Five-Year Review Report

Third Five-Year Review Report
for
Chemform, Inc.
FLD080174402

Pompano Beach
Broward County, Florida

September 2015

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

Franklin E. Hill, Director
Superfund Division

Date: 9/29/15

Third Five-Year Review Report
for
Chemform, Inc.
1410 SW 8th Street
Pompano Beach
Broward County, Florida

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List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
BCHD	Broward County Health Department
bgs	Below Ground Surface
bls	Below Land Surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CSF	Cancer Slope Factor
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FYR	Five-Year Review
HI	Hazard Index
HQ	Hazard Quotient
IC	Institutional Control
IRIS	Integrated Risk Information System
IUR	Inhalation Unit Risk
MCL	Maximum Contaminant Level
MW	Monitoring Well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCOR	Preliminary Close-Out Report
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RfC	Reference Concentration
RfD	Reference Dose
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SFWMD	South Florida Water Management District
TBC	To-Be-Considered
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound
µg/L	micrograms per liter

Executive Summary

The 4-acre Chemform, Inc. Superfund site (the Site) is located at 1410 SW 8th Street in Pompano Beach, in a highly industrialized part of Broward County, Florida. Specific industrial activities at the Site included metal milling and shaping using oils, lubricants and organic solvents; and fiber glassing and painting using organic solvents. Operators discharged process wastewater on site.

Industrial wastewater and sewage contaminated soils and groundwater with various solvents and volatile organic compounds (VOCs). The United States Environmental Protection Agency added the Site to the Superfund program's National Priorities List (NPL) on October 4, 1989. The Site's potentially responsible parties (PRPs) formed a PRP Group and are addressing the Site's cleanup as two operable units (OUs). OU1 addresses site groundwater and OU2 addresses site soils. The EPA selected a remedy for OU1 in September 1992 of no action with at least one year of quarterly monitoring for site groundwater. Quarterly groundwater monitoring was conducted between October 1993 and July 1994. Based on new information, the PRP Group consented to perform a groundwater monitoring study in 2012 to better determine the nature of site contamination. Groundwater monitoring continues and institutional controls are in place to restrict the use of groundwater for potable drinking water.

The EPA selected a remedy for OU2 in September 1993 of no further action based on prior soil excavation conducted by the PRP Group between 1990 and 1993.

The EPA deleted the Site from the NPL on July 28, 2000. The triggering action for this five-year review (FYR) was the signing of the previous FYR on September 29, 2010.

The remedy at OU1 currently protects human health and the environment because institutional controls are in place that effectively prevent consumption of water from the contaminated aquifer, there currently is no unacceptable risk of vapor intrusion, and groundwater monitoring assessments continue as needed. However, for the remedy to be protective in the long term, the following actions need to be taken: modify the OU1 remedy to require institutional controls for groundwater, and conduct sufficient groundwater monitoring to determine the source of elevated contaminant levels and take remedial action as appropriate.

The remedy at OU2 is protective of human health and the environment because contaminated soil was removed from the property to allow for unlimited use and unrestricted exposure to soil.

Because the remedy at OU1 is protective in the short term, the sitewide remedy is protective of human health and the environment in the short term.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Chemform, Inc.		
EPA ID: FLD080174402		
Region: 4	**State:** FL	**City/County:** Pompano Beach, Broward County
SITE STATUS		
NPL Status: Deleted		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Sarah Alfano and Treat Suomi (Reviewed by the EPA)		
Author affiliation: Skeo Solutions		
Review period: 10/01/2014 – 9/29/2015		
Date of site inspection: 1/13/2015		
Type of review: Policy		
Review number: 3		
Triggering action date: 9/29/2010		
Due date *(five years after triggering action date)*: 9/29/2015		

Five-Year Review Summary Form (continued)

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU2

Issues and Recommendations Identified in the Five-Year Review:				
OU: 1	**Issue Category: Institutional Controls**			
	Issue: Although institutional controls are in place for groundwater, they are not required by the OU1 decision documents.			
	Recommendation: Modify the OU1 remedy to require institutional controls for groundwater.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/FDEP	6/30/2017
OU: 1	**Issue Category: Remedy Performance**			
	Issue: Groundwater continues to show contamination above ARARs for arsenic and vinyl chloride.			
	Recommendation: Conduct sufficient groundwater monitoring and analysis to determine the source of elevated contaminant levels and evaluate appropriate remedial action as necessary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP/EPA	EPA/FDEP	6/30/2017

Protectiveness Statements		
Operable Unit: OU1	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: The remedy at OU1 currently protects human health and the environment because institutional controls are in place that effectively prevent consumption of water from the contaminated aquifer, there currently is no unacceptable risk of vapor intrusion, and groundwater monitoring assessments continue as needed. However, for the remedy to be protective in the long term, the following actions need to be taken: modify the OU1 remedy to require institutional controls for groundwater, and conduct sufficient groundwater monitoring to determine the source of elevated contaminant levels and take remedial action as appropriate.		

Operable Unit: OU2	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: The remedy at OU2 is protective of human health and the environment because contaminated soil was removed from the property to allow for unlimited use and unrestricted exposure to soil.		

Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: Because the remedy at OU1 is protective in the short term, the sitewide remedy is protective of human health and the environment in the short term.	

Five-Year Review Summary Form (continued)

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

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

Third Five-Year Review Report
for
Chemform, Inc. Superfund Site

1.0 Introduction

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

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

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

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

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

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Chemform, Inc. Superfund site (the Site) in Pompano Beach, Broward County, Florida. The EPA's contractor conducted this FYR from October 2014 to September 2015. The EPA is the lead agency for developing and implementing the remedy for the potentially responsible party (PRP)-financed cleanup at the Site. The Florida Department of Environmental Protection (FDEP), as the support agency representing the State of Florida, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the third FYR for the Site. The triggering action for this policy review is the previous FYR. The FYR is required due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of two operable units (OUs) for groundwater (OU1) and soils (OU2). This FYR report addresses all site OUs.

2.0 Site Chronology

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

Table 1: Chronology of Site Events

Event	Date
New England Mutual Life Insurance Company purchased the property and leased the property to Chemform, Inc.	1969
Broward County issued a Notice Violation to Chemform, Inc.	March 23, 1977
The EPA conducted a site screening investigation and collected groundwater samples	August 1985
The EPA conducted additional groundwater sampling	July 1986
The EPA proposed the Site for the National Priorities List (NPL)	June 24, 1988
The EPA finalized the Site on the NPL	October 4, 1989
PRP Group entered into an Administrative Order on Consent (AOC) with the EPA, agreeing to perform the remedial investigation/feasibility study (RI/FS)	October 19, 1989
The EPA issued an AOC requiring the PRP Group to remove drums found on site	April 17, 1990
PRP Group began removal action	October 1990
PRP Group began secondary removal action	July 1991
PRP Group completed ecological and human health risk assessments	June 26, 1992
PRP Group removed a septic tank from the Site	June-July 1992
PRP Group concluded RI/FS and the EPA finalized a Record of Decision (ROD) for groundwater (OU1)	September 22, 1992
The EPA and PRP Group entered into an AOC for groundwater monitoring	July 13, 1993
The EPA finalized ROD and close-out report for soil (OU2), documenting completion of site construction	September 16, 1993
PRP Group began quarterly groundwater monitoring	October 1993
PRP Group excavated additional arsenic-contaminated soil at the Site	1994
PRP Group concluded quarterly groundwater monitoring	July 1994
FDEP received monitoring well (MW)-9 data, revealing presence of vinyl chloride	April 4, 1995
New England Mutual Life Insurance Company merged with Metropolitan Life Insurance Company	August 1995
PRP Group collected additional groundwater samples	May 1996
The EPA finalized an Explanation of Significant Differences (ESD) for OU1	April 2, 1999
The EPA prepared a preliminary close-out report (PCOR)	April 6, 2000
The EPA deleted the Site from the NPL	July 28, 2000
The EPA completed the first FYR report	September 30, 2005
The EPA issued a comfort letter to Precision Metal Industries	January 28, 2010
PRP Group completed phase II assessment	April 23, 2010
The EPA issued comfort letter to Cadiz Realty Company	May 14, 2010
Cadiz Realty Company purchased property	June 3, 2010
The EPA completed the second FYR	September 29, 2010
PRP Group submitted a technical memorandum of 2011 sampling investigation	October 27, 2011
The PRP Group entered into an AOC with the EPA agreeing to conduct a groundwater monitoring study	June 8, 2012
PRP Group finalized a groundwater monitoring study work plan	July 13, 2012
PRP Group completed an off-site source evaluation	February 24, 2015

3.0 Background

3.1 Physical Characteristics

The 4-acre Site is located in Pompano Beach, Broward County, Florida at 1410 SW 8th Street (Figure 1). The Site consists of one parcel (ID: 4942 03 00 0392) with a 50,866-square-foot building. From 1967 to 1985, the building was used for turbine engine manufacturing and refurbishing operations.

Surrounding land use is industrial. The Site is bordered by SW 8th Street and industrial properties to the north, including the Veritech Dry Cleaning (Veritech), non-NPL site to the northeast. The cleanup for the Veritech site is overseen by Broward County. The Wilson Concepts of Florida, Inc. (Wilson Concepts) Superfund site is located to the east, an industrial access road to the south, and Seaboard Coast Line railroad tracks to the west. There are no residential areas in the immediate vicinity. Located about 3,000 feet (0.5 mile) south of the Site is the Pompano Cypress Creek Canal (the Canal), which flows east into the Biscayne Bay. The South Florida Water Management District (SFWMD) operates and maintains the Canal.

The Site is located on the Southern Atlantic Coastal plain, which is underlain by Pleistocene-aged sand, shelly sandstone and limestone. Groundwater from the Site is part of the Biscayne Aquifer that lies beneath Miami-Dade and Broward Counties. This aquifer serves as the sole-source supply of potable water for Broward County.

The ground surface gently slopes from north to south, with an average gradient of 1.4 feet across the Site. The generally flat topography and permeable soils tend to minimize surface water runoff, which generally flows south toward a neighboring industrial business. Groundwater flows south through the Site.

3.2 Land and Resource Use

The Site is located in an area zoned for commercial and industrial uses. From 1967 to 1985, industrial operations, including a precision machine facility, took place on site. The Sol Group, with a primary location across the street, expanded their operations to the Site in 2010. The company uses on-site buildings for product storage (mainly fruit), vehicle storage and office space. The entire Site is in industrial use.

Although land use is industrial and commercial, Broward County obtains drinking water from the Biscayne Aquifer, which lies in part beneath the Site. The groundwater is treated and disinfected at a water treatment plant before distribution to public water supplies.

3.3 History of Contamination

Kismet Engineering Company initiated industrial operations at the Site in 1967. The company repaired and refurbished turbine engine components for the aerospace industry. The company also manufactured metal parts and high-tech electro-chemical milling machines. Numerous companies, including Chemform, Inc., conducted operations and generated various wastes on the Site until 1985. Additional waste-generating activities included metal milling and mechanical shaping operations, which used cutting-oil to lubricate and cool components, and fiber glassing and metal cleaning with organic solvents.

Operators discharged wastewater and sanitary sewage from the manufacturing and cleaning processes into an on-site septic tank and a leach field located near the southwest corner of the building (see Appendix F). Workers dumped additional process wastewater into an open trench located in a field to

the west of the building. Industrial operations and improper waste disposal practices contaminated soil and groundwater with arsenic, chromium, volatile organic compounds (VOCs) and heavy metals.

New England Mutual Life Insurance Company (which merged with Metropolitan Life Insurance Company in August 1995) purchased the site property in 1969. Cadiz Realty Company purchased the Site in 2010.

3.4 Initial Response

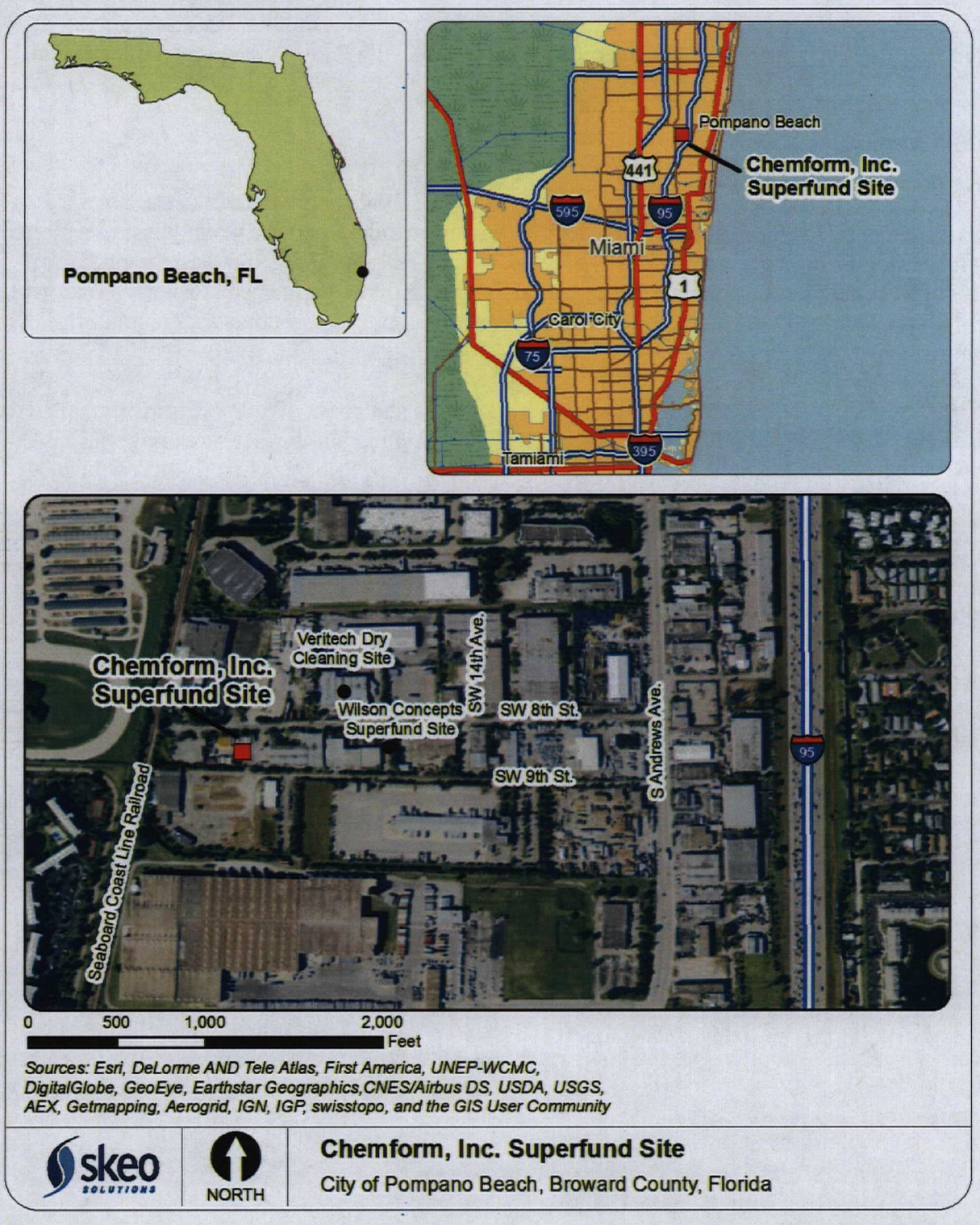
Between 1975 and 1985, the Broward County Pollution Control Board (now known as the Broward County Environmental Quality Control Board) regularly inspected the Site. The County issued a Notice of Violation to Chemform, Inc. on March 23, 1977, for violating county industrial waste regulations, specifically for unlawful discharge of industrial waste. Chemform, Inc. performed cleanup operations at the Site. By May 1985, the County determined that Chemform, Inc. had complied with regulatory requirements.

In August 1985, an EPA investigation uncovered leaking drums and about 47 other drums stored in a shop yard, along with tanks containing oil and sludge. After sampling and further screening, the EPA proposed the Site for inclusion on the Superfund program's National Priorities List (NPL) on June 24, 1988. The EPA finalized the Site on the NPL on October 4, 1989.

On October 19, 1989, four PRPs entered into an Administrative Order on Consent (AOC) with the EPA agreeing to fund and conduct a remedial investigation/ feasibility study (RI/FS) for the Site. The four PRPs, or PRP Group, were Chemform, Inc., KMS Industries, Inc., New England Mutual Life Insurance Company and Smith International, Inc. Specific work to be conducted by the PRP Group included removal of drums and investigation of the effect of metal concentrations in groundwater.

The PRP Group contractors began removal actions in October 1990. Actions included characterization and disposal of 450 waste containers. The PRP Group conducted a second removal action to remove contaminated soil that could impact groundwater between July 1991 and early 1993.

Figure 1: Site Location Map



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

3.5 Basis for Taking Action

The EPA designated two OUs to address site cleanup: OU1 to address site groundwater and OU2 to address site soils. As a result of the 1992 OU1 risk assessment and OU1 RI, the EPA determined the following contaminants for groundwater had the greatest potential for exposure, under the future industrial or residential scenarios (ingestion, dermal contact and inhalation):

- Inorganics – arsenic, barium, cobalt, hexavalent chromium, nickel, zinc
- Organics – 1,4-dichlorobenzene, methylene chloride, naphthalene, xylene

The 1993 OU2 RI included analysis of 113 soil samples. The OU2 risk assessment evaluated several metals and semi-volatile organic compounds and concluded that all exposure scenarios resulted in cancer risks within the EPA's risk range and below the noncancer hazard index of 1.0. The risk assessment concluded that contaminant levels were substantially reduced through early implementation of soil and source area cleanup activities performed by Chemform, Inc. However, based on the OU2 RI's source characterization and soil investigation and the PRP Group's removal actions, leaching of soil contaminants is the primary source of groundwater contamination at the Site.

4.0 Remedial Actions

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

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

4.1 Remedy Selection

The EPA issued the OU1 Record of Decision (ROD) in September 1992 to address contamination in site groundwater and the OU2 ROD in September 1993 to address site soils. The EPA updated the OU1 remedy by issuing an Explanation of Significant Differences (ESD) in 1999. Site decision documents do not explicitly state remedial action objectives (RAOs); however, the EPA designed the OU1 remedy to verify that site-related contamination was not being released to groundwater. Likewise, the EPA designed the OU2 remedy to clarify that exposures to site-related contamination in soil had already been eliminated.

<u>OU1 - Groundwater</u>

Due to a lack of significant groundwater contamination, the EPA selected a "No Action with Monitoring" option for OU1. The OU1 ROD stated that groundwater would be monitored quarterly for no less than one year in order to verify that no site-related release of contaminants was occurring. The OU1 ROD outlined ten contaminants of concern (COCs) for site groundwater, which the 1999 ESD later amended to 11 COCs, by adding vinyl chloride. The OU1 ROD did not select permanent cleanup goals but presented both Florida Drinking Water Standards and EPA's maximum contaminant levels (MCLs) for consideration should further remedial action be required. The 11 COCs are listed below in Table 2. Contractors use the more stringent of the two standards for sampling. In addition to groundwater sampling and monitoring, the 1999 ESD mentioned state and local groundwater use regulations and institutional controls currently in place that prevent groundwater use, but neither decision document explicitly required institutional controls for OU1. See Section 6.3 Institutional Control Review for more details.

Table 2: Groundwater COC Cleanup Considerations*

COC	MCL (µg/L)	Florida Drinking Water Standards (µg/L)
Arsenic	50	50
Barium	2,000	1,000
Chromium (VI)	100 [a]	50
Cobalt	NA	NA
1,4-Dichlorobenzene	75	75
Methylene chloride	NA	NA
Naphthalene	NA	NA
Nickel	100 [b]	NA
Vinyl chloride [c]	1	1
Xylene	10,000	NA
Zinc	5,000	5,000

Notes:
[a] – This value is for unspeciated chromium
[b] – Secondary MCL
[c] – COC added in the 1999 ESD
NA – No standard or criterion available; the OU1 RI identified cobalt as a COC based on a qualitative evaluation.
µg/L – microgram per liter

* The OU1 ROD did not select final cleanup goals.

OU2 - Soil

The OU2 ROD stated that no further action was required due to initial cleanup actions performed by the PRP Group between 1990 and 1993. The risk assessment for OU2 indicated that remaining contaminants at the Site were within acceptable risk ranges for both industrial and residential use. The OU2 ROD also stated that institutional controls for soil were unnecessary.

4.2 Remedy Implementation

OU1

The PRP Group installed three additional monitoring wells (MWs 7-9) and screened all nine MWs every three months from October 1993 to July 1994. In April 1995, the PRP Group conducted additional sampling, as requested by FDEP, and found elevated concentrations of vinyl chloride. The 1999 ESD added vinyl chloride as a COC, and called for future FYRs and groundwater sampling until results indicate that hazardous substances, pollutants, or contaminants are no longer on site above levels that allow for unlimited use and unrestricted exposure.

The EPA deleted the Site from the NPL in 2000. However, the PRP Group, under the EPA oversight, has continued groundwater monitoring because all MCLs have not been met.

On June 8, 2012, the PRP Group entered into an AOC with the EPA, agreeing to conduct a groundwater monitoring study. The study would monitor groundwater for a minimum of four quarters to evaluate if VOC and arsenic concentrations in groundwater exceed site closure standards. The PRP Group completed a groundwater monitoring study at the Site in October 2013. The study included redevelopment of existing wells, installation of additional wells, and four quarters of groundwater monitoring. After reviewing the study, the EPA was concerned that an on-site source of arsenic may remain near MW-101 and determined that the extent of vinyl chloride in groundwater in the southeast corner should be further evaluated. In August 2014, the PRP Group proposed, and the EPA approved, the Supplemental Assessment Work Plan. The plan included installation of additional wells to evaluate areal extent of the vinyl chloride impacts to the southeast (GW-2 and GW-3), and to provide data regarding upgradient conditions (GW-1). Well installation activities were initiated in November 2014 with the EPA oversight. The PRP Group discontinued the installation of GW-1 (upgradient at the northeast corner of the Chemform, Inc. property) because they encountered petroleum product at the water table.

The PRP Group conducted a search to determine the potential source of the petroleum release and issued a report in February 2015. The report indicated that the residual arsenic and vinyl chloride contamination observed in groundwater at the Chemform, Inc. site may be due to the migration of upgradient sources present at the Veritech site (also known as the Florida Linen Services site). The Veritech facility is located immediately upgradient to the northeast of the Chemform, Inc. site. The EPA is currently working with the PRP Group to determine the petroleum source and is reviewing the February 2015 report to determine if the work required by the June 2012 AOC has been completed.

OU2

The PRP Group removed over 2,000 tons of contaminated surface and subsurface soils between 1990 and 1993. The OU2 ROD required no further action or monitoring. However, in 1994, the PRP Group excavated additional arsenic-contaminated soil at the Site to meet FDEP's risk management goal of 1×10^{-6} for arsenic.

4.3 Operation and Maintenance (O&M)

The OU1 ROD, which required one year of groundwater monitoring, estimated the cost of monitoring activities at approximately $104,000. The 1999 OU1 ESD stated that additional sampling would be conducted as the EPA deemed necessary. The 2012 AOC required an additional groundwater monitoring assessment to determine whether groundwater contaminated with VOCs and arsenic remains at the Site. The PRP Group submitted the Supplemental Assessment Work Plan in August 2014 but has not completed sampling yet. Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site.

Costs expended during the past five years were related to the collection of groundwater samples, updating the groundwater monitoring system and conducting the FYR. Over the past five years, PRP Group contractors have expended more than in years past due to additional well installation and investigations into reasons for elevated concentrations of vinyl chloride and arsenic.

5.0 Progress since the Last Five-Year Review

The protectiveness statement from the 2010 FYR for the Site stated the following:

OU-l
The remedy at OU-l currently protects human health and the environment because ICs [institutional controls] are in place that effectively prevent consumption of water from the contaminated aquifer, there currently is no unacceptable risk of vapor intrusion, and FYRs are being conducted. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: modify the ROD to reflect current groundwater arsenic ARARs and require ICs as part of the remedy; attempt to locate, plug and abandon missing monitoring wells; develop and implement an assessment and monitoring program that includes vertical delineation and installation of monitoring wells with appropriate screen intervals to effectively monitor plume and confirm cleanup goals are met.

OU-2
The remedy at OU-2 is protective of human health and the environment. Contaminated soil was removed from the property to allow for unlimited use and unrestricted exposure to soil.

Site-wide
The remedy at OU-l is protective in the short-term. The remedy at OU-2 is protective. Therefore, the site is considered protective of human health and the environment in the short term. In order for the remedy to be protective in the long-term, the following actions need to be taken: modify the ROD to reflect current groundwater arsenic ARARs and require ICs as part of the remedy; attempt to locate, plug and abandon missing monitoring wells; develop and implement an assessment and monitoring program that includes vertical delineation and installation of monitoring wells with appropriate screen intervals to effectively monitor plume and confirm cleanup goals are met.

The 2010 FYR included six issues and recommendations. Table 3 summarizes each recommendation and its current status below.

Table 3: Progress on Recommendations from the 2010 FYR

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Install new permanent monitoring wells or utilize direct push/temporary wells for future groundwater sampling.	PRP Group	12/31/2011	Complete. The PRP Group performed approved well installations to evaluate areal extent of the vinyl chloride impacts to the southeast of GW-2 and GW-3, and to provide data regarding upgradient conditions (GW-1). GW-1 installation could not be completed.	11/4/2014
Attempt to locate and plug abandoned wells that lack integrity, or that will not be used to monitor plume or to confirm groundwater cleanup goals are met.	PRP Group	12/31/2014	Complete. The EPA attempted to locate all missing monitoring wells but was unable to locate several. Wells installed during 2012 groundwater monitoring efforts were all properly abandoned.	11/1/14
Develop and implement assessment and monitoring program that includes vertical delineation and installation of monitoring wells with appropriate screen intervals to effectively monitor plume and confirm cleanup goals are met.	PRP Group	12/31/2011	Complete. The PRP Group performed approved well installations to evaluate areal extent of the vinyl chloride impacts to the southeast of GW-2 and GW-3, and to provide data regarding upgradient conditions (GW-1). GW-1 installation could not be completed.	11/4/2014
Install/develop appropriate monitoring wells to ensure representative samples and evaluate likely sources.	PRP Group	12/31/2011	Complete. The PRP Group performed approved well installations to evaluate areal extent of the vinyl chloride impacts to the southeast of GW-2 and GW-3, and to provide data regarding upgradient conditions (GW-1). GW-1 installation could not be completed. In addition, the PRP Group conducted and submitted to the EPA an Evaluation of the Presence of an Off-Site Source.	3/17/2015
Modify the ROD to reflect the current state and federal groundwater ARARs for arsenic.	EPA	6/30/2011	Considered and not implemented. The EPA included updated levels in the 2012 AOC to ensure proper sampling and reporting. There were no cleanup goals needed for the 1992 OU1 ROD requiring no action with monitoring.	5/21/15
Modify the ROD to "require" institutional controls for groundwater as part of the remedy.	EPA	6/30/2011	Institutional controls are in place but efforts to update decision documents continue.	Ongoing

6.0 Five-Year Review Process

6.1 Administrative Components

The EPA Region 4 initiated the FYR in October 2014 and scheduled its completion for September 2015. Two EPA remedial project managers (RPM) for the Site, Samantha Urquhart-Foster and Jennifer Wendel, led the EPA site review team with contractor support provided to the EPA by Skeo Solutions. In October 2014, the EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. In April 2015, Samantha Urquhart-Foster took on RPM responsibilities. The review schedule established consisted of the following activities:

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

6.2 Community Involvement

On February 13, 2015, the EPA published a public notice in the *Sun Sentinel* newspaper announcing the commencement of the FYR process for the Site, providing contact information for Jennifer Wendel and inviting community participation. The press notice is available in Appendix B. No one contacted the EPA as a result of the advertisement.

The EPA will make the final FYR Report available to the public. Upon completion of the FYR, the EPA will place copies of the document in the designated site repository: Broward County Main Library, located at 100 S. Andrews Avenue in Fort Lauderdale, Florida.

6.3 Document Review

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

ARARs Review

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

- Applicable requirements are those cleanup standards, standards of control and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, remedial action, location or other circumstance found at a CERCLA site.

- Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards more stringent than federal requirements may be applicable or relevant and appropriate.
- To-Be-Considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, TBC criteria may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

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

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

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

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

Groundwater ARARs

The 1992 OU1 ROD established monitoring considerations in groundwater as the lower of the MCLs established under the Safe Drinking Water Act or Florida's drinking water standards established under Florida Administrative Code (FAC) 17-550, which have since been replaced by FAC 62-550. Further, the 1992 ROD identified secondary MCLs as TBCs in the absence of an established MCL. The 1999 ESD also established a monitoring goal for vinyl chloride in groundwater as Florida's drinking water standard. Table 4 shows that the MCL for arsenic has become more stringent since the 1992 ROD, while the MCLs for the remaining COCs have not changed or have become less stringent. In addition, federal and state MCLs are now available for methylene chloride, which have been incorporated into the current monitoring reports.

Table 4: Summary of Groundwater Standards

COC	1992 ROD		Current Standards		ARAR Change	
	Federal MCL (µg/L)	Florida Drinking Water Standards (µg/L)	Federal MCL[f] (µg/L)	Florida Drinking Water Standards[e] (µg/L)	Federal	State
Arsenic	50	50	10	10	More stringent	More stringent
Barium	2,000	1,000	2,000	2,000	None	Less stringent
Chromium (VI)	100 [a]	50	100	100	None	Less stringent
Cobalt	NA	NA	NA	NA	None	None
1,4-Dichlorobenzene	75	75	75	75	None	None
Methylene chloride	NA	NA	5	5	New value	New value
Naphthalene	NA	NA	NA	NA	None	None
Nickel	100 [b]	NA	NA	100	NA	New value
Vinyl chloride [c]	2	1	2	1	None	None
Xylene	10,000	NA	10,000	10,000	None	New value
Zinc	5,000	5,000	5,000[b]	5,000[b]	None	None

Notes:
[a] – This value is for unspecified chromium
[b] – Secondary MCL
[c] – COC added in the 1999 ESD http://www.dep.state.fl.us/legal/Rules/drinkingwater/62-550.pdf
[d] - Federal Safe Drinking Water Act MCLs are available at:
http://www.epa.gov/safewater/contaminants/index.html (accessed 3/13/15)
[e] - Florida Safe Drinking Water Act MCLs are available at:
http://www.dep.state.fl.us/legal/Rules/drinkingwater/62-550.pdf (accessed 3/13/15)
NA – No standard or criterion available

Institutional Control Review

Contractor staff conducted research on the Broward County Property Appraiser's website and found the deed information pertaining to the Site listed in Table 5.

Table 5: Site Deed Documents

Date	Type of Document	Description	Book #	Page #
5/28/2010	Special Warranty Deed	The deed transfers the property from Bard Realty Inc. to Cadiz Realty Company.	1676	47122
3/15/2000	Warranty Deed	The deed transfers the property from Hallandale Lakeside Park I Inc. to Bard Realty Inc.	30341	687

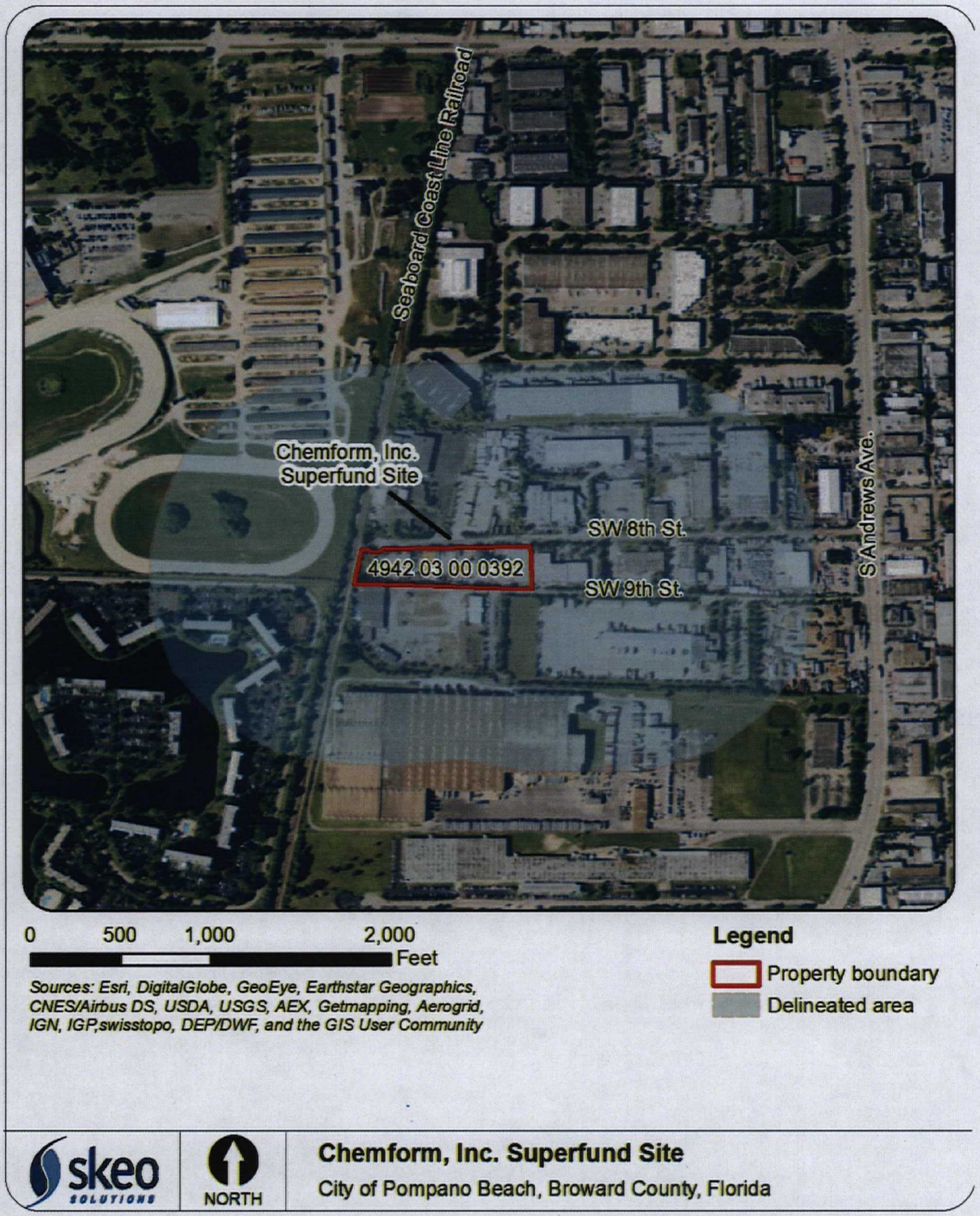
Table 6 lists the institutional controls associated with areas of interest at the Site. State and local regulations under FAC 62-524 prohibit the installation of potable water wells in Delineated Areas, which include the area of Broward County where the Site is located (Figure 2). In addition, the Broward County Health Department (BCHD) is responsible for issuing well construction permits. BCHD requires that water quality is first established before permits may be issued. Although the 1999 ESD mentions institutional controls are in place, none of the decision documents require that the current institutional controls remain in place.

Table 6: Institutional Control (IC) Summary Table

Areas of Interest – OU1 and OU2 (Parcel: 4942 03 00 0392)							
Media	**OU**	**ICs Needed**	**ICs Called for in the Decision Documents**	**Impacted Parcel(s)**	**IC Objective**	**Instrument in Place**	**Notes**
Groundwater	1	Yes	No	4942 03 00 0392	Restrict installation of drinking water wells	(1) FAC 62-524 (2) Broward County Code sections 34-35 through 34-49	(1) The Site lies within a Florida Delineated Area, which restricts well placement.[1] (2) The Site lies within the area in which a BCHD ordinance precludes installation of a new potable water well where the property abuts a water main owned by a public or private water utility system.
Soil	2	No	No	4942 03 00 0392	None	None	Soil was cleaned up to residential standards. Therefore, no institutional controls are needed.

1. The 1999 ESD acknowledged the presence of institutional controls for groundwater. However, because the ESD did not specifically require institutional controls as part of the remedy, it is recommended that the decision documents be modified by a decision document to require institutional controls as part of the remedy until MCLs are achieved.
2. Florida's groundwater delineation information is available online at: http://www.dep.state.fl.us/water/groundwater/delineate.htm. Accessed on 5/5/2015.

Figure 2: Institutional Control Base Map



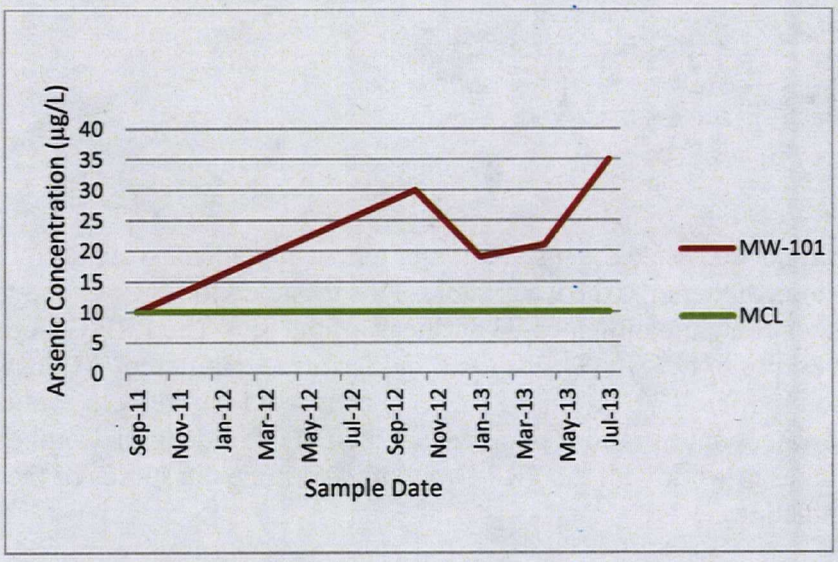
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding the EPA's response actions at the Site.

6.4 Data Review

This section summarizes the groundwater sampling results collected since the 2010 FYR including sampling conducted from 2011 to October 2013. The PRP Group has not yet sampled in accordance with their 2014 Supplemental Assessment Work Plan. Future monitoring results may need to be considered in future assessments to help determine the cause of elevated groundwater contaminant levels.

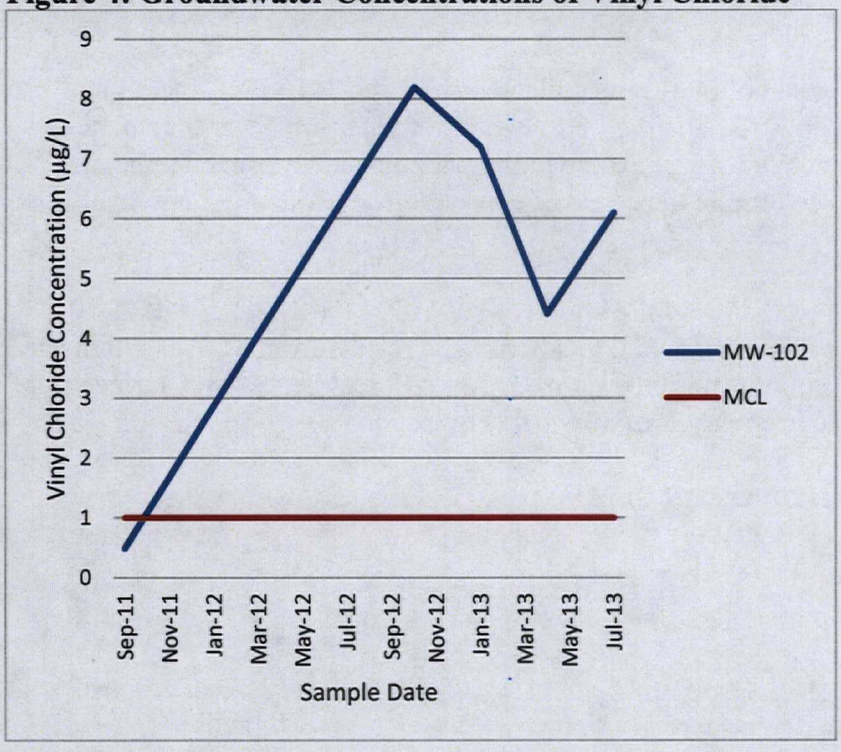
The PRP Group has sampled monitoring wells MW-4, MW-101, MW-102, MW-103R and MW-104 during this FYR period. See Figure 5 for monitoring well locations. The results from MW-101 indicate that arsenic contamination exists in the groundwater interval from 25 to 30 feet below land surface (bls) at concentrations consistently above the current MCL of 10 µg/L (Figure 3).

Figure 3: Groundwater Concentrations of Arsenic in MW-101



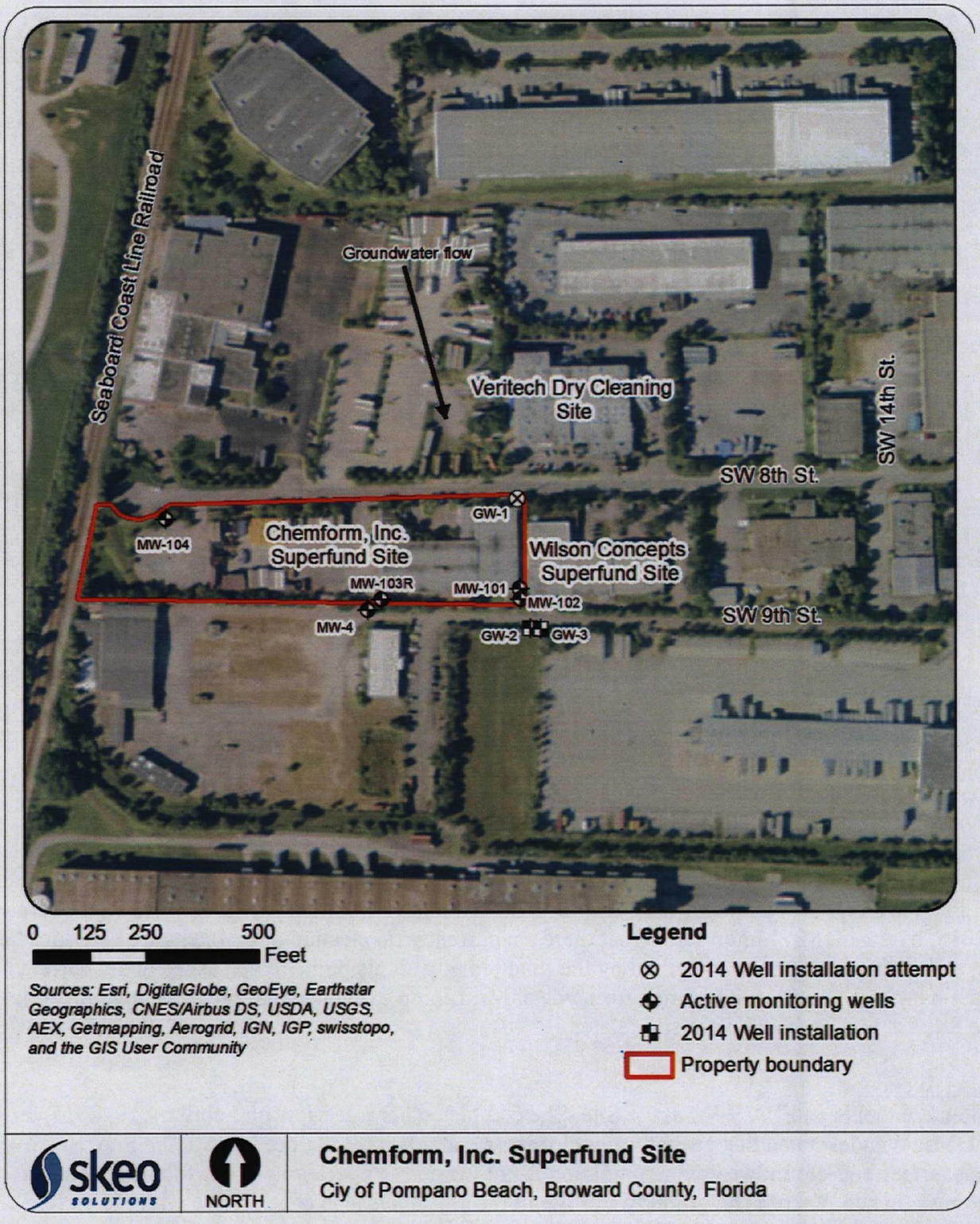
The monitoring also identified a limited area of vinyl chloride contamination above the MCL of 1 µg/L in the interval from 50 to 60 feet bls in MW-102 (Figure 4). Vinyl chloride in MW-4, MW-101, MW-103R and MW-104 were below detection (e.g., less than 0.5 µg/L).

Figure 4: Groundwater Concentrations of Vinyl Chloride



The PRP Group could not complete the installation of a new upgradient well, GW-1, due to the presence of petroleum product encountered at the water table. This triggered the PRP Group to evaluate possible sources of groundwater contamination located northeast of the Site. The PRP Group submitted an *Evaluation of the Presence of Off-site Source for Vinyl Chloride and Arsenic* (Geosyntec, 2015) to the EPA for consideration in March 2015. The PRP Group conducted the study to evaluate possible causes of remaining groundwater concentrations of arsenic and vinyl chloride in the southeast corner of the Site. The EPA continues to work with the PRP Group to determine the source of the remaining groundwater contamination.

Figure 5: Detailed Site Map



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

6.5 Site Inspection

On January 13, 2015, site inspection participants met at the entrance to the Chemform, Inc. Superfund site, located at 1410 SW 8th St. in Pompano Beach, Florida. Participants included Jennifer Wendel (EPA RPM), Treat Suomi and Sarah Alfano (Skeo Solutions). The team walked around the property in an attempt to locate active monitoring wells and view the premises. For additional inspection details see the inspection checklist in Appendix D and site photographs in Appendix E.

MW-101 and 102 were found locked and secure within a concrete walkway (see Appendix D). Site participants were also able to locate off-site wells GW-2 and GW-3, the approximate area proposed for installation of GW-1, and the general area where MW-104 and MW-103R were abandoned. Site inspection participants were not able to locate MW-4.

The property is an active industrial property used for fruit storage and related commercial operations. It is fenced with gates at entry points. Site inspection participants noted the Veritech site, the upgradient state-led UST site across the street, as well as the Wilson Concepts Superfund site, located next door to the Chemform, Inc. site.

On January 13, 2015, Treat Suomi and Sarah Alfano visited the Broward County Public Library, Main Library, located at 100 S. Andrews Avenue, in Fort Lauderdale, Florida. They located the Site's administrative record on floor five in section EP 1.2/2: C 42; the most recent document available was the 2010 FYR.

6.6 Interviews

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

Jim Linton

Jim Linton is an O&M contractor for Geosyntec Consultants. He completed his interview on February 20, 2015, by email. Mr. Linton stated that there are currently no cleanup or maintenance activities taking place at the Site, and none are required by the final remedy at this point. When asked about current contaminant levels and results of monitoring data, Mr. Linton explained that present contaminant levels at the Site are low, stable and not site-related.

Jennifer Wendel

Jennifer Wendel is an EPA RPM at the Site. She completed her interview on February 19, 2015, by email. Ms. Wendel stated that groundwater cleanup standards have not been met at the Site. However, the subsurface and groundwater contamination is not impacting operations of the food distribution warehouse on site. There is no groundwater use in the area and she is comfortable with the current institutional controls in place. Ms. Wendel believes that the EPA should issue an ESD to update the remedy based on more stringent cleanup standards for arsenic.

Kelsey Helton

Kelsey Helton works in the Waste Site Cleanup Section of FDEP. She completed her interview on September 1, 2015, by email. Ms. Helton stated that FDEP thinks that the site remedy is protective in the short term and that groundwater monitoring should continue in order to determine the source of elevated contaminant levels as well as to evaluate the need for appropriate remedial action.

Brian Blythe
Brian Blythe works for Morris, Manning & Martin, LLP, and represents the PRP Group. He completed his interview on March 26, 2015, by email. Mr. Blythe stated that the PRP Group believes the original remedy has rendered the Site safe and fit for commercial use. The PRP Group is not aware of any complaints from the community. The PRP Group would like to discontinue FYRs.

7.0 Technical Assessment

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

The OU1 remedy continues to operate and function as designed by the ROD and ESD because exposure pathways are incomplete. Contaminant concentrations remain above MCLs in two wells. Elevated levels of arsenic and vinyl chloride were detected at MW-101 and MW-102, respectively. The PRP Group submitted a report in 2015 evaluating potential sources for remaining vinyl chloride and arsenic contamination in groundwater; the EPA is reviewing the findings.

No current exposure pathways exist to groundwater because appropriate institutional controls are in place and impacted properties are connected to municipal water. The site lies within a Florida Delineated Area, which restricts well placement. A BCHD ordinance precludes installation of a new potable water well where the property abuts a water main owned by a public or private water utility system. Institutional controls are not currently required by decision documents and will be necessary to ensure continued protectiveness of the OU1 remedy. There has been no evidence of vandalism and the facility remains active during business hours.

The OU2 remedy continues to operate and function as designed by the ROD. The remedy required no further action based on a soil removal action that was completed prior to the ROD. The PRP Group excavated additional soils to residential standards, as required by FDEP.

Over the past five years, the PRP Group's O&M costs have been higher than noted in the previous FYR due to additional well installation and investigations for evaluating potential upgradient sources impacting the Site.

Site inspection participants were unable to locate MW-4 during the site inspection. Due to heavy vegetation in the area, MW-4 should be marked for inspection and sampling.

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

Though not explicitly stated, the RAOs indicated by the 1992 and 1993 RODs remain valid. The EPA considered MCLs or secondary MCLs (in the absence of an MCL) as cleanup standards for the groundwater COCs. If additional remedial action is required, the EPA will select final cleanup goals. Since the 1992 ROD and the 1999 ESD, the only chemical with a more stringent MCL is arsenic; a new value was added for methylene chloride. The more stringent MCL for arsenic is currently being used by

the PRP Group for evaluating the groundwater monitoring data and institutional controls are in place that prevent human exposure to contaminated groundwater. Thus, the change in ARAR does not call into question the current protectiveness of the remedy because there are no known exposures. However, it is recommended that the decision documents be updated to reflect the more stringent cleanup goal for arsenic if additional remedial action is required.

The EPA did not establish cleanup goals for soil because pre-ROD removal actions removed soils to levels that resulted in acceptable risks and noncancer hazard quotients (HQs). However, to ensure that the soils remain available for unrestricted use, the toxicity values used in the 1993 ROD were evaluated against current toxicity values. Based on this comparison, noncancer toxicity values became more stringent for barium, chromium VI, manganese and vanadium (Appendix H). Using the more current toxicity values for these four metals, the noncancer HQs were not impacted significantly because the HQs for each still remain well below the EPA's threshold of 1.0 (Appendix G). Therefore, the toxicity values used in the 1993 ROD remain valid.

Since the RODs were published, the EPA's standardized risk assessment methodology has been updated to require that a vapor intrusion pathway evaluation using multiple lines of evidence is required for sites where VOCs are detected in the subsurface. This FYR conducted a screening-level vapor intrusion evaluation using the most current data for VOCs detected at the Site (Appendix G). The screening-level risk and noncancer HQ results are within the EPA's risk management range of 1×10^{-6} to 1×10^{-4} and the noncancer HQs are below the EPA's threshold of 1.0. These results suggest that currently the vapor intrusion pathway does not pose significant risks; however, if long-term monitoring demonstrates any increases in concentrations, this pathway should be reevaluated using multiple lines of evidence.

There have been changes in the ecological risk assessment process since the RODs were written. However, there are no ecological habitats at the Site due to the industrial nature of the Site and surrounding area; thus, the new guidance does not impact the protectiveness of the remedy.

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

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

7.4 Technical Assessment Summary

Both the OU1 remedy and the OU2 remedy continue to function as designed. Contaminant concentrations remain above ARAR levels in two wells on site. The EPA is working with the PRP Group to determine the source of these contaminant levels. There are no current exposure pathways to groundwater. Institutional controls are in place, though they are not currently required by decision documents. These institutional controls will be necessary to ensure continued protectiveness of the OU1 remedy. Access to the active industrial site property is restricted by perimeter fencing and gates. The OU2 remedy required no further action based on a soil removal action that was completed prior to the ROD.

Arsenic currently has a more stringent MCL than was considered in the 1992 ROD. However, the PRP Group uses the more stringent level for site assessment and institutional controls prevent exposure to contaminated groundwater. Thus, the change in ARAR does not call into question the current

protectiveness of the remedy. If additional remedial action is required, future site decision documents will need to include the more stringent cleanup goal for arsenic.

The toxicity values used in the 1993 OU2 ROD remain valid. This FYR's screening-level vapor intrusion evaluation used the most current data for VOCs detected at the Site. The results suggest that currently the vapor intrusion pathway does not pose significant risks. However, if long-term monitoring demonstrates any increases in concentrations, this pathway should be reevaluated using multiple lines of evidence as per the EPA's standardized risk assessment methodology.

8.0 Issues, Recommendations and Follow-up Actions

Table 7 provides recommendations to address the current site issues.

Table 7: Issues and Recommendations Identified in the Five-Year Review

OU: 1	**Issue Category: Institutional Controls**			
	Issue: Although institutional controls are in place for groundwater, they are not required by the OU1 decision documents.			
	Recommendation: Modify the OU1 remedy to require institutional controls for groundwater.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/FDEP	6/30/2017
OU: 1	**Issue Category: Remedy Performance**			
	Issue: Groundwater continues to show contamination above ARARs for arsenic and vinyl chloride.			
	Recommendation: Conduct sufficient groundwater monitoring and analysis to determine the source of elevated contaminant levels and evaluate appropriate remedial action as necessary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP/EPA	EPA/FDEP	6/30/2017

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

- MW-4 is difficult to locate and inspect due to heavy vegetation; the wellhead should be marked for future sampling and inspection efforts.

9.0 Protectiveness Statements

Table 8: Protectiveness Statements

Protectiveness Statements

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU1	Short-term Protective	

Protectiveness Statement:
The remedy at OU1 currently protects human health and the environment because institutional controls are in place that effectively prevent consumption of water from the contaminated aquifer, there currently is no unacceptable risk of vapor intrusion, and groundwater monitoring assessments continue as needed. However, for the remedy to be protective in the long term, the following actions need to be taken: modify the OU1 remedy to require institutional controls for groundwater, and conduct sufficient groundwater monitoring to determine the source of elevated contaminant levels and take remedial action as appropriate.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU2	Protective	

Protectiveness Statement:
The remedy at OU2 is protective of human health and the environment because contaminated soil was removed from the property to allow for unlimited use and unrestricted exposure to soil.

Sitewide Protectiveness Statement	
Protectiveness Determination:	*Addendum Due Date (if applicable):*
Short-term Protective	

Protectiveness Statement:
Because the remedial actions at OU1 is protective in the short term, the sitewide remedy is protective of human health and the environment in the short term.

10.0 Next Review

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

Appendix A: List of Documents Reviewed

2013 Groundwater Monitoring Study Annual Report, Chemform, Inc. Superfund Site. Prepared by Geosyntec Consultants for EPA Region 4. October 3, 2013.

Explanation of Significant Differences for Record of Decision, Operable Unit 2, Chemform, Inc. Superfund Site, Pompano Beach, Broward County, Florida. Prepared by EPA Region 4. April 2, 1999.

Evaluation of the Presence of an Off-Site Source. Chemform, Inc. Former Superfund Site, Pompano Beach, Florida. Prepared by Metropolitan Life Insurance Company and Smith International, Inc. March 17, 2015.

First Five-Year Review Report. Prepared by EPA Region 4. September 30, 2005.

Notice of Intent to Delete the Chemform, Inc. Site from the National Priorities List. Prepared by EPA Region 4. April 6, 2000.

Phase I Remedial Investigation Report for the Chemform Site, Pompano Beach, Florida. Prepared by Westinghouse Environmental and Geotechnical Services, Inc. August 30, 1990.

Record of Decision for Operable Unit 1, Chemform, Inc. Superfund Site, Pompano Beach, Broward County, Florida. Prepared by EPA Region 4. September 22, 1992.

Record of Decision for Operable Unit 2, Chemform, Inc. Superfund Site, Pompano Beach, Broward County, Florida. Prepared by EPA Region 4. September 16, 1993.

Regional Site Profile Page, Chemform, Inc. Superfund Site, Pompano Beach, Broward County, Florida. Accessed on September 23, 2014.
<http://www.epa.gov/region4/superfund/sites/npl/florida/chemfrmfl.html>

Remedial Investigation and Feasibility Study Report, and Health and Safety Plan for Chemform Site, Pompano Beach, Florida. Prepared by Westinghouse Environmental and Geotechnical Services, Inc. December 4, 1989.

Remedial Investigation Report for the Chemform Site Operable Unit 2, Pompano Beach, Florida. Prepared by RUST Environment & Infrastructure Inc. June 28, 1993.

Second Five-Year Review Report. Prepared by EPA Region 4. September 29, 2010.

Soil Contamination Assessment Strategy for Chemform, Inc., Pompano Beach, Florida. Prepared by Enviropact, Inc. for EPA Region 4. April 30, 1987.

Supplemental Assessment Work Plan, Chemform, Inc. Superfund Site, Pompano Beach, Florida. Prepared by Geosyntec Consultants for EPA Region 4. August 1, 2014.

Appendix B: Press Notice

J. Wendel

SUN-SENTINEL
Published Daily
Fort Lauderdale, Broward County, Florida
Boca Raton, Palm Beach County, Florida
Miami, Miami-Dade County, Florida

STATE OF FLORIDA

COUNTY OF: BROWARD/PALM BEACH/MIAMI-DADE

Before the undersigned authority personally appeared Sharon Kamman, who on oath says that he or she is a daily authorized representative of the SUN-SENTINEL, a DAILY newspaper published in BROWARD/PALM BEACH/MIAMI-DADE County, Florida; that the attached copy of advertisement, being a Legal Notice in:

The matter of 11745-Other Legal Notices

U.S. Environmental Protection Agency
Chemform, Inc.

Was published in said newspaper in the issues of; Feb 13, 2015

3038215

Affiant further says that the said SUN-SENTINEL is a newspaper published in said BROWARD/PALM BEACH/MIAMI-DADE County, Florida, and that the said newspaper has heretofore been continuously published in said BROWARD/PALM BEACH/MIAMI-DADE County, Florida, each day and has been entered as second class matter at the post office in BROWARD County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he or she has neither paid nor promised, any person, firm or corporation, any discount, rebate, commission or refund, for the purpose of securing this advertisement for publication in the said newspaper.

Sharon Kamman

Signature of Affiant
Sworn to and Subscribed before me this: February 13, 2015.

Linda M Hall

Signature of Notary Public

LINCA M HALL
MY COMMISSION # EE182121
EXPIRES March 22, 2016

Name of Notary, Typed, Printed, or Stamped
Personally Known (X) or Produced Identification ( )

THE U.S. ENVIRONMENTAL PROTECTION AGENCY REGION 4 ANNOUNCES THE THIRD FIVE-YEAR REVIEW FOR THE CHEMFORM, INC. SUPERFUND SITE POMPANO BEACH, BROWARD COUNTY, FLORIDA

Purpose/Objective: EPA is conducting the third Five-Year Review of the remedy for the Chemform, Inc. Superfund site (the Site) in Pompano Beach, Florida. The purpose of the Five-Year Review is to evaluate whether the selected cleanup actions effectively protect human health and the environment.

Site Background: A precision machine shop made metal parts for the aerospace industry on site. Operations from 1961 to 1985 included manufacturing of an electromechanical milling machine, which involved the use of electrolytic solutions and strong electric current. In 1977, the Broward County Pollution Control Board found the facility had discharged industrial wastes onto the ground. In 1980, EPA found soil and ground water contaminated with heavy metals and other contaminants. The Biscayne Aquifer underneath the Site supplies all municipal water to Broward County. Four municipal wells within three miles of the Site serve 93,000 people. EPA listed the Site on the Superfund Program's National Priorities List (NPL) in October 1989.

Cleanup Actions: In 1990, the Site's potentially responsible parties (PRPs) removed contaminated drums as a part of an emergency action. The PRPs also removed USTs and a cellar from two underground storage tanks and excavated about 500 cubic yards of soil debris. An additional 3,200 cubic yards of soil were removed in 1992.

Based on ground water investigation results, EPA required no further action at the Site other than a year of monitoring. EPA documented its findings in the Site's 1992 Record of Decision (ROD). Ground water monitoring, ended in 1994, after soil and source area cleanup activities greatly reduced the volume and concentrations of contaminants. EPA deleted the Site's remedy in 1999 after sampling detected only chromium at a slightly elevated concentration. The remedy locked, known as an Explanation of Significant Differences (ESD), listed only chromium as a potential contaminant of concern and required Five-Year Reviews for the Site.

EPA took the Site off the NPL in June 2000. EPA is conducting the Site's third Five-Year Review in 2015.

Five-Year Review Scheduling: 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 third of the Five-Year Reviews for the Site will be completed by September 2015.

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

Jeremy Arnold, EPA Remedial Project Manager

Phone: (404) 562-8777

Email: arnold.jeremy@epa.gov

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

Additional information is available at the Site's local document repository, Broward County Public Library, located at 100 South Andrews Avenue NE in Fort Lauderdale, Florida, and online at http://www.epa.gov/region4/superfund/sites/npl/florida.html#broward.

2/13/2015

Order

Appendix C: Interview Forms

Chemform, Inc. Superfund Site **Five-Year Review Interview Form**

Site Name: Chemform, Inc. **EPA ID No.:** FLD080174402
Subject Name: Jennifer Wendel **Affiliation:** EPA Region 4
Subject Contact Information: wendel.jennifer@epa.gov
Time: 9:45 am **Date:** 2/19/2015

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

Interview Category: EPA Remedial Project Manager

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?
   The property is actively operating as a food distribution warehouse. Subsurface and groundwater contamination is not impacting operations. Ground water well locations are not well marked, and one well (Background) was not found.

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?
   MNA is not effective in reducing arsenic levels in groundwater to the new cleanup standard. Additional source reduction may be needed if groundwater is to ever achieve cleanup standards.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?
   Yes, no issues to note. No groundwater use in the area.

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?
   Review additional work performed and issue ESD based on new cleanup standard for arsenic. Consider additional source reduction.

Site Name:	**Chemform, Inc.**	**EPA ID No.:**	**FLD080174402**
Subject Name:	**Kelsey Helton**	**Affiliation:**	**DEP-Waste Cleanup Program**
Subject Contact Information:	**kelsey.helton@dep.state.fl.us**	**Date:**	**9/01/2015**

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

Interview Category: **State Agency**

From: Helton, Kelsey
Sent: Tuesday, September 01, 2015 4:29 PM
To: 'Urquhart-Foster, Samantha' <Urquhart-Foster.Samantha@epa.gov>
Cc: Helton, Kelsey <Kelsey.Helton@dep.state.fl.us>
Subject: DEP Review of the Chemform, Inc Superfund site draft FYR

Samantha-

DEP has completed review of the draft FYR for the Chemform, Inc. Superfund site.

- The draft report is thorough and provides a good historical overview and status update of the ongoing supplemental assessment at the site to determine the extent of remaining groundwater contamination and possible sources resulting in the persistence of arsenic and vinyl chloride in groundwater at the southeastern corner of the former facility property. We support the installation of the upgradient pair of monitoring wells to support evaluation of an upgradient source.
- DEP agrees with the conclusion that the site remedy remains protective, in the short term, for groundwater based on the limited extent of remaining groundwater contamination within a Chapter 62-524 "delineated area" which limits the installation of wells and use of groundwater in that area, until contaminant levels meet groundwater cleanup target levels. Soil contamination was addressed under a previous removal action to allow for unrestricted use.
- DEP supports the recommendations in Table 8 which include groundwater monitoring to determine source of elevated contaminant levels and to evaluate appropriate remedial action if necessary. We recommend that groundwater monitoring continue until confirmation that current groundwater cleanup target levels have been met for site related contaminants or conversely, institutional controls are in place to allow the plume to remain above groundwater cleanup target levels, in accordance with Chapter 62-780.

We appreciate the opportunity to provide comments. Please let me know if you have any questions.

Kelsey

Kelsey Helton
DEP-Waste Cleanup Program
Waste Site Cleanup Section
Tallahassee, FL
850-245-8969

Site Name:	**Chemform, Inc.**	**EPA ID No.:**	**FLD080174402**
Subject Name:	**Jim Linton**	**Affiliation:**	**Geosyntec Consultants**
Time:	**9:30 am**	**Date:**	**2/20/2015**

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

Interview Category: **O&M Contractor**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?
   There are no cleanup, maintenance or reuse activities in play at the site, and none are required. The low-level contamination detected in groundwater at the site is attributable to an off-site source upgradient approximately 500 feet.

2. What is your assessment of the current performance of the remedy in place at the Site?
   The current remedy at the site, No Further Action, has been and continues to be effective.

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?
   Recent sampling indicates that contaminants present at the site are low level and stable, with no exposure risk. Recent discoveries have shown that these detections are due to an off-site, upgradient source.

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.
   Not applicable. See response to Question #1.

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.
   Sampling activities and installation of monitoring wells have been conducted in the last five years following the 2010 Five-Year Review. See response to Question #3.

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.
   Not applicable. No remedy requiring O&M has ever been in place at the Site.

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.
   Not applicable.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?
   Not applicable. The Site was delisted.

Site Name:	**Chemform, Inc.**	**EPA ID No.:**	**FLD080174402**
Subject Name:	**Brian Blythe**	**Affiliation:**	**PRP Group**
Time:	**2:11 pm**	**Date:**	**3/26/15**

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

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

1. What is your overall impression of the remedial activities at the Site?
   The PRPs understand that remedial activities were completed at the Site prior to de-listing from the NPL and that no further action has been required since de-listing.

2. What have been the effects of this Site on the surrounding community, if any?
   The PRPs are unaware of any effect whatsoever on the surrounding community.

3. What is your assessment of the current performance of the remedy in place at the Site?
   The PRPs believe the original remedy effected prior to de-listing has rendered the Site safe and fit for current commercial use, particularly given regulatory restrictions on ground water access or use, and no further investigation or remedial activity by the PRPs is authorized under CERCLA nor necessary to protect human health, safety or the environment.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   The PRPs are not aware of any such complaints.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   The PRPs have discussed the Site at length with the EPA and provided material information to the EPA respecting area conditions and thus the PRPs are well informed about the Site and other properties in the vicinity of the Site.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   The PRPs understand that remedial activities were completed at the Site prior to de-listing from the NPL and that no further action has been required since de-listing. The PRPs believe the EPA should terminate the Five Year Review cycle as of this 3rd Five Year Review episode because at this time the EPA may conclude that the historical operations at the Site which were previously addressed under CERCLA do not pose any risk of human health, safety or the environment. The PRPs have documented these facts in detail in recent correspondence with the EPA under separate cover.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Chemform, Inc.	**Date of Inspection: 1/13/2015**
Location and Region: Pompano Beach, Florida, Region 4	**EPA ID: FLD080174402**
Agency, Office or Company Leading the Five-Year Review: EPA Region 4	**Weather/Temperature: Warm and in the 70s; sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Groundwater monitoring, Five-Year Reviews
- ☐ Monitored natural attenuation
- ☐ Ground water containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

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

2. **O&M Staff** Linton (Name) Jim (Title) 2/20/2015 (Date)
   Interviewed ☐ at site ☐ at office ☒ by email Phone: _____
   Problems/suggestions ☐ Report attached: See Appendix C

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

   Agency EPA

Contact	Name	Title	Date	Phone No.
	Jennifer Wendel	RPM	2/19/2015	404-562-8799

   Problems/suggestions ☐ Report attached: See Appendix C

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

PRP representative, Brian Blythe on 3/26/15 by email and Kelsey Helton, FDEP on 9/1/2015 by email, see Appendix C.

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

1.	**O&M Documents**			
	☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
	☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
	☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: There is a monitoring plan and supplemental workplan in place.			
2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☐ Up to date	☐ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
3.	**O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Ground Water Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

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

A. Fencing

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

Remarks: _____

B. Other Access Restrictions

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

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

Type of monitoring (e.g., self-reporting, drive by): The site lies within a Florida Delineated Area, which restricts well placement. A BCHD ordinance precludes installation of a new potable water well where the property abuts a water main owned by a public or private water utility system.

Frequency: Daily, site supports industrial operations which must abide by state and county policies.

Responsible party/agency: Broward County and FDEP

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: Institutional controls currently protect the Site but are not required by decision documents.

D. General

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

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

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

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

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

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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

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

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

C. Treatment System ☐ Applicable ☒ N/A

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☐ Contaminant concentrations are declining

Remarks: Groundwater monitoring data are used to determine whether the remedy remains protective rather than as a form of treatment. The EPA is working to determine if remaining groundwater contamination can be attributed to the Chemform, Inc. site. During the site inspection, one active well, MW-4, could not be found.

E. Monitored Natural Attenuation

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

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

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

Remarks: _____

X. OTHER REMEDIES

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

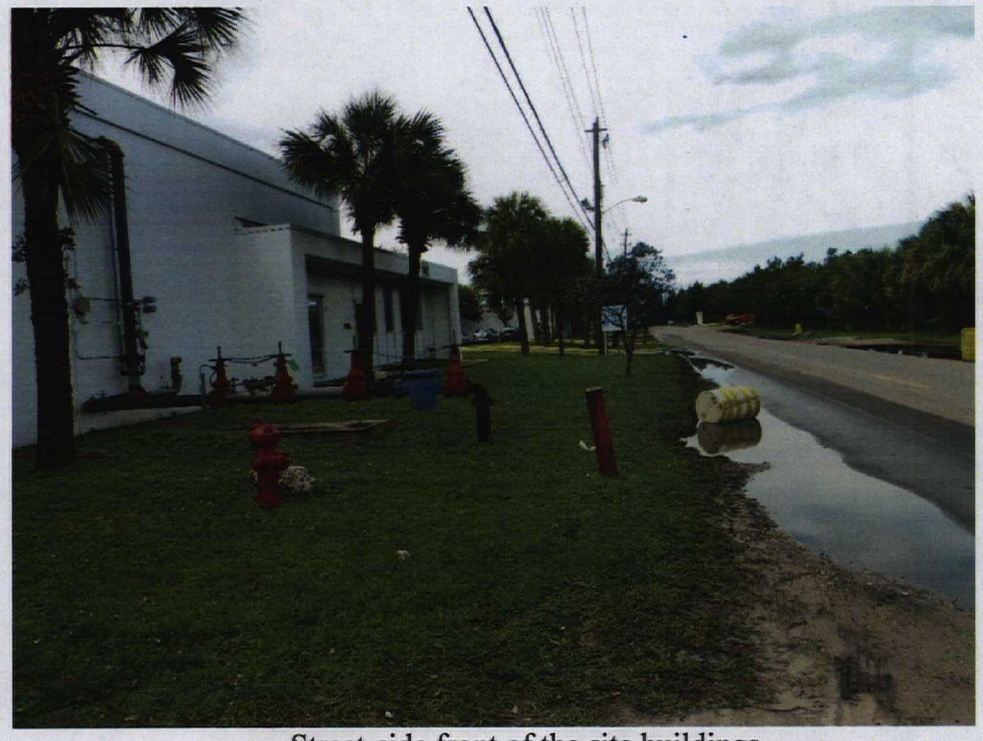
XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). The remedy appears to be functioning as designed. However, the sampling results indicate that a localized area of arsenic contamination exists in the groundwater interval from 25 to 30 feet below land surface (bls) as concentrations consistently exceeded the current MCL of 10 µg/L. In addition, the monitoring identified a limited area of vinyl chloride contamination in the groundwater above the MCL of 1 µg/L in the interval from 50 to 60 feet bls in MW-102. EPA is also working with the PRP Group to determine the source of site arsenic and vinyl chloride levels.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. There were no apparent issues 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. Over the past five years, the PRP Group O&M costs have been higher than noted in the previous FYR due to additional well installation and investigations for evaluating potential upgradient sources impacting the Site. The EPA is currently reviewing the 2015 report to determine if the PRP Group has met the requirements under the 2012 AOC for the Site.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. To ensure that site inspections and groundwater sampling is efficient, contractors may wish to mark off-site wells or wells that are not readily apparent during a walkthrough.

Appendix E: Photographs from Site Inspection Visit

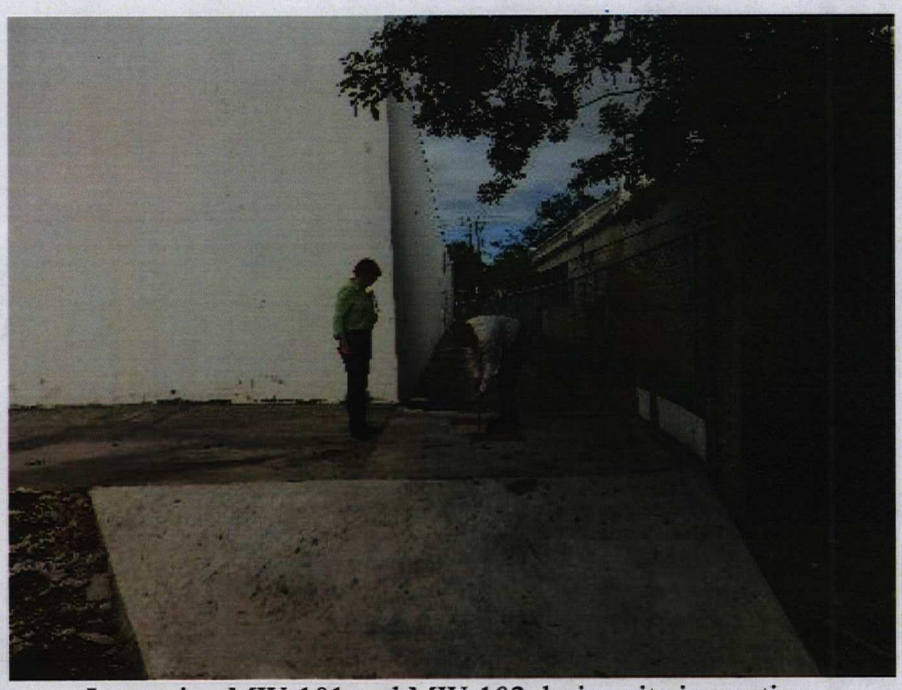
The Site currently hosts industrial operations for a fruit distribution company.



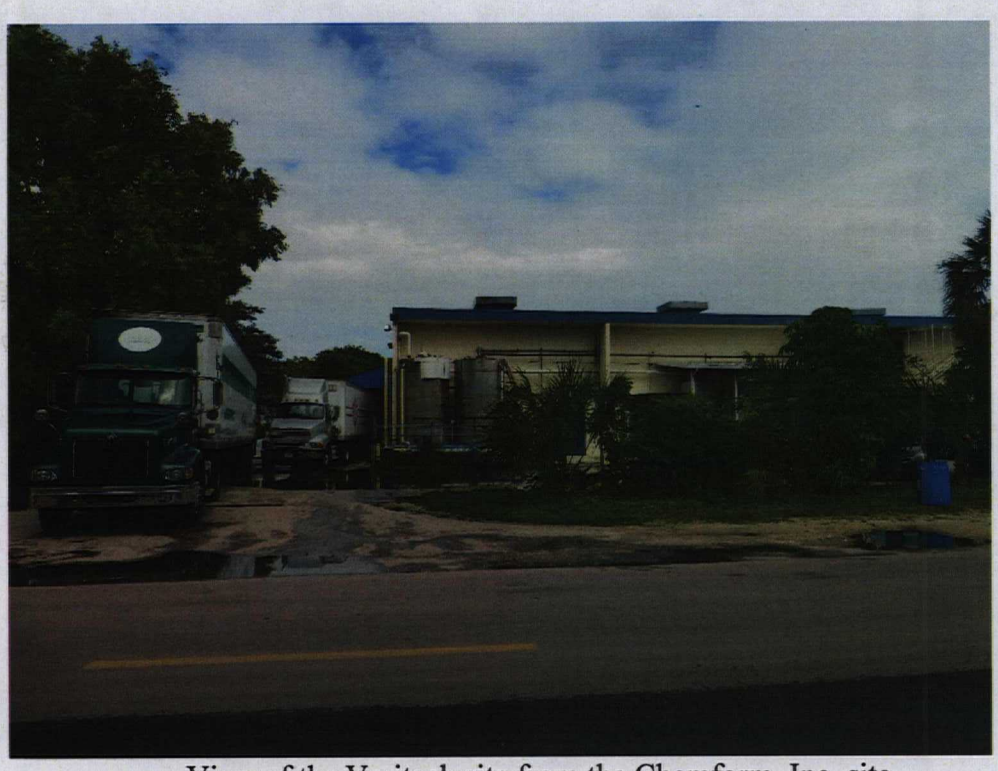
Street-side front of the site buildings.

GW-2 and GW-3 located across SW 9th Street.

Northwest corner of the Site where petroleum was encountered during drilling.



Inspecting MW-101 and MW-102 during site inspection.

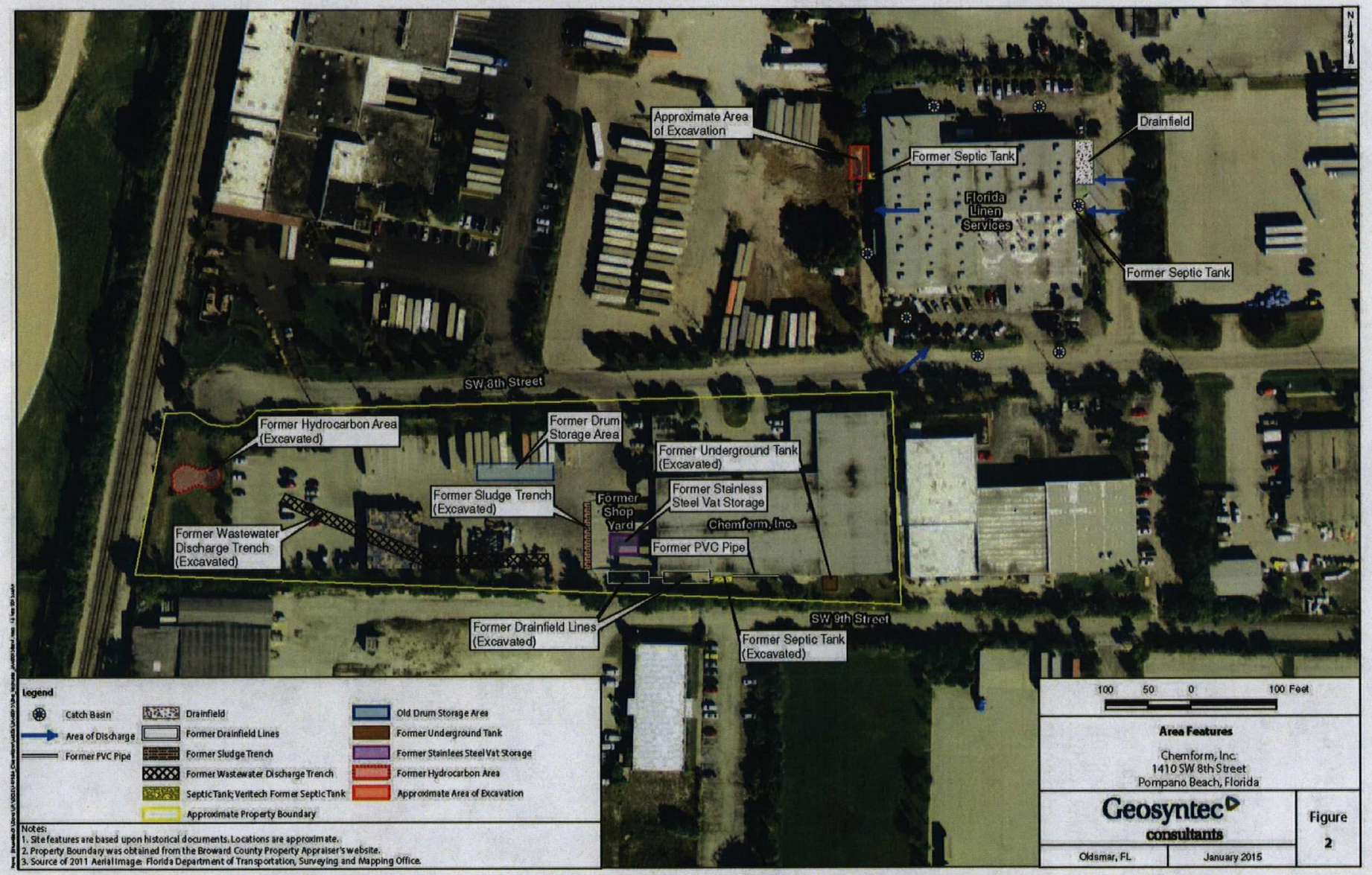


View of the Veritech site from the Chemform, Inc. site.

Wood pallet storage on the Chemform, Inc. site.

Appendix F: Historic Site Operations

(From the 2015 Evaluation of the Presence of an Off-Site Source Report)



Appendix G: Risk Assessment Support to Answer Question B (Section 7.2)

The RAOs have not changed since the EPA issued the RODs. The EPA selected MCLs or secondary MCLs (in the absence of an MCL) as the final cleanup goals for the groundwater COCs. Since the 1992 ROD, MCLs have changed for arsenic, barium and chromium. Based on changes in toxicity values, the current MCLs for barium and chromium have become less stringent while the MCL for arsenic has become more stringent. The more stringent MCL for arsenic is currently being used by the PRP Group for evaluating the groundwater monitoring data and institutional controls are in place that prevent human exposure to contaminated groundwater. Thus, the change in ARAR does not call into question the current protectiveness of the remedy. However, it is recommended that the ROD be modified to update the cleanup goal for arsenic to the current ARAR to ensure long-term protectiveness of the remedy.

The EPA did not established cleanup goals for soil because the removal actions removed soils to levels that resulted in acceptable risks and noncancer HQs. However, to ensure that the soils remain available for unrestricted use, the toxicity values used in the 1993 ROD were evaluated against current toxicity values. Based on this comparison, none of the carcinogenic values were more stringent. However, the oral noncancer toxicity values became more stringent for barium, chromium VI, and vanadium and the inhalation noncancer toxicity value became more stringent for manganese (Appendix H). As shown in Table G-1 and Table G-2, the more stringent oral and inhalation toxicity values would not have changed the HQ significantly (i.e., the HQ for each metal is well below 1.0 such that the cumulative HI would not change). Therefore, the toxicity values used in the 1993 ROD remain valid.

Table G-1: Risk Summary of Noncancer Oral Toxicity Value Changes

Soil COC	1993 ROD Oral RfD Value (mg/kg-d)	2015 Oral RfD Value (mg/kg-d)	1993 ROD Residential Ingestion HQ[a]	2015 Residential HQ[b]
Barium	7.0E-02	2.0E-01	6.0E-04	2.1E-04
Chromium VI	5.0E-03	3.0E-03	7.0E-03	1.2E-02
Vanadium	7.0E-03	5.0E-03	1.0E-03	1.4E-03
a. HQ obtained from Table 6-13 of OU2 ROD b. Revised HQ calculated by multiplying the 1993 HQ by the 1993 oral reference dose (RfD) and dividing by the 2015 oral RfD				

Table G-2: Risk Summary of Noncancer Inhalation Toxicity Value Changes

Soil COC	1993 ROD Inhalation RfC Value (mg/m^3)	2015 Inhalation RfC Value (mg/kg-d)	1993 ROD Residential Inhalation HQ	2015 Residential Inhalation HQ[b]
Manganese	1.1E-04	5.0E-05	8.0E-04	1.8E-03
a. HQ obtained from Table 6-13 of OU2 ROD b. Revised HQ calculated by multiplying the 1993 HQ by the 1993 inhalation RfD and dividing by the 2015 inhalation reference concentration (RfC)				

Since the RODs were published, the EPA's standardized risk assessment methodology requires that a vapor intrusion pathway evaluation using multiple lines of evidence is required for sites where VOCs are detected in the subsurface. This FYR conducted a screening-level vapor intrusion evaluation using the EPA's 2014 Vapor Intrusion Screening Level (VISL) calculator to determine if the volatile groundwater COCs detected in site groundwater require further evaluation. The EPA risk assessment guidance requires that concentrations detected closest to a building foundation be used in the vapor intrusion evaluation. Except for the upgradient well, all the current wells monitored at the Site are screened in the deeper aquifer zone; therefore, use of these data is conservative because the concentrations of VOCs tend to be lower as they migrate to the surface. For example, in 2010 the PRP Group detected vinyl chloride in TMW-2 at 60 feet below ground surface (bgs) at a concentration of 14.7 µg/L, but it was below detection at shallower depths of 10 feet and 30 feet bgs.

The maximum concentrations of volatile COCs detected in 2013 were used in the VISL calculator using all calculator default assumptions for commercial and residential exposure. As shown in Table G-3, vinyl chloride was the only groundwater COC detected in 2013. The screening level cancer risks are within the EPA's risk management range of 1×10^{-6} to 1×10^{-4} and the HQs are below the EPA's threshold of 1.0. These results suggest that currently the vapor intrusion pathway does not pose significant risks; however, if long-term monitoring demonstrates any increases in concentrations, this pathway should be reevaluated using multiple lines of evidence.

Table G-3: Screening Level Vapor Intrusion Risk Evaluation

COC	Maximum Concentration Detected in April 2013 (µg/L)	2014 VISL Calculator[a]			
		Residential		Commercial Worker	
		Cancer Risk	Noncancer HQ	Cancer Risk	Noncancer HQ
Vinyl chloride	4.4 (MW-102)	3.0E-5	0.05	1.8E-6	0.01

a. VISL calculator accessed at: http://www.epa.gov/oswer/vaporintrusion/guidance.html.

There have been changes in the ecological risk assessment process since the RODs were written. However, there are no ecological habitats at the Site due to the industrial nature of the Site and surrounding area. Therefore, the new guidance does not impact the protectiveness of the remedy.

Appendix H: Summary of Toxicity Value Changes

Contaminants	Carcinogenic Toxicity Changes						Non-Carcinogenic Toxicity Changes					
	Oral Cancer Slope Factor (CSF)			Inhalation Unit Risk (IUR)			Oral Reference Dose (RfD)			Inhalation Reference Concentration (RfC)		
	1993 ROD Oral CSF $(mg/kg\text{-}day)^{-1}$	2015 Oral CSF $(mg/kg\text{-}day)^{-1}$	Change in CSF	1993 ROD IUR $(\mu g/m^3)^{-1}$	2015 IUR $(\mu g/m^3)^{-1}$	Change in IUR	1993 ROD Oral RfD Value (mg/kg-d)	2015 Oral RfD Value (mg/kg-d)	Change in RfD	1993 ROD RfC Value (mg/m^3)	2015 RfC Value (mg/m^3)	Change in RfC
Arsenic	1.8E+00	1.5E+00	Less stringent	1.4E-02	4.3E-03	Less stringent	3.0E-04	3.0E-04	None	NA	1.5E-05	New
Barium	ND	ND	None	ND	ND	None	7.0E-02	2.0E-02	More stringent	5.0E-04	5.0E-04	None
Benzo(b)fluoranthene	7.3E+00	7.3E-01	Less stringent	ND	1.1E-04	New	ND	ND	None	ND	ND	None
Bis-2-(ethyhexyl)phthalate	1.4E-02	1.4E-02	None	ND	2.4E-06	New	2.0E-02	2.0E-02	None	ND	ND	None
Cadmium (food)	ND	ND	None	ND	1.8E-03	New	1.0E-03	1.0E-03	None	ND	ND	None
Chromium III	ND	ND	None	ND	ND	None	1.0E+00	1.5E+00	Less stringent	ND	ND	None
Chromium VI	ND	ND	None	1.2E-02	1.2E-02	None	5.0E-03	3.0E-03	More stringent	1.0E-04	1.0E-04	None
Copper	ND	ND	None	ND	ND	None	3.7E-02	4.0E-02	Less stringent	ND	ND	None
4,4'DDT	3.4E-01	3.4E-01	None	9.7E-05	9.7E-05	None	5.0E-04	5.0E-04	None	ND	ND	None
Di-N-butylphthalate	ND	ND	None	ND	ND	None	1.0E-01	1.0E-01	None	ND	ND	None
Manganese (food)	ND	ND	None	ND	ND	None	ND	1.4E-01	New	1.1E-04	5.0E-05	More stringent
Mercury	ND	ND	None	ND	ND	None	3.0E-04	3.0E-04	None	3.0E-04	3.0E-04	None
Nickel	ND	ND	None	ND	2.6E-04	New	2.0E-02	2.0E-02	None	ND	9.0E-05	New
Silver	ND	ND	None	ND	ND	None	5.0E-03	5.0E-03	None	ND	ND	None
Vanadium	ND	ND	None	ND	ND	None	7.0E-03	5.0E-03	More stringent	ND	ND	None
Zinc	ND	ND	None	ND	ND	None	3.0E-01	3.0E-01	None	ND	ND	None

a. Toxicity values from 1990 ROD Table 6-3. To convert the inhalation reference dose (RfDi) into reference concentrations (RfC) the RfDi was multiplied by a body weight of 70 kg and divided by an inhalation rate of 20 cubic meters per day (m^3/day). To convert the inhalation cancer slope factor (CSFi) to a inhalation unit risk (IUR) factor, the CSFi was multiplied by an inhalation rate of 20 m^3/day and divided by a body weight of 70 kg and then multiplied by a conversion factor of 0.001.

b. RfD, RfC, CSF and IUR factors were obtained from the EPA's Integrated Risk Information System (IRIS) available at: http://www.epa.gov/iris/

c. ND = not determined, no value available for comparison from the EPA's IRIS