidance. NA = the EPA has not established carcinogenic toxicity values for these COCs.
 -- = carcinogenic risk or noncancer HQ could not be calculated for this contaminant.

APPENDIX I – INTERVIEW FORMS

**Landia Chemical Company
Superfund Site**

Five-Year Review Interview Form

Site Name: Landia Chemical Company

EPA ID No.: FLD042110841

Subject Name: PRP Representatives
Interview via Written Submission

Affiliation: BASF, PCS and Williams

Location:

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

Interview Category: Potentially Responsible Parties (PRPs)

1. What is your overall impression of the remedial activities at the Site?

Favorable. The remedial activities have eliminated the risk to potential receptors and addressed the contaminants of concern, as anticipated. The removal of the industrial structures located on the Site prior to remedial action eliminated potential safety hazards, and the addition of trees, flowers, and other plants have attracted beneficial wildlife to the area.

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

Potential exposure to Site contaminants through stormwater runoff or trespassing on the site has been eliminated. The appearance of the Site is greatly improved from the pre-remedial dilapidated buildings existing on the site.

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

Potential for exposure to Site contaminants has been effectively eliminated through the remedial actions (soil excavation and placement of engineered caps), the Southwest Florida Water Management District Memorandum of Agreement that prevents installation of recovery wells within the potential groundwater plume footprint, and the restrictive covenants filed for both the Landia and the former Florida Favorite Fertilizer sites. From the data we have reviewed, it appears that the remedy in place at the Site is performing as anticipated. In certain areas (nitrate plume), it appears that the remedy in place is performing better than originally anticipated. Based on the performance to date, it appears that natural attenuation could be viable as a final remedy for the Site.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

The post-remedial Site condition has been noticed by the surrounding community as greatly improved. In fact, during the 2014 EPA Ecological Reuse Award ceremony, the City representatives inquired about the opening date for the "park."

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?

To date, significant work has been completed at the site to eliminate the risk to sensitive receptors and to decrease the mass of contaminant in the subsurface. The positive impacts of these actions are still being realized, and we recommend that additional monitoring be continued over the next 5 years to fully evaluate the efficacy of the actions already implemented.

7. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

Yes

Landia Chemical Company Superfund Five-Year Review Interview Form Site

Site Name: Landia Chemical Company **EPA ID No.:** FLD042110841

Subject Name: Amy Mixon, PE and Jeff Wagner, PG **Affiliation:** AECOM

Interview Location: Via Written Submission

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

Interview Category: O&M Contractor

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

The overall appearance of the Site has been improved dramatically since 2010. The removal of the dilapidated buildings and the ecological reuse of the Site has made it an aesthetically pleasing feature in an otherwise industrialized neighborhood. The risk of exposure to contaminants has been properly eliminated (by soil removal and emplacement of the engineered caps) and managed (Southwest Florida Water Management District Memorandum of Agreement that prevents installation of wells within the groundwater plume and restrictive covenants for both the Landia and the Sylvite properties). The PRP group for the Site is proactive, and they are open to ways to improve reuse of the Site. The recent enhancements of the pollinator habitat are an example.

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

The current remedy has eliminated the potential for direct contact with the site contaminants. In addition, the engineered caps are functioning as designed, and the reduction in infiltration of storm water has restored the natural westerly groundwater gradient. A more westerly gradient will allow for the pesticide groundwater plume to move naturally into higher pH groundwater with conditions more favorable for degradation of the pesticide plume. Additionally, the westerly gradient prevents movement of the groundwater plume toward sensitive receptors.

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?

The pesticide plume concentrations have remained stable. Evidence of attenuation in the pesticide plume (BHC) is occurring along the outer edges of the plume. The nitrate plume concentrations have been decreasing in recent years. Installation of additional monitoring wells in 2014 in the nitrate source areas showed much lower nitrate concentrations than anticipated based on previous investigations, demonstrating that natural attenuation is functioning at a quicker pace than originally anticipated. Based on the data evaluated to date, natural attenuation could be feasible as a final remedy for both the pesticide and nitrate plumes at the Site.

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 Landia and Sylvite properties are completely fenced along their perimeters. The gates to the Landia property are kept locked except when maintenance crews are present, and the gates to the Sylvite property are open when Sylvite operations are in progress and personnel are onsite.

The cap is maintained by a local landscaping company who conducts bi-monthly visits to the site to mow and water the vegetation as needed. While onsite, the landscapers note the condition of the perimeter fencing and of the cap. If breaches of either are evident they report them to AECOM personnel. Additionally, one of the PRP's has hired a third-party contractor to conduct site inspections twice per month since the completion of the remedial actions. Site inspection reports are submitted to the PRP who communicates any noted issues to AECOM personnel. If maintenance is required, AECOM mobilizes resources to complete the work. Per the schedule, AECOM personnel are onsite twice a year for groundwater sampling and another two times a year (at least) for data logger maintenance and general site inspections. Finally, the Sylvite facility manager conducts inspections of the site perimeter nearly every week and reports any noticeable differences to AECOM and the PRPs.

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.

As the root systems of the plants in the evapotranspiration cap have taken hold, the frequency of vegetative irrigation has decreased somewhat. This reduction in irrigation does not negatively impact the effectiveness of the remedy. In fact, less irrigation allows for more efficient use of rain water and a decrease in the overall infiltration volume.

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.

During the first year of O&M, the automated irrigation was prone to leaks. Removal of portions of the irrigation piping and switching to manual watering of the vegetation has greatly reduced the potential for leaks.

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 reductions in monitoring activities have been implemented at the Site at this time. The manual irrigation discussed above has eliminated the potential for wasting of water.

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

No revisions in the O&M activities or monitoring at the Site are recommended at this time.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

Yes

Landia Chemical Company Superfund Five-Year Review Interview Form Site

Site Name: Landia Chemical Company EPA ID No.: FLD042110841

Subject Name: Shelby Johnston Affiliation: EPA
Subject Contact 404-562-8287 johnston.shelby@epa.gov

Information:

Time: 11:00 a.m. Date: 4/12/2017

Interview Format (circle one): In Person Phone Email 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 remedy was composed of 2 operable units, OU1 addresses the contaminated soil from 0-3 feet below land surface (ft bls) by removal and OU2 addresses groundwater. The PRP group decided to excavate additional contaminated soil at greater than 3 ft bls and installed a clay and evapotranspiration cover to reduce infiltration to better reduce the mobility of the pesticide plume. The site parcel with the cover now is now in ecological reuse and has more than 1,000 plants which provide habitat for native wildlife, migratory birds and pollinators. The western parcel (FFF facility) is currently owned by Sylvite Southeast Ltd, a wholesale fertilizer merchant. The company continues to operate as a fertilizer blending facility on site.

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

None

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?

The groundwater sampling analysis has continued to show that the contaminant concentrations are decreasing as a result of the soil remedial action and the cover installation.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

Yes. Restrictive Covenants have been finalized for both properties and the site groundwater plume is being managed under the MOA between EPA and the SFWMD. The current property owners understand what is being required under these restrictions to provide protection of the remedy.

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.

Landia Chemical Company Superfund Five-Year Review Interview Form Site

Site Name: Landia Chemical Company **EPA ID No.:** FLD042110841
Subject Name: Miranda McClure **Affiliation:** FDEP

Time: **Date:** 6/26/17

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

Interview Category: State Agency

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

Site inspections onsite shows that the cap is well maintained and the site reuse has ecological and aesthetic value.

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

Progress has been made at the site regarding the cleanup of the soil and sediment. The groundwater remedy has not been implemented, however. The cap that remains at the site appears to be performing as planned.

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.

DEP provides peer reviews on submitted documents and attended the Five Year Review site inspection.

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

The Groundwater Cleanup Target Level for 2,4-dichlorophenol is currently 0.3 ug/l and at the time of the signed ROD it was at 20 ug/l.

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

Yes. The RC in place restricts land use and there is a MOA that restricts groundwater use until cleanup goals are met.

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?

DEP would recommend EPA and the PRP consider implementing the groundwater remedy.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

Yes.

Landia Chemical Company Superfund Five-Year Review Interview Form Site

Site Name: Landia Chemical Company **EPA ID No.:** FLD042110841

Interviewer Name: Kirby Webster **Affiliation:** Skeo
Subject Name: Resident 1 **Affiliation:** Nearby Resident
Time: 11:15 a.m. **Date:** 06/16/2017

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

Interview Category: Residents

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

I know they excavated a little land a couple of times and filled it in but it still stinks like death up there. There's a lot of chemicals still in the dirt.

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

I don't know. I can only tell by my nose. When I can smell, it smells like death.

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

A lot of them died and some killed themselves – we played in the stream that ran from the plant, we thought it was a sulfur plant, so we played in the stream and people got sick from it.

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

No. I haven't noticed any. But I don't go by there too much. I haven't seen anything.

12. 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?

Not lately. The Ledger paper, the tv, or the radio.

13. 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.

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

No I don't.

Landia Chemical Company Superfund Five-Year Review Interview Form Site

Site Name: Landia Chemical Company **EPA ID No.:** FLD042110841

Interviewer Name: Kirby Webster **Affiliation:** Skeo
Subject Name: Local Business **Affiliation:**
Time: 12:35 p.m. **Date:** 6/20/2017

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

Interview Category: Business

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

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

It looks good. Appearances are not always everything.
3. What have been the effects of this Site on the surrounding community, if any?

We have had runoff issues, I don't know if we still do or not, from that property to our property. They installed levees to prevent that. From our perspective if there is an issue, they address it.
4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

Trespassing is very common in this area, I don't think it is related to the site. We have issues with fences being cut and there are probably 2 or 3 cuts in fencing on the property in question because people use it to transit across from George Jenkins to Olive Street. A lot of people on bicycles or foot, they will use quick passage ways.
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?

We've been in contact with some of them. They have a well on the right-of-way on our property. They inspect it about once per year and we'll make contact.

I don't know. I understand this is a very expensive project and there is a lot of money involved in it. It leaks down the side of the hill in different ways. I don't know if dollar for dollar it is effective or not.
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. Not at this location.

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

No.

APPENDIX J – MEMORANDUM OF AGREEMENT

MEMORANDUM OF AGREEMENT

Between

the U.S. Environmental Protection Agency, Region 4, Superfund Division and
the Southwest Florida Water Management District

This MEMORANDUM OF AGREEMENT (MOA) is hereby made and entered into by and between the United States Environmental Protection Agency (EPA) and the Southwest Florida Water Management District (SWFWMD). The purpose of this MOA is to develop a framework for cooperation between the EPA and the SWFWMD and to set forth the mutual understanding of the parties concerning cooperative efforts to minimize the potential effects of groundwater contamination in areas within SWFWMD'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 SWFWMD's jurisdiction, to prevent the potential human exposure to contaminated groundwater in areas impacted or potentially impacted by Superfund sites.

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, 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 construction of potable and irrigation wells and the use of contaminated groundwater 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 SWFWMD and various local government authorities;

Whereas, SWFWMD has adopted rules to govern the construction of water wells within the geographic boundaries of SWFWMD, to implement the provisions of Part III of Chapter 373, F.S.;

Whereas, such rules are adopted by SWFWMD to ensure that water wells within SWFWMD are located, constructed, maintained, used and abandoned in a manner that protects the water resources, does not pose a threat of contamination to the water resource and protects the health, safety and welfare of the public;

Whereas, SWFWMD 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 SWFWMD, 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 groundwater contamination may exist or is known to exist;

Whereas, pursuant to Chapter 40D-3, F.A.C., SWFWMD is authorized to impose upon any well construction permit issued by SWFWMD such reasonable conditions as are necessary to protect the water resource and assure that the permitted activity is consistent with the overall objectives of SWFWMD, and may deny an application for a well construction permit if construction or use of the well would increase the potential for harm to the public health, safety and welfare or if the proposed well would degrade groundwater quality by causing pollutants to spread;

Whereas, EPA and the SWFWMD desire to cooperate in exercising their respective regulatory authority to prevent the potential spread of groundwater 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 SWFWMD on strategies to address water pollution, including groundwater and surface water pollution.

IT IS MUTUALLY UNDERSTOOD AND AGREED BY AND BETWEEN THE PARTIES THAT:

A. As to EPA:

1. EPA shall notify SWFWMD in writing of any area of groundwater impacted by a Superfund site within the jurisdiction of SWFWMD.

2. Attached hereto and incorporated herein by reference as Appendix 1 is a list of agreed-upon Superfund sites within the jurisdiction of SWFWMD to which this MOA shall be applicable and which shall hereinafter be referred to as the Superfund Areas. EPA shall provide SWFWMD 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 West 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 SWFWMD for each Superfund Area as often as necessary to maintain an accurate boundary of the Superfund Area, or at least every five years.
3. EPA shall consult with SWFWMD 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.
4. 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 SWFWMD available monitoring and other site assessment reports demonstrating the status of groundwater contamination.

5. 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 groundwater 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.

B. As to SWFWMD:

1. Upon receipt of the electronic and other descriptive data for a Superfund Area including the contamination zone and buffer zone for such Superfund Area, SWFWMD will make available through its website for public information purposes an aerial map depicting the location of the Superfund Area and specifically the contamination zone and buffer zone for each Superfund Area. A written description of the Superfund Area will also be made available to the public upon request.
2. When reviewing and approving permit applications involving activity to be undertaken on property located within a Superfund Area (hereinafter referred to as a Permit Application), SWFWMD will, where appropriate, impose such reasonable conditions as are necessary to protect the water resource, prevent the spread of ground or surface water contamination and otherwise be consistent with the overall objectives of SWFWMD. For well construction permits, such conditions may include prohibiting use of the well as a

potable water supply, requiring notice to well owners of potential groundwater contamination or requiring specific methods of construction.

3. SWFWMD agrees that following receipt of an application for a well construction permit for activity located within Zone A of a Superfund Area, if a Request for Additional Information (RAI) is issued, SWFWMD will provide to EPA a copy of the RAI.
4. Pursuant to Rule 40D-3.505(3), F.A.C., SWFWMD will deny an application for a well construction permit for activity in Zone A of a Superfund Area if use of the well would increase the potential for harm to public health, safety and welfare, or if the proposed well would degrade the water quality of the aquifer by causing pollutants to spread.
5. SWFWMD will provide notice to EPA of the receipt of a written request for a variance or waiver pursuant to Section 120.542, F.S., Rule 40D-1.1001, F.A.C., or Rule 40D-3.505(4), F.A.C., or an objection or petition for a hearing in relation to a Permit Application for an activity located or to be located within a Superfund Area.

C. As to both parties:

1. Both parties agree to make their staffs available for timely consultation as to the potential for groundwater impacts occurring within or near a Superfund Area as a result of proposed activity for which a Permit Application is received by SWFWMD.
2. 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.
3. 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.

4. 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

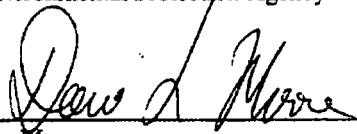
For SWFWMD: Manager, Well Construction
 Regulation Performance Management Department
 Southwest Florida Water Management District
 2379 Broad Street
 Brooksville, Florida 34604-6899

5. This MOA shall become effective on the latest day and year executed by either the EPA or the SWFWMD as noted below.
6. Either party may terminate this MOA upon written notice to the other party.
7. 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.
8. 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.

9. 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 SWFWMD or EPA, their officers or employees, or any other person. This MOA does not direct or apply to any person outside of SWFWMD and EPA.

10. The undersigned representative(s) certify that they are fully authorized to execute this MOA.

BY:  DATE: SEP 11 2008
J.L. Palmer, Jr.
Regional Administrator
U.S. Environmental Protection Agency

BY:  DATE: 8-26-08
David L. Moore
Executive Director
Southwest Florida Water Management

APPENDIX 1
March 2010

1. Landia Chemical Superfund Site, EPA ID No. FLD042110841, Lakeland, Polk County, Florida (August 2008)
2. Alaric Area Groundwater Plume, Helena Chemical Company and Stauffer Chemical Company Combined Superfund Sites, EPA ID Nos. FLD012978862, FLD053502696 and FLD004092532, Tampa, Hillsborough County, Florida (July 2009)
3. Southern Solvents Superfund Site, EPA No. FLD0001209840, Tampa, Hillsborough County (March 2010)