FOURTH FIVE-YEAR REVIEW REPORT FOR CHEVRON CHEMICAL CO. (ORTHO DIVISION) SUPERFUND SITE ORANGE COUNTY, FLORIDA

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Prepared by

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9/26/18

Date

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LIST OF ABBREVIATIONS AND ACRONYMS

4,4-DDD	Dichlorodiphenyldichloroethane
alpha-BHC	alpha-Hexachlorocyclohexane
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
beta-BHC	beta-Hexachlorocyclohexane
BHC	Hexachlorocyclohexane
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
delta-BHC	delta-Hexachlorocyclohexane
DWEL	Drinking Water Equivalent Level
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FDEP	Florida Department of Environmental Protection
FYR	Five-Year Review
gamma-BHC	gamma-Hexachlorocyclohexane
HQ	Hazard Quotient
IC	Institutional Control
MCL	Maximum Contaminant Level
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
MNA	Monitored Natural Attenuation
NA	Not Applicable
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PFAS	Per- and Poly-fluoroalkyl Substances
PRB	Permeable Reactive Barrier
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
TSC	Target Soil Concentration
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

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

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

This is the fourth FYR for the Chevron Chemical Co (Ortho Division) Superfund site (the Site). The triggering action for this statutory review is the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit (OU), which is addressed in this FYR. OU1 addresses contaminated soil and groundwater.

EPA remedial project manager (RPM) Karl Wilson led the FYR. Participants included EPA community involvement coordinator L'Tonya Spencer, EPA site attorney Rudy Tanasijevich, EPA hydrologist James Ferreira , EPA risk assessor Sydney Chan, Florida Department of Environmental Protection (FDEP) project manager Kelsey Helton, potentially responsible party (PRP) representative Mark Stella of Chevron Corporation (Chevron), PRP contractor Allen Just of Arcadis, and Amanda Goyne and Sabrina Foster of Skeo (EPA FYR support contractor). The PRP was notified of the initiation of the FYR. The review began on 8/9/2017.

Site Background

The 4.4-acre Site is located in Orlando, Orange County, Florida (Figure D-1). From 1950 until 1976, Chevron formulated and processed pesticides and nutritional sprays at the Site. In 1978, Central Florida Mack Trucks (Mack Trucks) purchased the property and used it for truck sales and service until 1986. During operation, owners discharged waste and wastewater into two unlined rinsate ponds and near an abandoned rail spur along the southern property boundary.

The site property is currently unused. Current site features include a storage shed, perimeter fencing and monitoring wells. Future use of the Site is limited to commercial and industrial uses. Land uses in the site area include residential, commercial and industrial. Refer to Appendix A for additional resources, Appendix B for site status information, and Appendix C for a chronology of site events.

The Site is underlain by a surficial aquifer and the deeper Floridan aquifer. The surficial aquifer is encountered at 10 feet deep or less, with a saturated thickness of 17 to 40 feet. It consists of interbedded quartz sand, silt and clay, with multiple water-producing zones in the site area. The Floridan aquifer is encountered at a depth of 70 feet. Groundwater flow direction for both aquifers is to the northeast (Figures I-1 and I-2 in Appendix I). The closest surface water feature to the Site is Lake Fairview, about

600 feet northeast of the Site. The lake is a remnant karst lake, about 400 acres in size. The Site is within the St. John's River Water Management District, but not within a groundwater delineated area.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Chevron Chemical Co (Ortho Division)		
EPA ID: FLD004064242		
Region: 4	**State:** Florida	**City/County:** Orlando/Orange
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the Site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Karl Wilson (EPA) and Amanda Goyne and Sabrina Foster (Skeo)		
Author affiliation: EPA and Skeo		
Review period: 8/9/2017 - 9/11/2018		
Date of site inspection: 9/28/2017		
Type of review: Statutory		
Review number: 4		
Triggering action date: 9/11/2013		
Due date *(five years after triggering action date)*: 9/11/2018		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Initial investigations at the Site from 1980 to 1989 indicated pesticides, metals and volatile organic compounds (VOCs) in soil, groundwater, or both. In 1993, Chevron voluntarily entered into an Administrative Order on Consent (AOC) with the EPA to conduct a remedial investigation/feasibility study (RI/FS), pursuant to the EPA's Superfund Accelerated Cleanup Model. The EPA finalized the Site on the National Priorities List (NPL) on May 31, 1994, and Chevron completed the RI/FS in May 1996. A baseline risk assessment, completed as part of the RI/FS, indicated no unacceptable risks from direct contact exposure to soil at the Site or surrounding areas under current or potential future land uses. The objective of soil/source removal activities at the Site was to reduce the contaminant loading to groundwater. However, the results of the baseline risk assessment indicated that ingestion of

groundwater would pose unacceptable health risks to future residents due to the presence of VOCs, pesticides and metals. The baseline risk assessment did not identify any ecological receptors at the Site.

Response Actions

In 1990, Chevron entered into an AOC with the EPA and the former owner of Mack Trucks to conduct a contamination assessment and develop a removal action plan for the property. The assessment results helped define general areas of soil and groundwater contamination and to inform a plan for soil removal. Conducted by Chevron from August 1990 to September 1992, this first removal action involved the following activities:

- Demolition and removal of remaining structures.
- Excavation and offsite disposal of 17,780 tons of pesticide-contaminated soil.
- Excavation and onsite treatment of 4,900 tons of petroleum-contaminated soil.
- Extraction and offsite disposal of 90 to 100 gallons of a free-phase liquid from subsurface soils.
- Recovery and treatment of 126,000 gallons of stormwater and groundwater during the soil excavation, with subsequent discharge into an infiltration trench on the property.
- Backfilling of all excavated areas with clean soil, followed by grading and seeding.

Based on investigations into the adjacent former Armstrong Trailer Park, Chevron performed a second removal action in September 1994. This action involved removing a one-foot layer of soil in five designated areas (227 tons of soil) at the former Armstrong Trailer Park, backfilling the area with clean soil, grading and laying sod.

The EPA signed the Site's Record of Decision (ROD) on May 22, 1996, and issued a first Explanation of Significant Differences (ESD) in July 2000 and a second ESD in September 2010. The ESDs updated cleanup goals for certain contaminants of concern (COCs). The remedial action objectives (RAOs) for the Site, as updated in the 2010 ESD, included:

- Prevent the potential exposure to contaminated groundwater on the Site for human health.
- Restore groundwater quality to the cleanup goals specified in the ROD, thereby restoring groundwater to potential beneficial use.
- Prevent or minimize migration of contaminated groundwater for the protection of the environment.

The major components of the selected remedy included:

- Monitored natural attenuation (MNA) of groundwater until all cleanup goals are achieved.
- Deed restrictions/notices or other institutional controls to prohibit consumption or use of contaminated groundwater until the cleanup goals have been met and prohibit residential use of the Site.
- Routine maintenance at the Site, including fence maintenance and grass mowing.
- A groundwater contingency plan including:
    - Increased monitoring frequency.
    - Installation of a subsurface filter wall.
    - Implementation of other measures such as limited air sparging, hydraulic gradient control or source removal, as necessary.
- The above groundwater contingency plan to be implemented if:

- Contaminant concentrations do not decrease by 10-15 percent within one year;
- MNA does not continue as expected; or
- Organic contaminants are detected in either of the sentinel monitoring wells (MW-11 and MW-15).

The 2010 ESD implemented the groundwater contingency plan as outlined in the 1996 ROD.

Table 1 summarizes the groundwater cleanup goals for COCs as presented in the 1996 ROD and revised in the 2000 and 2010 ESDs.

Table 1: Groundwater Cleanup Goals

Groundwater COC	ROD Cleanup Goal (µg/L)[a,b]
Benzene	1
Ethyl benzene	700
Xylenes	10,000
Total naphthalenes	100[c]
Dichlorodiphenyldichloroethane (4,4-DDD)	0.1[d]
alpha-BHC	0.05[d]
beta-BHC	0.1[d]
gamma-BHC or Lindane	0.2
Chlordane	2
Arsenic	10
Chromium	100
Lead	15[e]

Notes:
[a] Cleanup goals from Table 9 in the 1996 ROD or as amended in the 2000 and 2010 ESDs.
[b] Lower of the federal and state primary maximum contaminant levels (MCLs) unless otherwise noted.
[c] State target level listed in the 1996 ROD.
[d] State guidance concentration listed in the 1996 ROD.
[e] Federal action level.
µg/L = micrograms per liter
BHC = Hexachlorocyclohexane

Status of Implementation

Remedial design and remedial action implementation dates are included in Appendix C. The site achieved construction completion in February 1998.

Per the 1996 ROD, Chevron implemented the groundwater contingency remedy after a COC (alpha-hexachlorocyclohexane, or alpha-BHC) was detected in a sentinel well (MW-15) in 2004. Although the EPA initially planned to implement permeable reactive barriers (PRBs) as the primary remedial strategy, as delineation continued, the EPA determined that soil removal would be most effective at reducing the contaminant load. As such, the PRBs were planned as a polishing treatment for the contaminated groundwater plume as it moves toward Lake Fairview.

In 2007, Chevron conducted a pilot study to investigate the feasibility of using PRBs to filter groundwater in the subsurface. The pilot study employed zero valent iron within an organic substrate under varying configurations and construction techniques, with the purpose of degrading chlorinated

pesticides. Results demonstrated that PRBs can reduce alpha-BHC concentrations in the contaminated groundwater plume across the Site. Based on pilot study results, Chevron installed 11 PRBs across the Site to capture nearly all of the groundwater plume that is migrating offsite. Chevron installed PRBs 1, 2 and 3 in April 2007; PRBs 4, 5, 6 and 7 in November 2007; PRB 8 in April 2009; PRBs 9 and 10 in October 2011; and PRB 11 in May 2014. Based on current groundwater data, Chevron has developed a 2017 work plan to construct another two PRBs. The locations of the 11 existing PRBs and the two planned PRBs are in Figure D-2 of Appendix D. According to the 2010 ESD, the expected lifespan for the PRBs installed at the Site is estimated to be between five and 10 years. With seven PRBs installed in 2007 and an additional PRB (Number 8) installed in 2009, the majority of PRBs are at or have exceeded their expected lifespan and consequently may no longer be as effective at addressing contamination as when initially installed. Furthermore, during review of the PRB Work Plan for the proposed PRBs 12 and 13, the EPA raised the concern that existing and proposed PRBs at the Site may not be adequately addressing the dissolved-phase pesticide groundwater contaminant migration on and offsite (Appendix M). The 2017 Operation and Maintenance (O&M) Plan calls for quarterly monitoring of individual PRB performance, which should be able to assess their effectiveness.

Chevron conducted additional on-site soil investigations in 2009 and developed the Revised Source Reduction Work Plan in 2011 to establish site-specific target soil concentrations (TSCs) for the four hexachlorocyclohexane (BHC) isomers for on-site soil that are protective of groundwater (Table 2). In addition, the 2011 Work Plan presents an area-weighted average approach for using the BHC isomer TSCs in a source reduction (excavation) program. Leaching to groundwater was not considered to be a major transport pathway for toxaphene and chlordane, so source reduction activities focused on the four BHC isomers. However, the EPA determined that removing the BHC isomers would also address chlordane and toxaphene by removing an estimated 91 percent of these contaminants. Residual toxaphene and chlordane concentrations did not pose a significant risk to groundwater, but did pose a potential risk to human health through direct contact or inhalation. Table 2 presents a summary of the TSCs developed in the 2011 Work Plan; these concentrations are not considered applicable or relevant and appropriate requirements (ARARs).

Table 2: Summary of On-Site Target Soil Concentrations for Soil

Soil COC	TSC (mg/kg)[a]
alpha-BHC	0.120
beta-BHC	0.077
delta-BHC	1.386
gamma-BHC or Lindane	0.180
Chlordane	50[b]/100[c]

Notes:
[a] As reported in the January 2011 Revised Source Reduction Work Plan.
[b] Chlordane value for surface soil 0 to 2 feet in depth.
[c] Chlordane value for subsurface soil 2 to 5 feet in depth.
mg/kg = milligrams per kilogram
BHC = Hexachlorocyclohexane

The EPA approved the Revised Source Reduction Work Plan and in January 2012 Chevron excavated over 4,000 tons of contaminated soil onsite to achieve the TSCs, then disposed of the material offsite. Prior to backfilling, over 8,000 pounds of zero valent ion with organic substrate were placed inside the excavated areas to treat groundwater.

In June 2012, Chevron began additional soil and groundwater characterization at properties offsite and across North Orange Blossom Avenue due to the presence of another groundwater contamination plume that appears to emanate from a source south of the Lake Fairview Commerce Center (Figure 1). Chevron presented findings to the EPA in an August 2014 Groundwater Investigation Report. The study looked at organochlorine pesticides in groundwater at the McDonald's restaurant property, located south-southeast of the Site. Due to the presence of organochlorine pesticides in all three wells sampled and across five sampled intervals between 6 and 30 feet below the ground surface, it is anticipated that the source of this contamination is located to the south, further upgradient from the Site, and is not site-related. Separate investigations into this source and PRPs will be needed. Currently, the contamination plume from this separate source is comingling with the Site's groundwater contamination plume directly upgradient of Lake Fairview.

In 2014, Chevron performed a Human Health Risk Assessment for the former California Spray Chemical Corporation (Cal Spray) property, located directly upgradient of the Lake Fairview Commerce Center Property. Cal Spray operated a pesticide and nutritional spray formulating plant at this property from 1943 to 1948 before moving operations to the current Chevron site in 1950. Tropical Plant Products is the third operator since Cal Spray and continues to operate on the property storing, packaging and distributing materials and supplies for orchids. The assessment found estimated carcinogenic risks and non-carcinogenic hazards for the future utility/maintenance worker exceeded the EPA's acceptable risk range and the target hazard index of 1. These contaminants of potential concern identified in the assessment are not COCs at the Site. The EPA is investigating the need for cleanup actions for this separate source at the Tropical Plant Products property.

Institutional Control (IC) Review

Institutional controls have been implemented at the Site in the form of a restrictive covenant placed on the Chevron property on January 11, 2000. The restrictive covenant prevents the drawing of groundwater for any purpose other than monitoring and restricts land uses for the Site to commercial and industrial. In addition, engineering controls such as fencing prevent access to the Site. Although all offsite properties above the contaminated groundwater plume (Figure 1) receive municipal water, the EPA will continue to work on implementing restrictions that would prevent the installation of private wells and prohibit the use of groundwater for irrigation purposes.

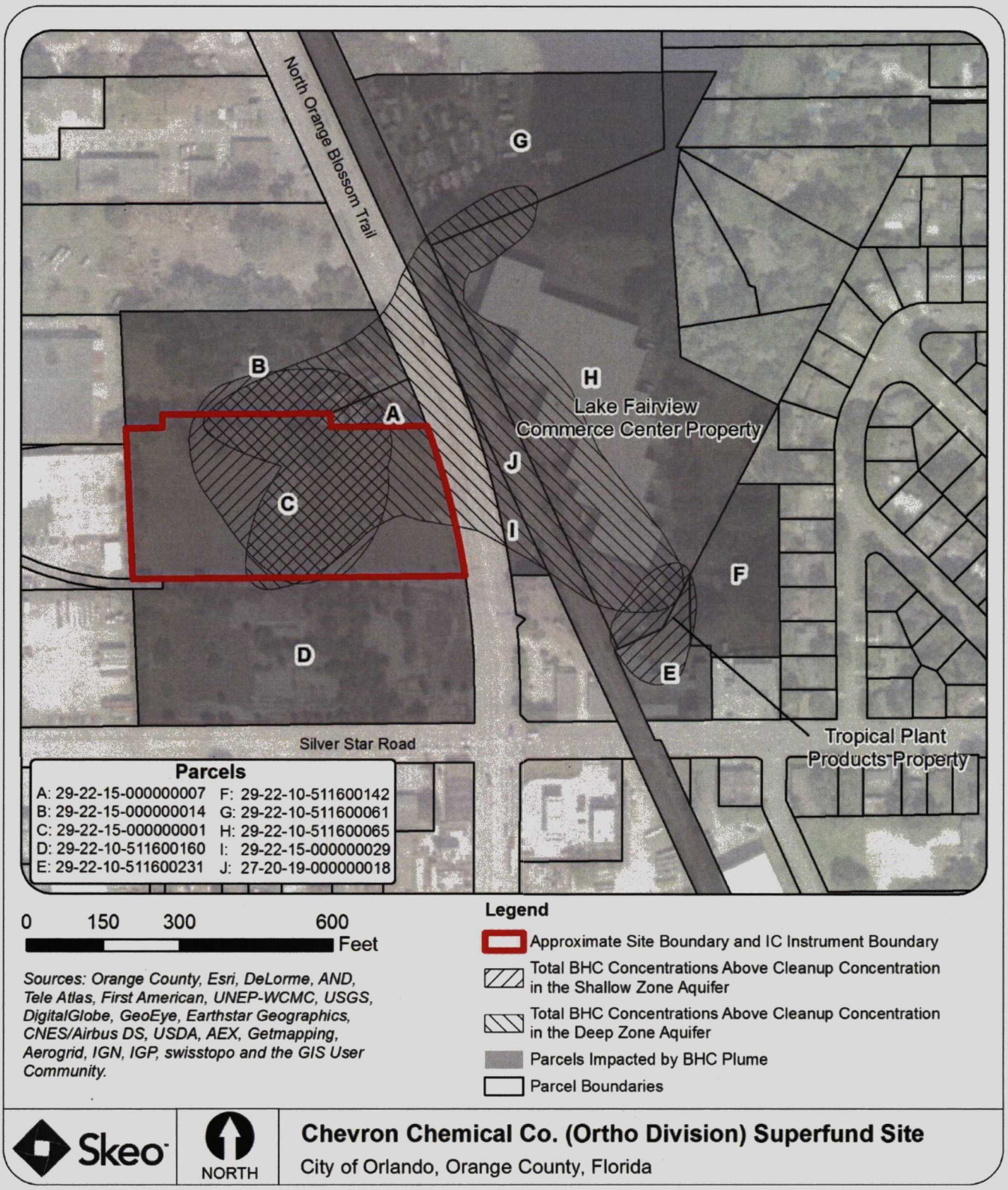
Table 3 lists the institutional controls associated with areas of interest at the Site. Figure 1 illustrates the land parcels above the contaminated shallow and deep aquifer plumes based on total BHC levels to illustrate where institutional controls for offsite groundwater are needed. Review of the Saint John's River Water Management District e-Permitting Portal did not identify any well completion reports in the area of the groundwater contamination plume. FDEP's Water Permitting Portal indicates the entire site is located within a consumptive use permit (Individual 40C-2) held by the Orlando Utilities Commission. In September 2018, Chevron performed a confirmatory well survey of the area within a one-mile radius of the Site (see Appendix L). This included the site parcel and the nine off-site parcels. The survey did not find any privately or publicly owned potable wells within one mile of the Site. This 2018 well survey could help inform implementation of a groundwater delineated area around the Site. The Site is within the St. John's River Water Management District, but the Site and surrounding area are not currently part of a groundwater delineated area restricting well installation. The EPA will continue to work with the water management district on implementing institutional controls and a groundwater delineated area to meet the milestones established in this five-year review report.

Table 3: Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Onsite groundwater	Yes	Yes	29-22-15-000000001	Restrict access to or usage of contaminated groundwater until cleanup goals are achieved	Restrictive Covenant, January 2000
Offsite groundwater	Yes	Yes	29-22-15-000000007 29-22-15-000000014 29-22-10-511600160 29-22-10-511600231 29-22-10-511600142 29-22-10-511600061 29-22-10-511600065 29-22-15-000000029 27-20-19-000000018	Restrict access to or usage of contaminated groundwater until cleanup goals are achieved	During the previous FYR, EPA and St. John's River Water Management District discussed a Memorandum of Agreement to prevent issuance of water use permits or potable and irrigation well construction within an area impacted by a Superfund site. The discussed Memorandum of Agreement has not been implemented yet.
Onsite soil	Yes	Yes	29-22-15-000000001	Prohibit residential use of the Chevron site	Restrictive Covenant, January 2000

Note: Listed offsite groundwater parcels were identified based on the December 2017 groundwater plume map (see Figure 1). Ongoing groundwater monitoring will be used to identify future changes to parcels impacted by groundwater contamination.

Figure 1: Institutional Control Map



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

Systems Operations/Operation and Maintenance (O&M)

The EPA approved the final O&M plan for the Site in May 2017. The O&M plan specifies routine site upkeep and maintenance activities, such as mowing, waste management and fencing; PRB installation, maintenance and replacement guidance; monitoring requirements for groundwater, stormwater treatment system effluent[1] and investigation-derived waste; corrective actions to address flood, trespassing, storm, train derailments and other potential events that might impact the remedy; and record-keeping and reporting requirements.

Chevron regularly performs routine maintenance in accordance with the 2017 O&M Plan. Chevron monitors the groundwater on a quarterly basis to evaluate the MNA remedy and potential contaminant migration and submits results to the EPA for review. Chevron installed and maintains fencing to restrict access to the Site.

The 1996 ROD's estimated annual O&M cost for the MNA program was $17,160. Yearly O&M costs were not anticipated to increase after installation of a PRB. However, eleven PRBs have been installed with an additional two planned. Table 3 lists rounded, annual O&M costs incurred for 2013 through 2017. The actual costs are roughly an order of magnitude higher that the anticipated annual costs, which may be attributable to the larger number of PRBs installed than was originally anticipated in the 1996 ROD.

Table 4: O&M Costs Over the FYR Period

Year	Total Cost (rounded to the nearest $1,000)
2013	$172,000
2014	$187,000
2015	$176,000
2016	$152,000
2017	$129,000

III. PROGRESS SINCE THE PREVIOUS REVIEW

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

Table 5: Protectiveness Determinations/Statements from the 2013 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Short-term Protective	The remedy at the Site currently protects human health and the environment in the short term, because institutional controls are in place to limit the Site to industrial use and unauthorized site access is discouraged through secured fencing. In addition, no drinking or irrigation wells exist currently within the impacted area, and institutional controls have been implemented to prevent exposure to groundwater on the Chevron property. In order for the remedy to be protective in the long term, additional institutional controls need to be

[1] Chevron installed a treatment system at the Site to handle any stormwater that may accumulate in excavated areas during rain events.

		identified and/or implemented to restrict the use of water within the affected area until cleanup goals are attained. In addition, to ensure protectiveness in the long term, the EPA will continue to evaluate contaminant trends over time to confirm that concentrations are in the process of decreasing in response to the remedial action.

Table 6: Status of Recommendations from the 2013 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Sitewide	Contaminated groundwater at concentrations exceeding cleanup goals has migrated offsite of the Chevron property boundary.	Ensure the current remedy prevents further migration	Ongoing	Statistical analysis indicates increasing COC concentrations at the leading edge of the Site's groundwater plume (offsite). The EPA and FDEP have approved the workplan for installation of additional PRBs (Numbers 12 and 13). However, both agencies raised concerns about the effectiveness and performance of the PRBs during the review process.	NA
Sitewide	Groundwater institutional controls are not in place in all the areas affected by the groundwater plume.	Implement additional groundwater-use institutional controls that prevent access and use of contaminated groundwater.	Ongoing	No additional groundwater institutional controls have been implemented since the previous FYR.	NA
Sitewide	Groundwater contaminant concentrations appear to be fluctuating following the recent remedial actions.	Continue to evaluate contaminant trends over time to confirm that concentrations are in the process of decreasing in response to the remedial action.	Ongoing	Quarterly groundwater monitoring data are analyzed to evaluate contaminant trends. The EPA and FDEP have raised concerns about the effectiveness of existing PRBs in addressing contamination and recommended a performance review to seek out opportunities to optimize the remedy.	NA
Sitewide	A current O&M plan was not available for review during the FYR process.	EPA should confirm that there is a current O&M plan in place and if not, request that one be developed.	Completed	Final O&M Plan approved and in implementation.	5/5/2017
NA: Not applicable					

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

A public notice was made available by a newspaper posting in the Orlando Sentinel, on 10/1/2017 (Appendix E). It stated that the FYR was underway and invited the public to submit any comments to the EPA. The results of the review and the report will be made available at the Site's information repository, Edgewater Public Library, located at 5049 Edgewater Drive, Orlando, Florida 32810.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The interviews are summarized below, and full interviews can be found in Appendix F.

The EPA interviewed people from three nearby businesses during the site inspection. All three were aware of the Site's history and noted that they frequently see sampling occurring. They did not feel that there had necessarily been any effects of the Site on the community. However, one interviewee expressed concern that the Superfund site proximity may make it challenging to sell their own property in the future. Another interviewee expressed interest in the possibility of expanding operations onto the Site. All interviewees shared that they felt they had the basic information they needed about the Site, but one requested to have more sustained communication with the EPA in the future.

The EPA also interviewed FDEP representatives who are familiar with the Site. FDEP remains involved with the Site and had two main recommendations regarding the Site. First, FDEP recommends a more comprehensive site evaluation to identify/address remaining source contamination or plume migration. Second, FDEP encourages finalization of the planned Memorandum of Agreement between the EPA and the Water Management District to prevent access to contaminated groundwater. FDEP also noted their concern about needing a confirmed path forward to address other contaminated properties near the Site.

Data Review

This FYR reviewed current and historical groundwater data from the First Quarter 2018 Site Status Update, as well as supporting information from the Fourth Quarter 2017 Site Status Update, the June 2017 PRB Installation Work Plan (PRB Work Plan) and the EPA and FDEP comments on the PRB Work Plan. The Site's groundwater monitoring program samples 16 monitoring wells quarterly and another 16 monitoring wells annually for chlorinated pesticides. Select wells are also analyzed for total organic carbon.[2] The fourth quarter site status updates present the results of the more comprehensive annual sampling. The objectives of the groundwater monitoring program are to monitor changes in the groundwater plume and to evaluate performance of the PRBs.

Over the past five years, alpha-BHC and beta-hexachlorocyclohexane (beta-BHC) concentrations consistently exceeded groundwater cleanup goals in both the shallow and deep aquifer zones. Concentrations of dichlorodiphenyldichloroethane (4,4-DDD) and gamma-hexachlorocyclohexane (gamma-BHC) also exceeded cleanup goals during this FYR period. However, these exceedances were

[2] The EPA approved removal of VOCs, semi-volatile organic compounds and metals from the monitoring program in April 2008. Detected concentrations of benzene, ethylbenzene, xylenes, total naphthalene, arsenic, chromium and lead had met groundwater cleanup goals, except for benzene in MW-1D.

more sporadic and only at a few locations. Chlordane did not exceed cleanup goals during this FYR period. Therefore, this data review focuses on primary COCs alpha-BHC and beta-BHC.

Figures I-3 and I-4 in Appendix I share the most recent comprehensive sampling results for alpha-BHC and beta-BHC, respectively, from the fourth quarter 2017. Figures I-5 and I-6 in Appendix I show the first quarter 2018 concentrations of alpha-BHC and beta-BHC, respectively. In the shallow zone, alpha-BHC and beta-BHC are primarily present above cleanup goals in wells on the Chevron property. However, off-property wells MW-44S and MW-45S, located south of the Lake Fairview Commerce Center building and just north of the Tropical Plant Products property (Figure 2), continue to report alpha-BHC and/or beta-BHC above cleanup goals. In first quarter 2018, the highest concentrations of alpha-BHC and beta-BHC were observed in MW-4S (0.62 micrograms per liter, or µg/L, with a duplicate result of 1.0 µg/L; cleanup goal of 0.05 µg/L) and MW-4S (4.8 µg/L; cleanup goal of 0.1 µg/L), respectively. Both wells are located on the Chevron property.

In the deep zone, the extent of alpha-BHC and beta-BHC is more widespread and extends beyond the Chevron property northeast toward Lake Fairview. Beta-BHC contamination in the deep zone is also observed south of the Lake Fairview Commerce Center (wells MW-34D, see Figure I-4,and MW-44D, see Figure I-6). In the first quarter 2018, the highest concentration of alpha-BHC in the deep zone was detected in well MW-49D (0.74 µg/L), located off-property near Lake Fairview. The highest beta-BHC concentrations were detected on the site parcel in MW-4D (1.7 µg/L) and MW-16D (1.9 µg/L), and in MW-49D (1.5 µg/L) by Lake Fairview. Due to elevated concentrations of beta-BHC in close proximity to Lake Fairview (MW-29D and MW-49D), additional testing to evaluate the groundwater and lake water interaction and its potential effect on contaminant migration, may be needed.

Well MW-51S is located along the southern fence line of the site parcel, along a railroad track. This well is sampled annually and the fourth quarter 2017 concentrations for alpha-BHC (0.49 µg/L) and beta-BHC (1.4 µg/L) not only exceed cleanup goals but are an order of magnitude higher than any previous detections going back to February 2012. Given groundwater movement from southwest to northeast, and the increase in the shallow aquifer concentrations but not the deep aquifer, an evaluation of the possibility of a spill along the railroad track or other upgradient source is needed.

The PRB Work Plan included time-concentration charts for alpha- and beta-BHC concentrations in select wells, including well MW-49D and wells MW-1D and MW-26, located upgradient of MW-49D (Figures I-7 to I-9 in Appendix I). The PRB Work Plan also included the results of Mann-Kendall trend analyses for wells MW-1D, MW-26D, MW-29D, MW-32D, MW-47D and MW-49D, conducted using data collected between first quarter 2012 and fourth quarter 2016. The analyses reported upward trends in alpha-BHC and beta-BHC concentrations for MW-26D and MW-49D. The analyses also found upward trends in alpha-BHC concentrations for MW-29D, MW-32D and MW-47D. Downward trends were observed for beta-BHC in MW-32D and for both alpha-BHC and beta-BHC in MW-1. Because of the increasing trends, the PRB Work Plan proposed two additional PRBs: a twelfth PRB, extending the existing PRB 8, just upgradient of Lake Fairview, and a thirteenth PRB near the equipment shed on the Chevron property. Figure D-2 in Appendix D shows locations of existing and proposed PRBs.

The EPA reviewed the PRB Work Plan and concurred with the proposed placement of the two new PRBs. Given the concerns about whether the PRBs can adequately address groundwater contaminant migration, the EPA recommended further review of site conditions and a performance review of the constructed PRBs to evaluate their effectiveness. FDEP provided similar comments, noting that existing PRBs may have historically affected groundwater flow, and therefore plume movement. FDEP recommended broader statistical analysis to assess potential increasing trends or ongoing contaminant

sources that were not captured in the Mann-Kendall analyses at six site monitoring wells. FDEP also emphasized the importance of performing statistical analyses in offsite areas and areas of the groundwater plume that are not currently showing increasing trends to effectively monitor contaminant migration and plume movement.

The 2017 O&M Plan calls for quarterly PRB performance evaluation. If an increasing contaminant trend is noted for three or more quarters, the PRB is evaluated and additional monitoring or corrective actions can be determined, as needed. It is recommended that this evaluation be performed for all PRBs to determine opportunities to optimize the site remedy by considering possible PRB-caused plume shifts and comingling with the plume emanating from the area of the Tropical Plant Products property.

Figure 2: Detailed Site Map

Note: TPP denotes that monitoring well is located on the Tropical Plants Products property.

0 125 250 500 Feet

Sources: Esri, DeLorme, AND, Tele Atlas, First American, UNEP-WCMC, USGS, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, the GIS User Community, Figure 2 of the 2017 O&M Plan and Figure 2 of the 2017 Quarter 4 Site Report.

Legend

- Approximate Site Boundary
- Deep Monitoring Wells
- Middle Monitoring Wells
- Shallow Monitoring Wells
- Fence
- Railroad

Skeo

NORTH

Chevron Chemical Co. (Ortho Division) Superfund Site

City of Orlando, Orange County, Florida

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

Site Inspection

The site inspection took place on 9/28/2017. In attendance were Karl Wilson of the EPA, Mark Stella of Chevron, Allen Just of Arcadis, and Amanda Goyne and Brice Robertson of Skeo. The purpose of the inspection was to assess the protectiveness of the remedy. The site inspection checklist is in Appendix G and photographs from the inspection are in Appendix H.

Participants began by discussing activities at the Site over the past five years. Mr. Stella mentioned that Hurricane Irma caused minimal damage to the Site; one tree and several branches fell. Participants also discussed the proposed location of PRB 13. Participants then toured the Site and inspected site features. The on-site shed was locked and in good condition. Most monitoring wells were locked and labeled. The casings of MW-4D and MW4S were not locked. MW-40D and MW-40S were unlocked and it was possible to access the interior of the well. The fencing near MW-7D and MW-7D was very low and did not prevent access to the property. There was also fencing damage near MW-3D, but it was covered with temporary orange netting. Participants then toured the Lake Fairview Commerce Center across Orange Blossom Trail. Mr. Stella and Mr. Just indicated the proposed location of PRB 12. Participants then toured the Tropical Plant Products property and interviewed the business owner. Following the site inspection, participants interviewed several businesses. Skeo staff visited the site repository at the Edgewater Public Library, located at 5049 Edgewater Drive, Orlando, Florida 32810. The site repository contained no site-related documents.

V. TECHNICAL ASSESSMENT

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

Question A Summary:

The Site inspection and review of documents, ARARs, and risk assumptions indicate that the Site's remedy has been mostly implemented and partially functioning as intended by site decision documents.

Soil excavation removed source contamination from the Site and surrounding areas. Sixteen groundwater monitoring wells are sampled quarterly, and another 16 wells are sampled annually. Groundwater contamination has not achieved cleanup goals and some BHC isomers have shown increasing trends in a subset of monitoring wells where statistical analyses have been performed. Chevron constructed 11 PRBs to filter groundwater contamination and is currently working with the EPA and FDEP to finalize the work plan to construct another two PRBs to address remaining contamination and prevent further plume migration. A restrictive covenant for the Chevron property parcel established institutional controls to limit site uses and groundwater access and use. The Chevron property is fenced to restrict access. The groundwater contamination plume extends offsite. Area buildings are connected to the municipal water supply and there are no wells in the offsite plume area. The EPA will work to implement institutional controls to prevent well installation at those offsite properties above the plume. A September 2018 well survey performed by Chevron did not find any privately or publicly owned potable wells within one mile of the Site. This includes all areas currently impacted by Site-related groundwater contamination. This well survey may help inform implementation of a delineated area to restrict well installation and use in the area of contamination.

The PRBs may have influenced the migration of the groundwater plume. Although PRBs have been in place, contaminant concentrations fluctuate and increase in some areas downgradient of the Site and in some remediated former source areas. In addition, the PRBs have an effective lifespan of 5 to 10 years;

the oldest of the PRBs were installed in 2007. The opportunity exists to evaluate the performance of the existing PRBs and propose additional corrective actions that may increase the effectiveness of the remedy and achieve cleanup goals in a shorter timeframe. Additional confirmatory soil sampling may be beneficial in ascertaining that contaminant concentrations remaining in site soils are below the level at which they could leach to groundwater. The recent increase of alpha-BHC and beta-BHC in MW-51S should be evaluated to determine whether there may be a new upgradient source impacting the Site.

Chevron has performed additional studies to delineate an apparent separate groundwater contamination plume emanating from the Tropical Plant Products property. Action is needed to address this separate plume, especially as it comingles with the site-related plume. Although the EPA does not believe that the contamination at the Tropical Plant Products property is related to the Site, the EPA's scientific, technical, and legal staff will continue to work with Chevron and evaluate the groundwater data and will decide on a path forward during the next fiscal year.

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

Question B Summary:

Yes, the exposure assumptions, ARARs and RAOs used at the time of remedy selection are still valid. Toxicity data have changed since the ROD and ESDs. However, these changes do not call into question the protectiveness of the remedy as presented below. A comparison of the 2010 ESD ARAR-based groundwater cleanup goals to current standards found that none of the ARARs have changed since 2010 (Appendix J).

This FYR evaluated the protectiveness of the risk-based groundwater cleanup goals for total naphthalene, 4,4-DDD, alpha-BHC and beta-BHC using EPA's current tapwater regional screening levels (RSLs), which are based on conservative exposure assumptions and updated toxicity data (Table K-1, Appendix K). The groundwater cleanup goals for alpha-BHC and beta-BHC remain protective as the associated estimated cancer risks and noncancer hazards are within the EPA's risk management range of 1×10^{-4} to 1×10^{-6} and below a hazard quotient (HQ) threshold of 1. The groundwater cleanup goal for total naphthalene exceeds the EPA's risk management range and HQ of 1 and the cleanup goal for 4,4-DDD slightly exceeds an HQ of 1. However, the RSL used is for tapwater (drinking exposure) and no one is currently drinking the groundwater at the Site due to the restrictive covenant onsite and the municipal water supply to offsite parcels impacted by groundwater contamination.

The current xylene MCL of 10,000 µg/L is based on outdated toxicity. However, for reasons other than risk, EPA's Office of Drinking Water has elected not to revise the MCL at this time. Institutional controls currently prevent exposure to groundwater with xylene concentrations exceeding EPA Region 4's recommended risk-based xylene cleanup level of 3,500 µg/L. If those institutional controls are lifted in the future, is it recommended that xylene concentrations and the cleanup goal be reevaluated. The chromium cleanup goal for the Site is the total chromium MCL of 100 µg/L. Again, institutional controls currently in place prevent potential exposure to elevated contaminant concentrations. However, if those institutional controls are lifted, reevaluation of total chromium, as well as speciation of chromium, is recommended to ensure the cleanup goal remains protective of human health.

It should be noted that the estimated cancer risks associated with naphthalene may be overstated because the EPA has not classified naphthalene as a carcinogen. The RSLs have incorporated a cancer-based toxicity value developed by the California Environmental Protection Agency as a conservative measure

for screening. Further, it should be noted that the EPA Office of Drinking Water lists a Lifetime Health Advisory value for naphthalene of 100 µg/L, which is recommended as protective of chronic exposures.[3] Based on the uncertainties in the toxicity of naphthalene, the cleanup goal for total naphthalenes of 100 µg/L is considered protective for both cancer and noncancer endpoints. In addition, groundwater under the Site is currently not used as a source of drinking water, and all properties downgradient of the Chevron property are connected to a municipal water supply.

Although not selected in a decision document, the TSCs were used as cleanup goals for additional soil remediation conducted in 2012. The TSCs were based on protection of groundwater and did not address direct exposure to humans. Therefore, to determine if the TSCs are protective of human exposure to soils under an industrial exposure scenario, this FYR evaluated the TSCs using the industrial soil RSLs (Table K-2, Appendix K). The risk screening found that the TSCs are protective of an industrial exposure pathway; the 2000 restrictive covenant limits site uses to industrial and commercial. Residual soil contamination detected onsite during the 2012 source reduction work confirmation sampling was compared with 2017 industrial RSLs. All samples had concentrations less than the current RSL for the respective contaminant.

The remedy is making progress toward meeting the RAOs of preventing exposure to contaminated groundwater onsite for human health, restoring groundwater to cleanup goals specified in decision documents, and preventing or minimizing contaminated groundwater migration for the protection of the environment. However, further performance evaluation to optimize the implemented contingency remedy and additional statistical analysis to rule out or address any potential remnant contaminant sources would accelerate this progress.

In 1984, a tanker truck stored on the property leaked 3,000 to 6,000 gallons of acid, resulting in an explosion. The former pesticide formulating and storage building onsite burned down in 1991. These actions contaminated site soil and groundwater with pesticides, VOCs and metals. Per- and Poly-fluoroalkyl substances (PFAS) have been identified as an emerging COC for sites on which fire-fighting foams were used. It is not known whether these products were used onsite, but the potential exists due to the 1984 explosion and the 1991 fire. Information about past practices at the Site should be reviewed to determine whether products containing PFAS were used at the Site. If it is confirmed that PFAS were used at the Site, confirmatory sampling should be considered to determine if PFAS remain onsite and whether concentrations require remediation.

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

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

[3] 2018 Edition of the Drinking Water Standards and Health Advisory Tables, available at https://www.epa.gov/sites/production/files/2018-03/documents/dwtable2018.pdf.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
None

Issues and Recommendations Identified in the FYR:

OU(s): OU1 (Sitewide)	**Issue Category:** Remedy Performance			
	Issue: Groundwater contaminant concentrations are not decreasing below cleanup goals despite PRBs installed as part of the contingency remedy. Contaminated groundwater at concentrations exceeding cleanup goals has migrated offsite.			
	Recommendation: Evaluate PRB performance and augment or modify the remedy as needed to optimize cleanup and prevent further contaminant migration.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2020

OU(s): OU1 (Sitewide)	**Issue Category:** Remedy Performance			
	Issue: Statistical analyses indicate increasing trends of alpha-BHC and beta-BHC in a subset of monitoring wells, despite several removal actions to eliminate source material.			
	Recommendation: Expand statistical analyses to all site monitoring wells and perform additional soil confirmation sampling to evaluate the need to delineate and address remnant source contamination.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2020

OU(s): OU1 (Sitewide)	**Issue Category:** Institutional Controls			
	Issue: Groundwater institutional controls have not been implemented on all properties affected by groundwater contamination.			
	Recommendation: Implement additional groundwater institutional controls to prevent access to and use of contaminated groundwater at offsite parcels. The EPA will continue to work with the water management district on implementing institutional controls prior to the milestone date.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2020

OU(s): OU1 (Sitewide)	**Issue Category:** Changed Site Conditions			
	Issue: Contaminant concentrations in upgradient well MW-51S have increased in the last year.			
	Recommendation: Evaluate whether a new or recently mobilized source may be migrating onto the Site along the southern site boundary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2020

OU(s): OU1 (Sitewide)	**Issue Category:** Other: potential for emerging contaminant			
	Issue: It is unknown if PFAS were used onsite, but the potential exists due to the 1984 explosion and 1991 fire.			
	Recommendation: Review information about past practices at the Site to determine whether products containing PFAS were used, and if so, if the quantity used may have resulted in the need to test for PFAS contamination.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2020

OTHER FINDINGS

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

- Clarify roles and responsibilities related to the Tropical Plant Products property. Chevron's predecessor operated at the property in the 1940s and several other pesticide companies operated at the property after that time. A PRP search will help mobilize cleanup and coordinate with Chevron, as needed, on respective site cleanups.
- Repair fencing around the Site to prevent trespassing.
- Ensure all monitoring wells and casings are secured.
- Send current site information to the site information repository.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Site currently protects human health and the environment in the short term because there are no completed exposure pathways, contaminated groundwater is routinely monitored, source areas have been excavated to site-specific TSCs, and PRBs have been installed to filter groundwater and prevent migration of contamination. In order for the remedy to be protective in the long term, action is needed to evaluate contaminant trends to optimize the groundwater remedy, prevent further contaminant migration, address potential remnant source contamination, investigate potential new sources migrating onto the Site, implement additional institutional controls to restrict use of groundwater within the affected area until cleanup goals are attained, and clarify whether PFAS contamination is a concern at the Site. The EPA will continue to work with the PRP and Saint Johns River Water Management District at addressing these concerns during the next fiscal year.

VIII. NEXT REVIEW

The next FYR Report for the Chevron Chemical Co (Ortho Division) Superfund site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Explanation of Significant Differences. Chevron Chemical Company-Ortho Division. Orlando, Orange County, Florida. EPA Region 4. July 2000.

Explanation of Significant Differences. Chevron Chemical Company-Ortho Division Orlando, Orange County, Florida. EPA Region 4 September 2010.

Final Remedial Investigation Superfund Accelerated Cleanup Model, Chevron Chemical Company Site, Orlando, Florida, Volume 1. Prepared by TASK Environmental, Tampa, Florida, and PTI Environmental Services, Boulder, Colorado for Chevron Chemical Company, 6001 Bollinger Canyon Road, San Ramon, CA 94583-0947. November 1994.

Groundwater Investigation Report, McDonald's Property, 2929 North Orange Blossom Trail, Orlando, Florida. Prepared by Arcadis for Chevron Environmental Management Company. August 1, 2014.

Human Health Risk Assessment for the Former Cal Spray Facility, 1715 Silver Star Road, Orlando, Florida. Prepared by Arcadis for Chevron Environmental Management Company. November 24, 2014.

Operation and Maintenance Plan, Chevron Chemical Co. (Ortho Division) Superfund Site, Orlando, Florida. Prepared by Arcadis for EPA Region 4 and Chevron Environmental Management Company. May 2017.

Permeable Reactive Barrier (PRB) Installation Work Plan, Chevron Orlando Superfund Site. Prepared by Arcadis for Chevron Environmental Management Company. June 21, 2017.

Record of Decision, Chevron Chemical Co. (Ortho Division) Superfund Site, Orlando, Florida. EPA Region 4. May 22, 1996.

Site Status Update Meeting Presentation, Chevron Chemical Co. (Ortho Division) Superfund Site, Orlando, Florida. Prepared by Arcadis for EPA Region 4 and Chevron Environmental Management Company. September 28, 2017.

Site Status Update, Chevron Orlando Superfund Site, March 5, 2018. Prepared for Arcadis for Chevron Environmental Management Company. March 5, 2018.

Site Status Update, Chevron Orlando Superfund Site, May 31, 2018. Prepared for Arcadis for Chevron Environmental Management Company. May 31, 2018.

Source Reduction Activities Report, Chevron Orlando Superfund Site, Orlando, Florida. Prepared by Arcadis for Chevron Environmental Management Company. June 2, 2012.

Third Five-Year Review Report, Chevron Chemical Co. (Ortho Division) Superfund Site, Orlando, Florida. EPA Region 4. September 11, 2013.

APPENDIX B – CURRENT SITE STATUS

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

Are Necessary Institutional Controls in Place?
☐ All ☒ Some ☐ None *Additional institutional controls are needed to prevent well installation and groundwater use in areas of offsite groundwater contamination.*

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

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

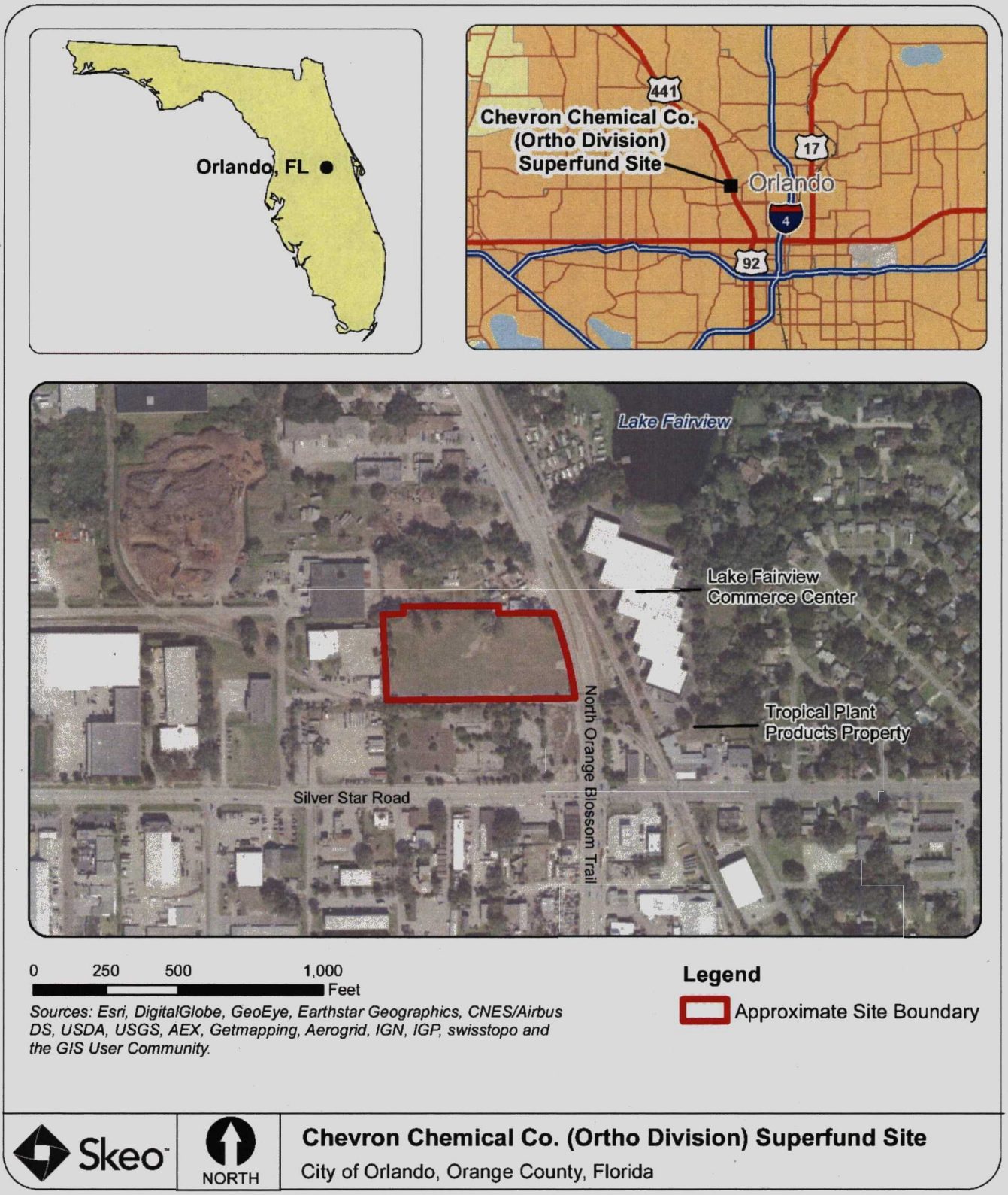
APPENDIX C – SITE CHRONOLOGY

Table C-1: Site Chronology

Event	Date
Chevron formulated and processed pesticides and nutritional sprays onsite	1950-1976
Mack Trucks operated onsite, using the property for truck sales and service	1978-1986
Site contamination discovered	November 1, 1979
The EPA completed the first preliminary assessment	March 1, 1980
The EPA completed the second preliminary assessment	July 1, 1982
The EPA issued an AOC to Chevron and the former owner of Mack Trucks to conduct a contamination assessment and develop a removal action plan for the Site	May 15, 1990
Chevron began first removal action	August 20, 1990
Chevron completed first removal action	September 15, 1992
The EPA issued an AOC to Chevron to conduct the Site's RI/FS	January 25, 1993
Chevron began the second removal action	March 17, 1994
The EPA finalized the Site on the NPL	May 31, 1994
Chevron completed the second removal action	September 26, 1994
The EPA completed the RI/FS and signed the ROD	May 22, 1996
The EPA issued a Unilateral Administrative Order for Chevron to implement the remedial action at the Site	July 11, 1997
Chevron began the remedial design	August 12, 1997
Chevron completed the remedial design and began the remedial action	October 9, 1997
The EPA completed the Preliminary Closeout Report	February 10, 1998
Chevron completed the remedial action	June 11, 1999
The EPA issued an ESD to revise the cleanup goals for ethyl benzene and xylenes	July 1, 2000
The EPA issued the first FYR	May 2, 2003
Chevron detected alpha-BHC in sentinel well MW-15, triggering groundwater contingency remedy implementation	2004
Chevron submitted PRB pilot study to the EPA	November 2006
Chevron installed three PRBs (Numbers 1, 2 and 3)	April 2007
The EPA approved the pilot test work plan addendum	October 30, 2007
Chevron installed four PRBs (Numbers 4, 5, 6 and 7	November 2007
The EPA issued the second FYR	September 30, 2008
Chevron installed one PRB (Number 8)	April 2009
Chevron began additional source area delineation both on and off the Chevron property	August 2009
Chevron expanded one PRB (Number 8)	November 2009
The EPA issued a second ESD to update the Site's arsenic cleanup goal, clearly define the RAOs and implement the contingency plan as outlined in the 1996 ROD	September 20, 2010
Chevron submitted, and the EPA approved, a Source Reduction Work Plan to establish cleanup goals for on-site soil that are protective of groundwater	January 2011
Chevron installed two PRBs (Numbers 9 and 10)	October 2011
Chevron performed soil excavation and backfilling as part of the source reduction program	January 2012
The EPA issued the third FYR	September 11, 2013
Chevron installed an additional PRB (Number 11) at the Lakeview Commerce Center to enhance the existing treatment zones and completed groundwater investigation activities at the McDonald's property	May 2014
Chevron submitted final Groundwater Investigation Report for McDonald's property to the EPA	August 1, 2014
Chevron submitted Human Health Risk Assessment for Former Cal Spray Facility to the EPA	November 24, 2014
Chevron shared updated O&M Plan with the EPA for review	February 17, 2015
Chevron submitted final EPA-approved O&M plan to the EPA	February 1, 2017
Chevron submitted PRB Installation Work Plan to the EPA for review	June 21, 2017

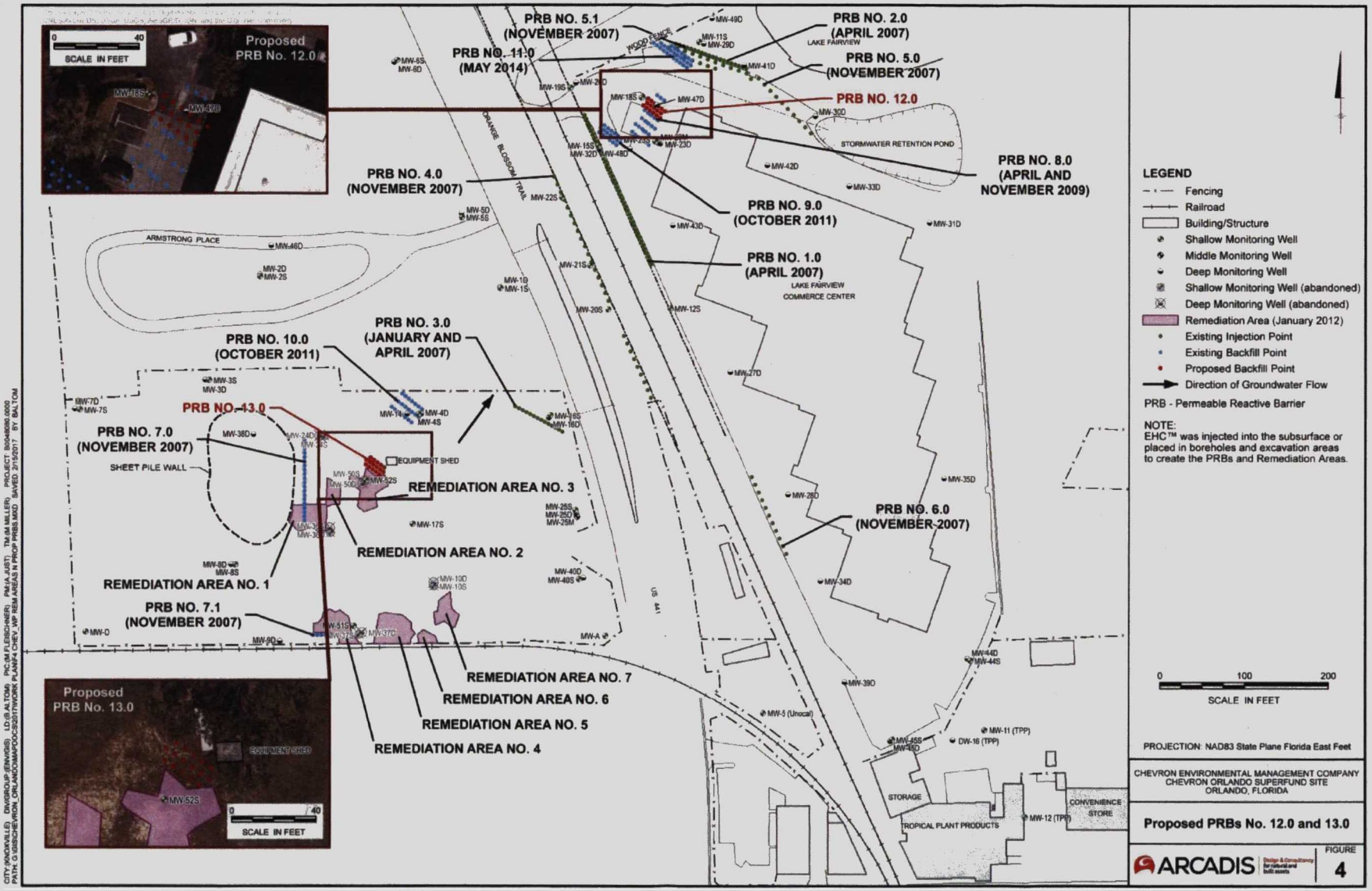
APPENDIX D – SITE MAPS

Figure D-1: Site Vicinity Map



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

Figure D-2: Map Indicating Location of Current and Proposed PRBs (from Arcadis's 2017 PRB Installation Work Plan)



APPENDIX E – PRESS NOTICE

Orlando Sentinel
OrlandoSentinel.com

Printed: 9/28/2017 10:22:02 AM
Page 2 of 4
* Agency Commission not included

Order ID: 5219556

GROSS PRICE * : **$462.51**

PACKAGE NAME: Orlando Sentinel

Product(s): Orlando Sentinel, Affidavit, Floridapublicnotices.com, Classifieds.OS.com_Legals
AdSize(s): 1 Column
Run Date(s): Sunday, October 01, 2017
Color Spec. B/W

Preview

THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 4 ANNOUNCES THE FOURTH FIVE-YEAR REVIEW FOR THE CHEVRON CHEMICAL CO. (ORTHO DIVISION) SUPERFUND SITE, ORLANDO, ORANGE COUNTY, FLORIDA

Purpose/Objective: EPA is conducting a Five-Year Review of the remedy for the Chevron Chemical Co. (Ortho Division) Superfund site (the Site) in Orlando, Florida. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect human health and the environment.

Site Background: The 4-acre Site is located on Orange Blossom Trail in Orlando, Florida. From 1950 until 1976, Chevron Chemical Co. (Chevron) formulated and processed pesticides and nutritional sprays at the Site. From 1978 until 1986, Central Florida Mack Trucks used the property for truck sales and service. During operations, Chevron disposed of contaminated rinse water in two unlined rinsate ponds and a warehouse floor drain on site. Central Florida Mack Trucks also disposed of rinsate, used oil filters, waste oil, diesel fuel, paint and partially-filled drums of pesticides in the rinsate pond area during operations. Investigations from 1982 until 1989 indicated the presence of pesticides, metals and volatile organic compounds (VOCs) in soil and groundwater. EPA listed the Site on the National Priorities List (NPL) in May 1994.

Cleanup Actions: From 1990 until

GROSS PRICE * : **$462.51**

PACKAGE NAME: Orlando Sentinel

1992, Chevron conducted a removal action, which involved removing remaining site structures, excavation and treatment of over 20,000 tons of pesticide- and petroleum-contaminated soils, recovery and treatment of 90 to 100 gallons of free-phase liquid from subsurface soils, and backfilling of all excavated areas with clean fill. In September 1994, Chevron conducted an additional removal action to remove a one-foot layer of soil in five designated areas of a nearby trailer park. EPA designated one operable unit to address the Site's soil and groundwater contamination. EPA selected the Site's remedy in the 1996 Record of Decision (ROD). It included monitored natural attenuation of groundwater until cleanup levels are met, institutional controls, routine maintenance of the Site and a contingency plan if contaminant concentrations do not decrease as expected. EPA issued two Explanation of Significant Differences (ESDs) in 2000 and 2010 that modified several contaminant cleanup goals.

Five-Year Review Schedule: The National Contingency Plan requires review of remedial actions that result in any hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure every five years to ensure the protection of human health and the environment. The fourth of the Five-Year Reviews for the Site will be completed by September 2018.

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:

Order ID: 5219556

GROSS PRICE * : **$462.51**

PACKAGE NAME: Orlando Sentinel

Karl Wilson, EPA Remedial Project Manager
Phone: (404) 562-9295
Email: wilson.karl@epa.gov

Latonya Spencer, EPA Community Involvement Coordinator
Phone: (404) 562-8463 I (800) 241-1754 (toll-free)
Email: spencer.latonya@epa.gov

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

Additional information is available at the Site's local document repository, located at Edgewater Public Library, 5049 Edgewater Drive Orlando, FL 32810 and online at: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0400520.

OS5219556 10/1/2017

APPENDIX F – INTERVIEW FORMS

Chevron Chemical Co (Ortho Division) Superfund Site — **Five-Year Review Interview Form**

Site Name: Chevron Chemical Co (Ortho Division) **EPA ID No.:** FLD004064242

Interviewer Name: Karl Wilson **Affiliation:** EPA
Subject Name: Nearby Business 1 **Affiliation:** N/A
Subject Contact Information: N/A
Time: 10:00 am **Date:** 09/28/2017
Interview Location: Business facility

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

Interview Category: Residents

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

   Yes.

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

   I think it was almost completed by the time I was here. I think it was fine.

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

   Besides testing, there have been no effects. We might have trouble selling this property in the future.

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

   No.

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

   I think so. I don't know.

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

   No.

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

No. Arcadis and EPA answered all our questions.

Chevron Chemical Co (Ortho Division) Superfund Site **Five-Year Review Interview Form**

Site Name: Chevron Chemical Co (Ortho Division) **EPA ID No.:** FLD004064242

Interviewer Name: Karl Wilson **Affiliation:** EPA
Subject Name: Nearby Business 2 **Affiliation:** N/A
Subject Contact Information: N/A
Time: 10:20 am **Date:** 09/28/2017
Interview Location: Business facility

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

Interview Category: Residents

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

   Somewhat. I know they test all the time.

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

   I asked someone about the testing once and they said it's fine, so that's all I need to know.

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

   None.

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

   There has been trespassing by homeless people on my property. For the Site, there are none.

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

   No. I want to be involved, though. I will give you my business card.

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

   We're on city water.

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

   Keep me informed.

Chevron Chemical Co (Ortho Division) Superfund Site **Five-Year Review Interview Form**

Site Name: Chevron Chemical Co (Ortho Division) **EPA ID No.:** FLD004064242

Interviewer Name: Karl Wilson **Affiliation:** EPA
Subject Name: Nearby Business 3 **Affiliation:** N/A
Subject Contact Information: N/A
Time: 10:45 am **Date:** 09/28/2017
Interview Location: Business facility

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

Interview Category: Residents

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

   Yes.

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

   I wish it was for sale, I need more room.

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

   None. They do testing all the time.

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

   No.

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

   Someone came in here two or three years ago. Same as this. I don't really care.

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

   No.

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

   I don't think it's ever going to be cleaned up.

Interview Record

Site Name: Chevron (Ortho) Superfund Site **EPA ID No:**

Interviewer's Name:

Interviewee's Name/Title: Kelsey Helton/ PG II, FDEP- Waste Cleanup

Contact Information: kelsey.helton@dep.state.fl.us

Time: **Date: 7/6/2018**

Type of Interview (Circle one): In person **Phone** **Mail**

Location of Interview: email

Chevron (Ortho) Superfund Site

Five-Year Review Questionnaire- Community Involvement

Interview Category: State of Florida

1.) What is your overall impression of the project? *Cleanup has progressed at the site with several source removals and implementation of the contingent insitu groundwater remedy by installation of 11 PRBs. However, there are portions of the plume that continue to show an increasing trend, where additional corrective action is necessary. Chevron has recently recommended installation of 2 additional PRBs. DEP has recommended a more comprehensive evaluation to determine if there are other areas where additional insitu treatment is warranted or where the data may indicate an ongoing source or plume migration.*

2.) How well do you believe the remedy currently in place is performing? *See above response.*

3.) Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents in the last five years? *No.*

4.) Has your office conducted any Site-related activities or communications in the last five years? If so, please give purpose and results of these activities. *DEP has participated in annual conference calls to discuss the status and progress of site cleanup, provided review comments on 2 work plans for installation of additional PRBs and provided recommendations outlined in response above.*

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

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

7.) Are you comfortable with the status of the institutional controls at the Site? If no, what do you see as the outstanding issues? *There are restrictive covenants on the former facility property that prevent use and exposure to contaminated groundwater and restrict land use to commercial/industrial. DEP recommends the establishment of a Memorandum of Understanding (MOU) between EPA and the Water Management District to restrict well installation and groundwater use in the area of the offsite groundwater contaminant plume until cleanup goals have been met.*

8.) Do you have any comments, suggestions or recommendations regarding the Site's management or operation? *DEP urges EPA to work with Chevron and DEP to determine a path forward to address contaminated soil and groundwater on the offsite Tropical Plans Products property. Previous sampling by Chevron and the subsequent November 2014 draft risk assessment indicates that pesticide contaminated soils are at levels above the State 10^{-6} risk management level and EPA's 10^{-4} risk range and are likely acting as an ongoing source of groundwater contamination.*

APPENDIX G – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Chevron Chemical Co (Ortho Division)	**Date of Inspection:** 09/28/2017
Location and Region: Orlando, Florida 4	**EPA ID: FLD004064242**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** Sunny/80s

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other: Removal of source soils and installation of PRBs onsite and off site to treat contaminated groundwater.

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** Susan Tobin (Name) | President, TASK Environmental (Title) | _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems, suggestions ☐ Report attached: _____

2. **O&M Staff** Allen Just (Name) | Associate Vice President, Arcadis (Title) | _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

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

   Agency EPA
   Contact Karl Wilson (Name) | Remedial Project Manager (Title) | _____ (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency FDEP
   Contact Kelsey Helton (Name) | Professional Geologist II (Title) | 7/6/2018 (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ (Name) | _____ (Title) | _____ (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ (Name) | _____ (Title) | _____ (Date) | _____ (Phone No.)

Problems/suggestions ☐ Report attached: _____

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

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

Mark Stella, Chevron - Senior Environmental Specialist

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

1. **O&M Documents**

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

Remarks: _____

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

Remarks: _____

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

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5. **Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

6. **Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

7. **Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

8. **Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: 1/1/2013 Date	To: 12/31/2013 Date	$172,132 Total cost	☐ Breakdown attached
From: 1/1/2014 Date	To: 12/31/2014 Date	$186,646 Total cost	☐ Breakdown attached
From: 1/1/2015 Date	To: 12/31/2015 Date	$176,306 Total cost	☐ Breakdown attached
From: 1/1/2016 Date	To: 12/31/2016 Date	$151,808 Total cost	☐ Breakdown attached
From: 1/1/2017 Date	To: 12/31/2017 Date	$128,847 – Total cost	☐ Breakdown attached

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

Describe costs and reasons: _____

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

A. Fencing

1. **Fencing Damaged** ☐ Location shown onsite map ☐ Gates secured ☐ N/A

Remarks: Fencing near MW-7S and D is very low. There was also fencing damaged near MW-3D, which was covered with an orange marker.

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown onsite map ☐ N/A

Remarks: Signs posted on fencing indicating no trespassing.

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

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

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

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

Frequency: As needed.

Responsible party/agency: Chevron Environmental Management Company

Contact	Mark Stella	Project Manager	_____	_____
	Name	Title	Date	Phone no.

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

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

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

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

Other problems or suggestions: ☐ Report attached

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

Remarks: Institutional controls needed offsite to restrict groundwater use in areas with groundwater contamination.

D. General

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

Remarks: _____

2. **Land Use Changes Onsite** ☒ N/A

Remarks: _____

3. **Land Use Changes Offsite** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown onsite map ☒ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

B. Benches ☐ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

C. Letdown Channels ☐ Applicable ☐ N/A

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

D. Cover Penetrations ☐ Applicable ☐ N/A

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

F. Cover Drainage Layer ☐ Applicable ☐ N/A

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

H. Retaining Walls ☐ Applicable ☐ N/A

I. Perimeter Ditches/Offsite Discharge ☐ Applicable ☐ N/A

VIII. VERTICAL BARRIER WALLS ☒ Applicable ☐ N/A

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

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

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

C. Treatment System ☒ Applicable ☐ N/A

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

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☒ Additive (e.g., chelation agent, flocculent): zero-valent ion and solid carbon

☐ Others: _____

☒ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

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

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

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

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

Remarks: Groundwater treatment purge water stored in plastic tanks onsite.

4. **Discharge Structure and Appurtenances**

☒ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

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

☐ Chemicals and equipment properly stored

Remarks: _____

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

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

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

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

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

Remarks: Some wells not locked.

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 purpose of the remedy is to protect human health and the environment from exposure to contaminated groundwater through direct exposure. Institutional controls prevent exposure to groundwater onsite; however, additional institutional controls are needed to prevent installation of wells on offsite parcels impacted by groundwater contamination. Overlying businesses at these offsite parcels are connected to municipal water supply. Additional institutional controls also restrict the residential use of the Site.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The PRP monitors groundwater quarterly until contaminants are below cleanup goals. The PRB injections and soil removals have reduced contamination at some wells, but there are still some increasing contamination levels onsite and offsite. The PRPs are waiting for approval to install two new PRBs to hopefully decrease contamination levels permanently.

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.

Contaminant concentrations are recently increasing in some wells onsite and offsite. This is a possible sign that the soil removal and PRB injections are not working as intended.

D. Opportunities for Optimization

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

Both EPA and FDEP have noted that the existing 11 PRBs warrant closer performance evaluation to assess their effectiveness. The PRBs are intended as a groundwater polishing treatment following source removal. However, contaminant concentrations are not declining as rapidly as anticipated. The opportunity exists to reassess the groundwater contingency remedy and evaluate ways to optimize groundwater cleanup.

Site Inspection Team:

Karl Wilson, EPA
Mark Stella, Chevron
Allen Just, Arcadis
Amanda Goyne, Skeo
Brice Robertson, Skeo

APPENDIX H – SITE INSPECTION PHOTOS

Gated entrance to the Site from Orange Blossom Trail with "No Trespassing" signage

On-site shed housing stormwater effluent treatment equipment

View of site area looking west

Damaged trees onsite from Hurricane Irma

Unlocked casings, but labeled monitoring wells MW-4D and MW-4S

Unlocked interior, but labeled monitoring wells MW-40S and MW-40D

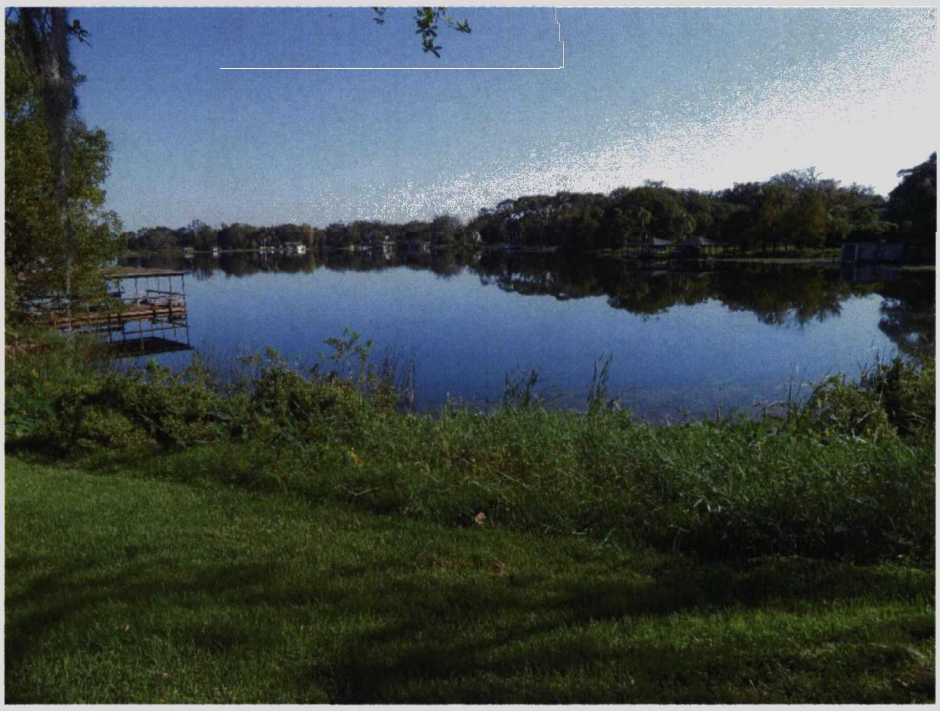
Monitoring well MW-52S and area where new PRB 13 is proposed

Damaged fencing near MW-3D

Low fencing near MW-7S and MW-7D

A Lake Fairview Commerce Center building

Flush-mounted well along west side of Lake Fairview Commerce Center, which needs repair



Lake Fairview looking northeast

Business that operates directly adjacent to the Site

APPENDIX I – GROUNDWATER DATA

Figure I-1: Shallow Groundwater Contour Map – Fourth Quarter 2017

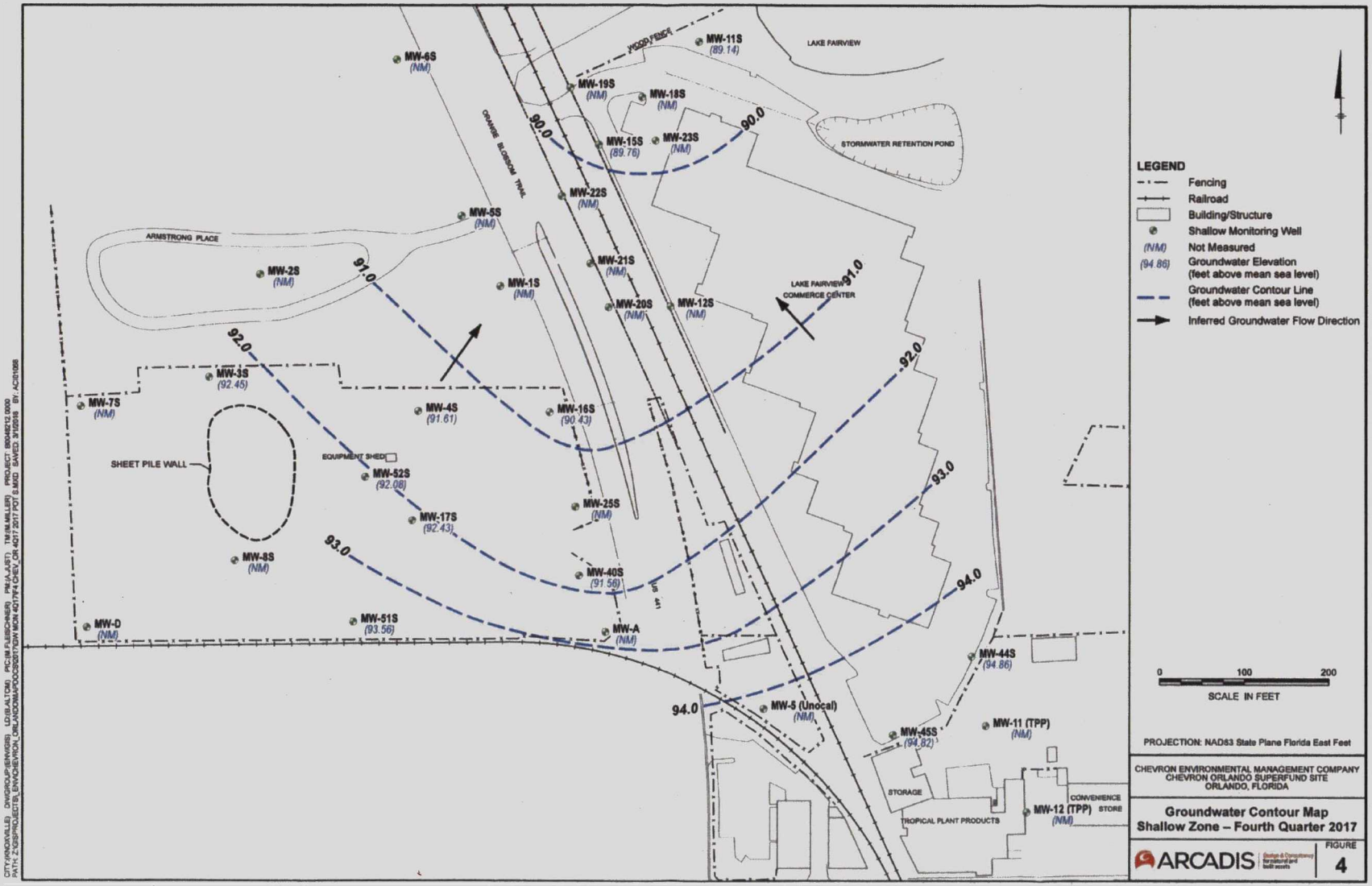


Figure I-2: Deep Groundwater Contour Map – Fourth Quarter 2017

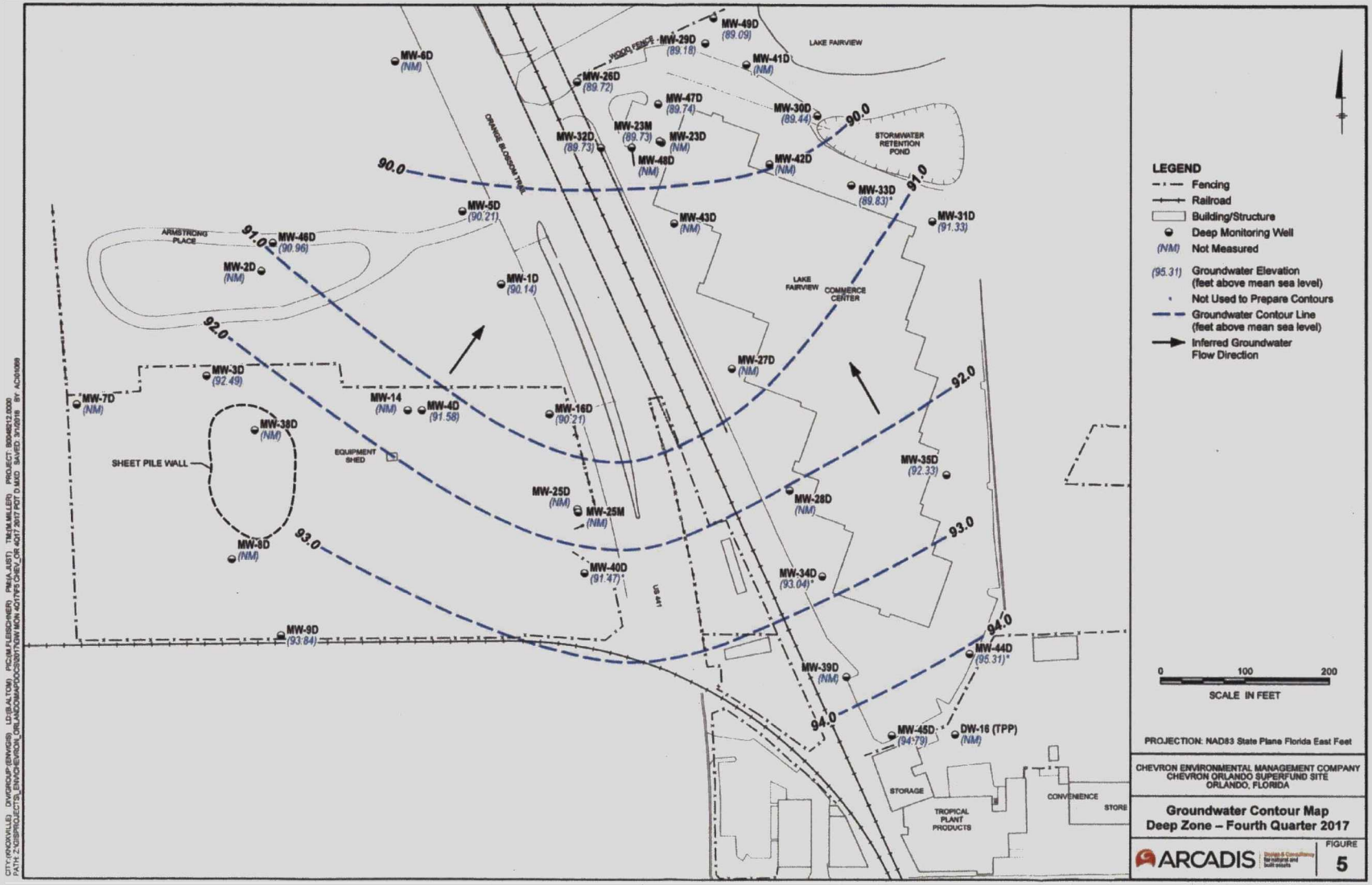


Figure I-3: alpha-BHC Concentrations in Groundwater – Fourth Quarter 2017

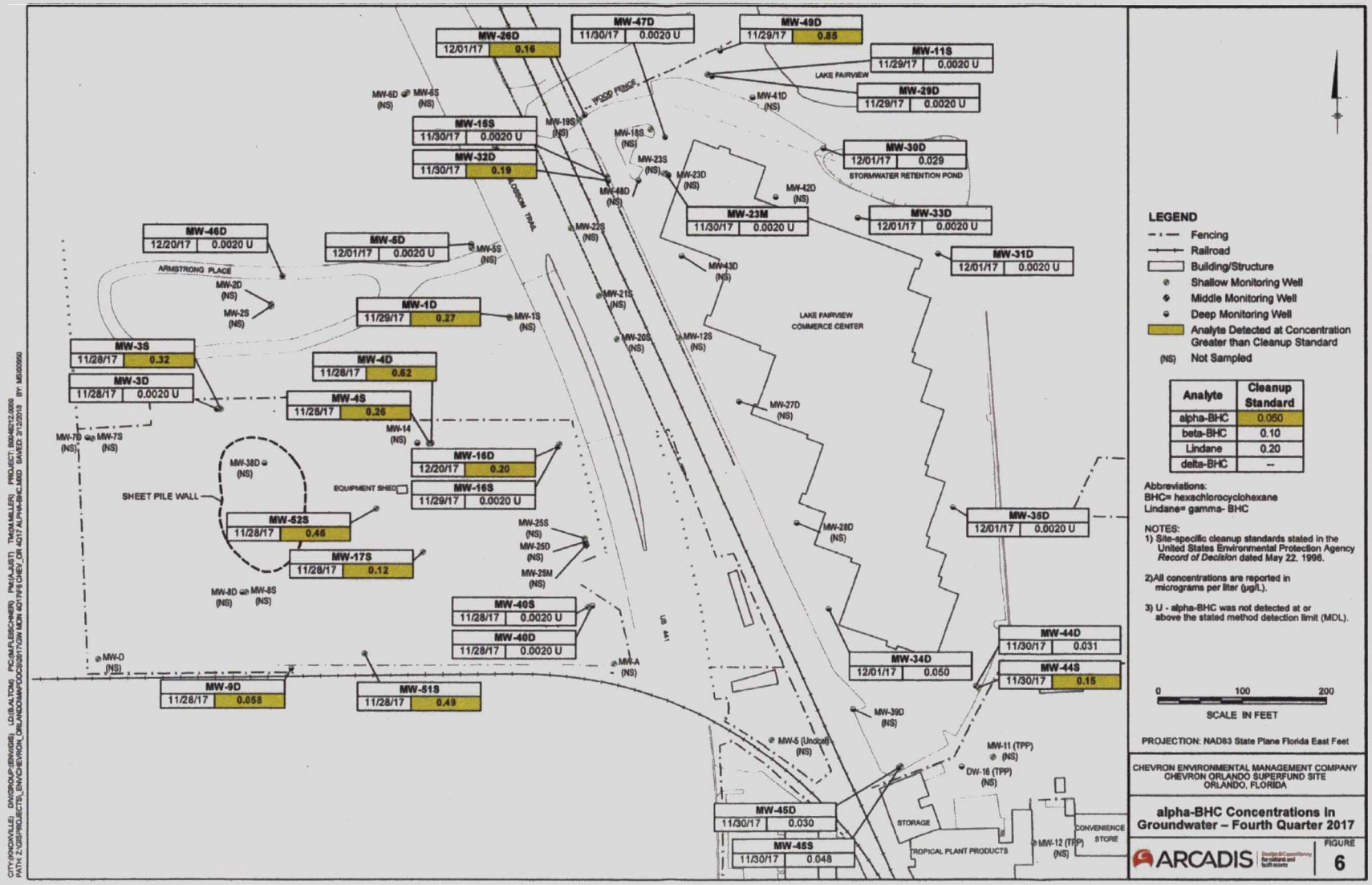


Figure I-4: beta-BHC Concentrations in Groundwater – Fourth Quarter 2017

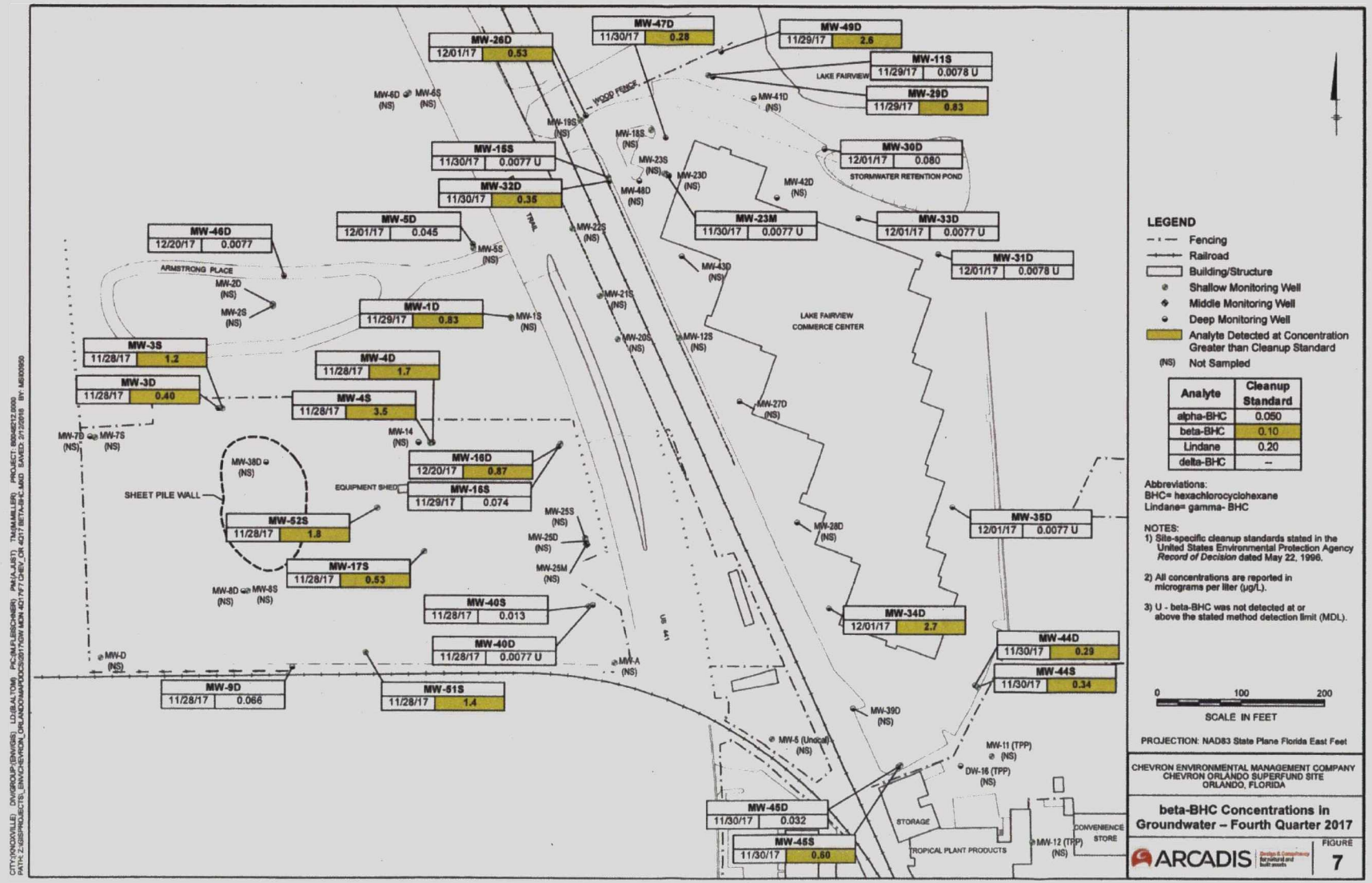


Figure I-5: alpha-BHC Concentrations in Groundwater – First Quarter 2018

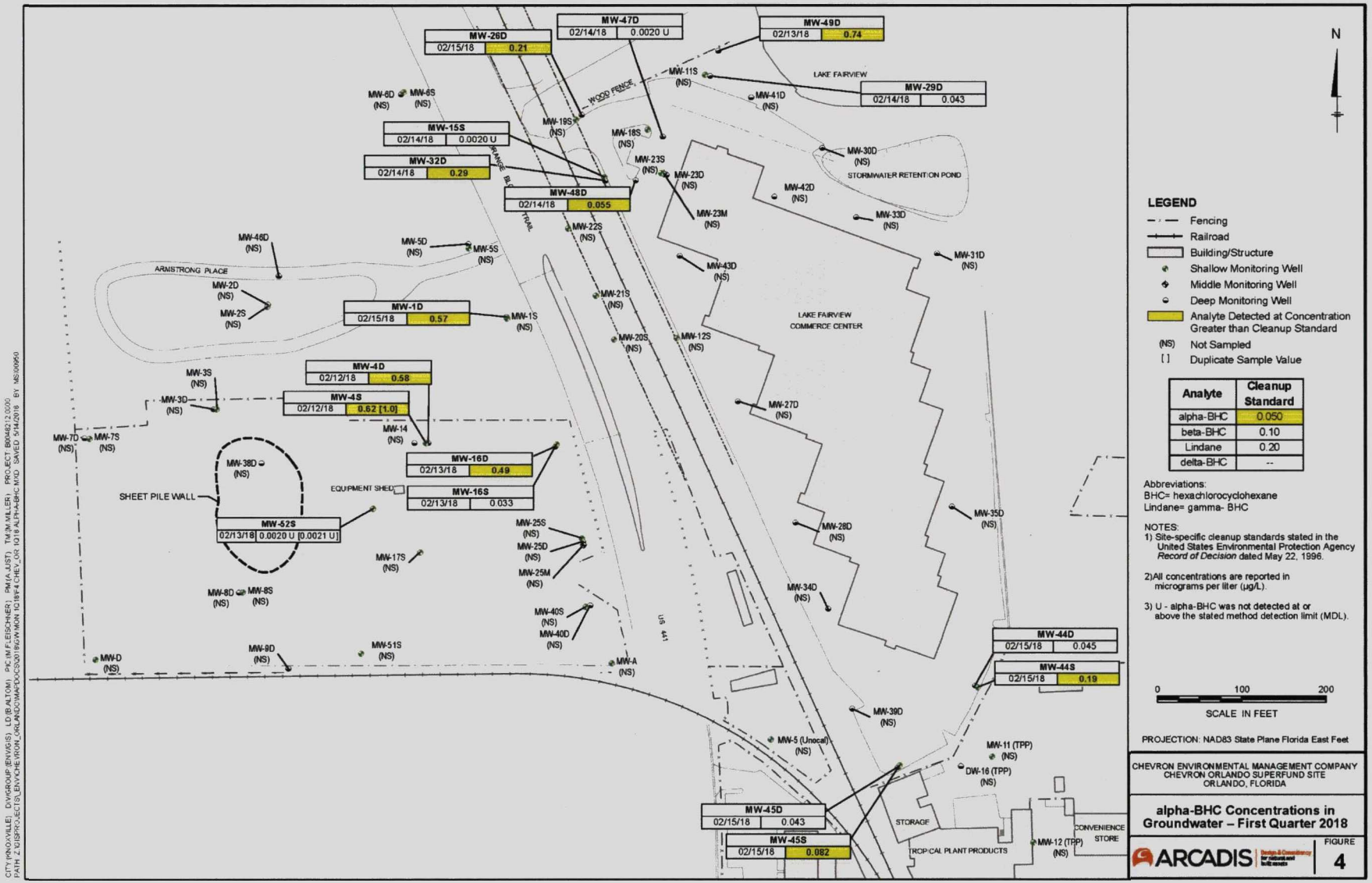


Figure I-6: beta-BHC Concentrations in Groundwater – First Quarter 2018

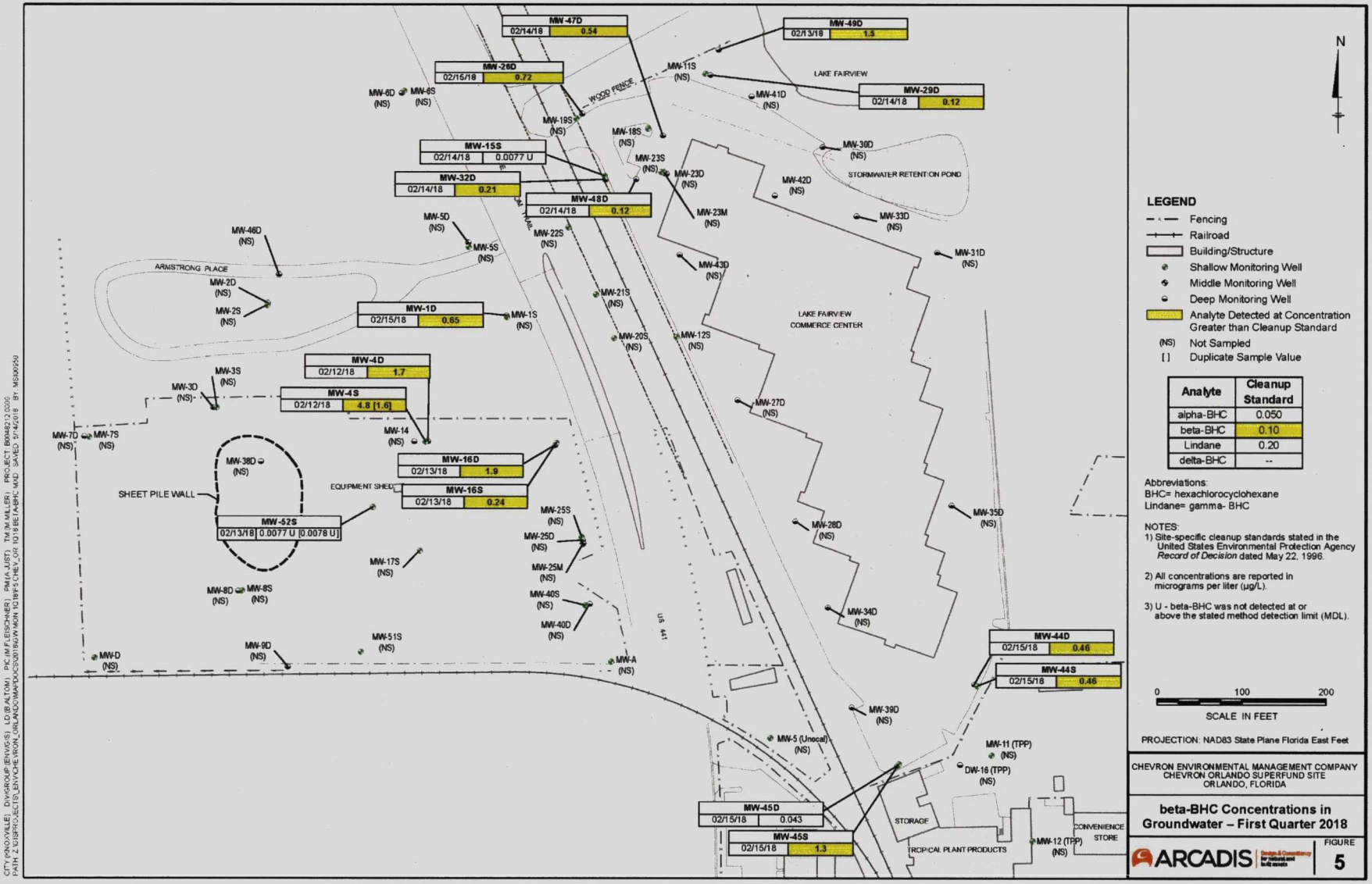


Figure I-7: Concentration Trends for Four BHC Isomers at the Site in MW-1D

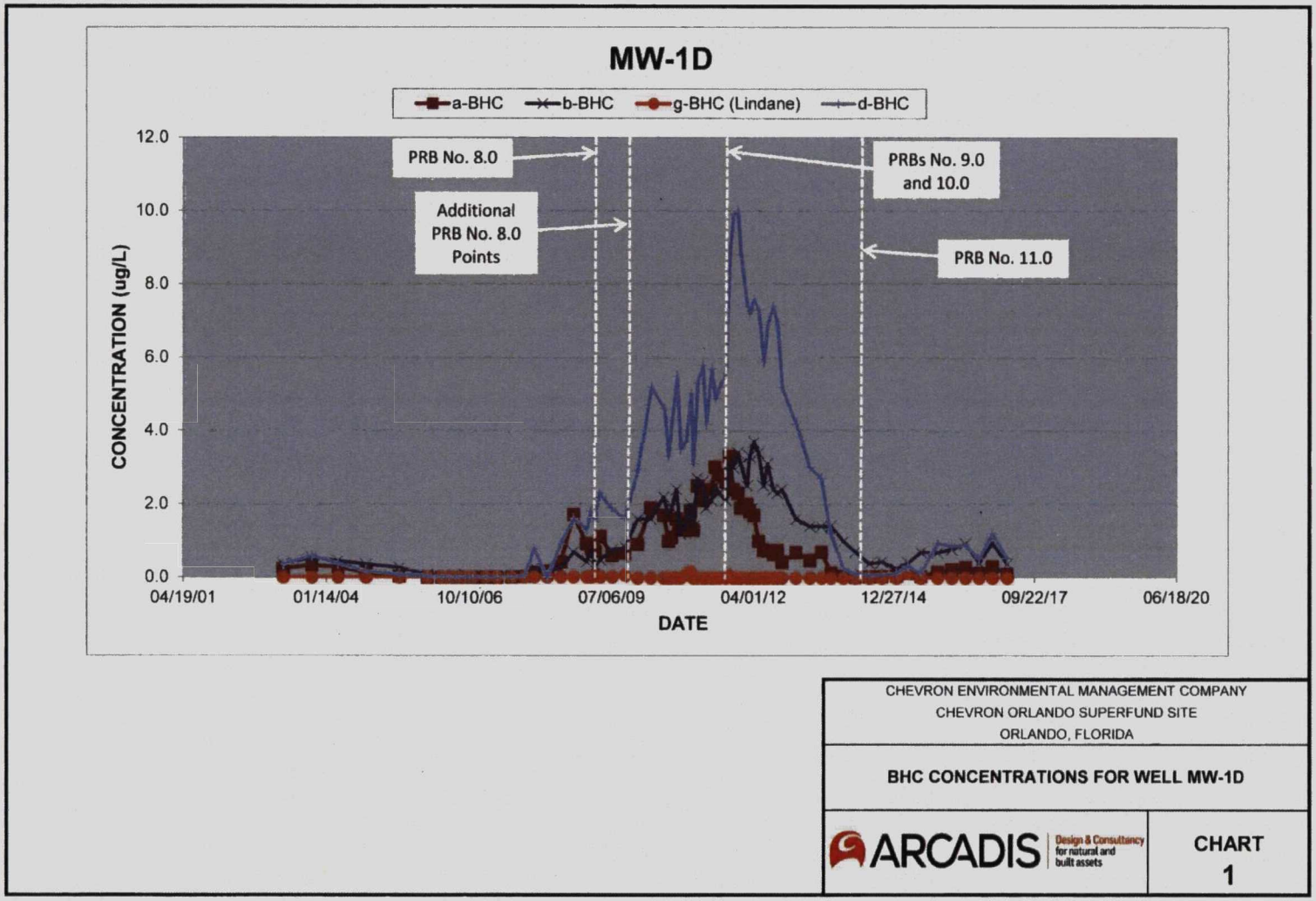


Figure I-8: Concentration Trends for Four BHC Isomers at the Site in MW-26D

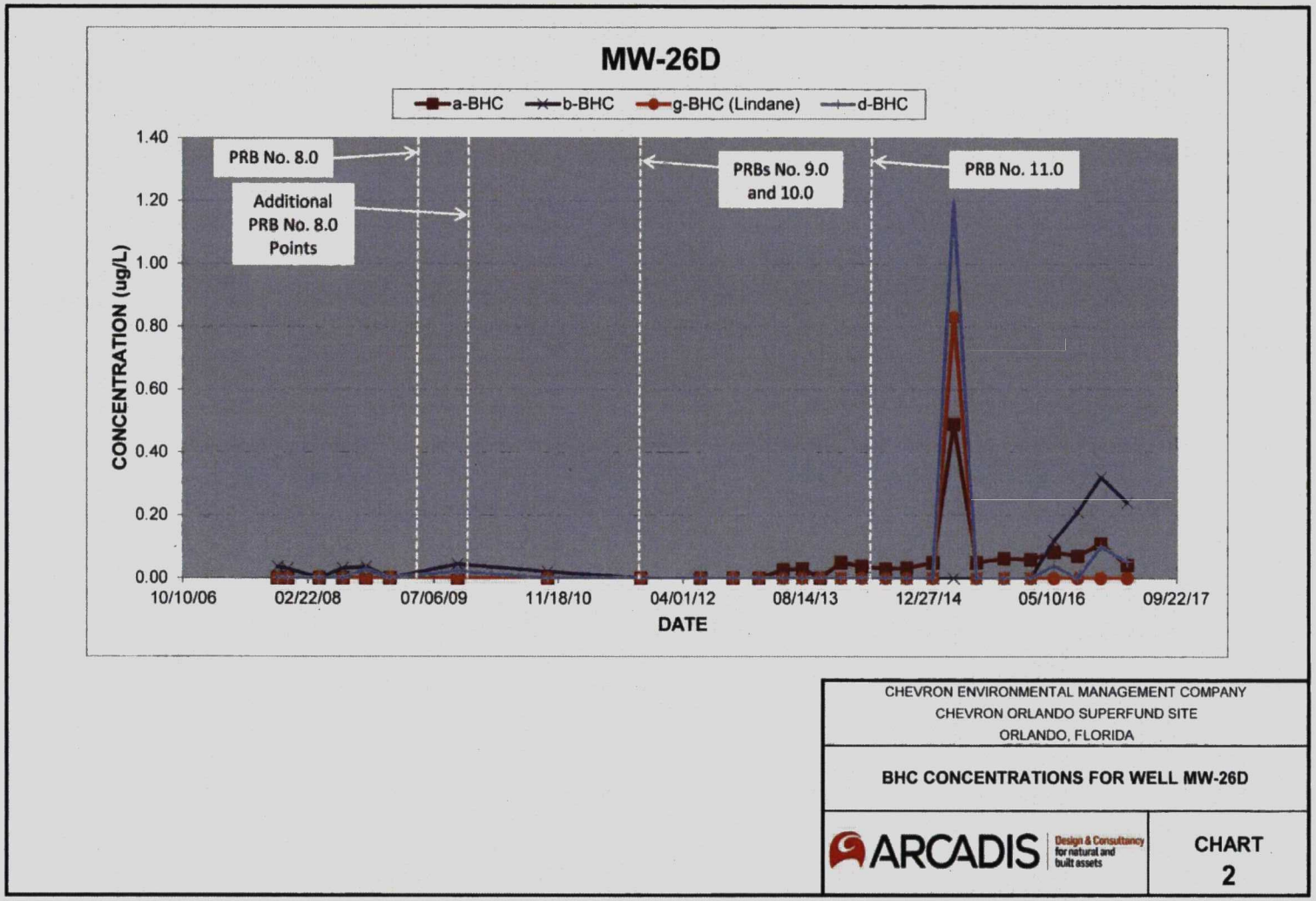
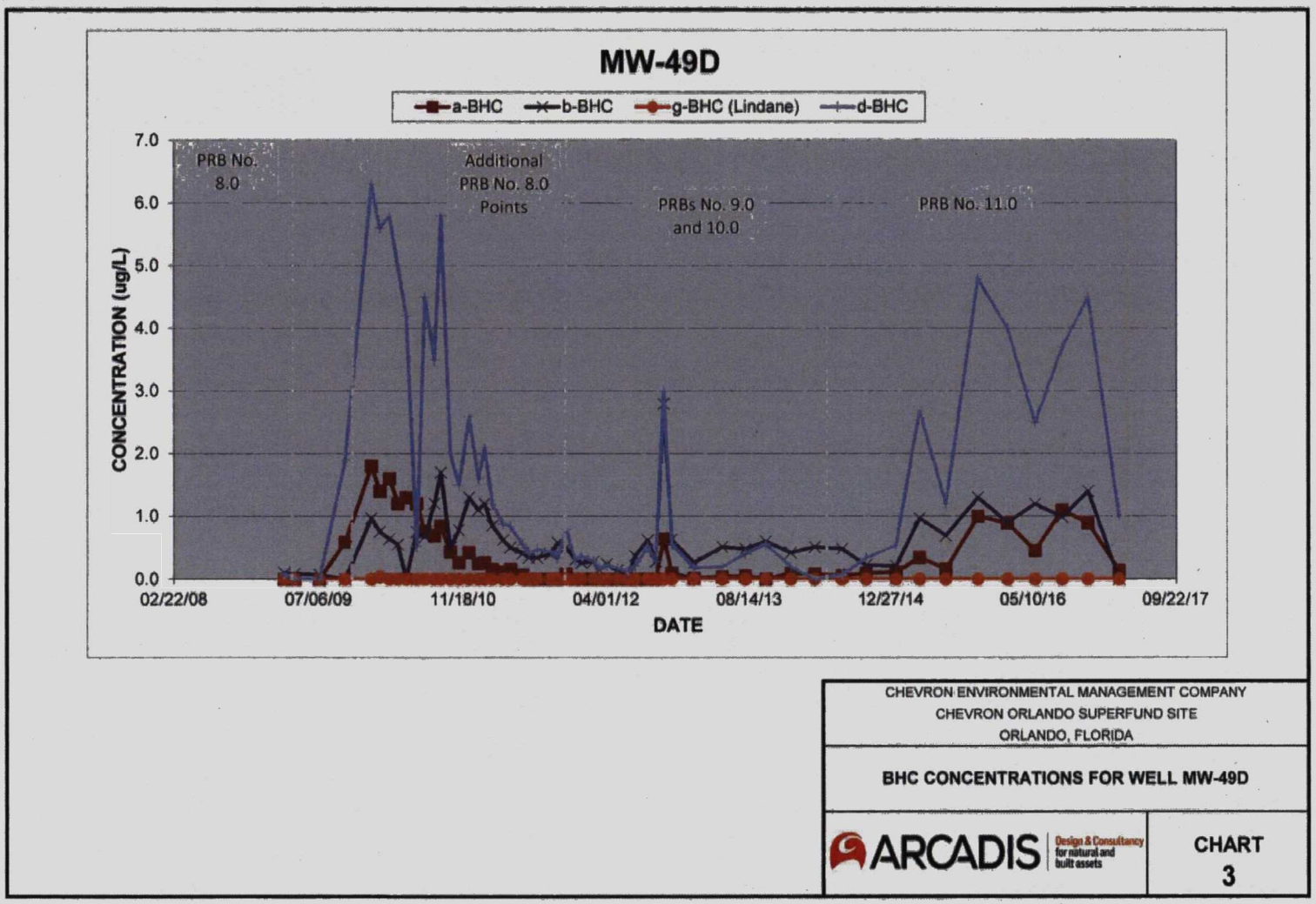


Figure I-9: Concentration Trends for Four BHC Isomers at the Site in MW-49D



APPENDIX J – DETAILED ARARS REVIEW TABLES

Groundwater ARARs

The 2010 ESD updated the groundwater cleanup goals originally established in the 1996 ROD. The 2010 ESD established the federal maximum contaminant levels (MCLs) under the Safe Drinking Water Act (40 CFR Part 141.61 and 141.62) and the Florida drinking water standards (Chapter 62-550.310, Florida Administrative Code) as relevant and appropriate standards for the Site. A comparison of the 2010 ARAR-based groundwater cleanup goals to current standards found that none of the ARARs has changed since the 2010 ESD.

The currently promulgated MCL for xylene (10,000 µg/L) is based on outdated toxicity information. EPA's Office of Drinking Water is aware of the risk issues, but for reasons other than risk has decided not to revise the MCL for xylene at this time. The Office of Water Drinking Water Standards and Health Advisories Tables does include a Drinking Water Equivalent Level (DWEL) of 7,000 ug/L based on the current reference dose. The DWEL assumes 2 L/d ingestion and 70 kg body weight. This is equivalent to a Preliminary Remediation Goal based on ingestion only exposure. In Region 4, site risk assessments looking at VOCs usually assume that the human receptor drinks about 2 L/d and is additionally exposed to another 2 L/d via showering. This assumption doubles the risk, or reduces the risk-based Remedial Goal Option by a factor of 2. Therefore, EPA Region 4's recommended risk-based cleanup level for xylene in groundwater is 3,500 µg/L. As long as the institutional controls remain in place, the remedy remains protective. If institutional controls are lifted, reevaluation of xylene concentrations and the cleanup goal is recommended.

The currently promulgated MCL for site COC chromium (100 µg/L) is based on total chromium. The remedy remains protective at the Site because institutional controls prevent exposure to contaminant concentrations exceeding cleanup levels. However, if institutional controls are lifted in the future, a reevaluation of the cleanup goal looking at speciation would be recommended to ensure the MCL remains protective of human health.

Table J-1: Review of Groundwater ARARs

COC	2010 ESD ARAR[a] (µg/L)	2018 Standard[b] (µg/L)	ARARs Change
Benzene	1	1	None
Ethylbenzene	700	700	None
Xylenes	10,000	10,000	None
Total naphthalenes	NA[c]	NA	None
4,4-DDD	NA	NA	None
alpha-BHC	NA	NA	None
beta-BHC	NA	NA	None
gamma-BHC (Lindane)	0.2	0.2	None
Chlordane	2	2	None
Arsenic	10	10	None

COC	2010 ESD ARAR[a] (µg/L)	2018 Standard[b] (µg/L)	ARARs Change
Chromium	100	100[d]	None
Lead	15	15	None

Notes:

a. Groundwater cleanup goals from Table 1 of the 2000 ESD.

b. Lower of the federal and Florida primary MCLs. Federal MCLs are available at http://water.epa.gov/drink/contaminants/index.cfm (accessed 4/9/2018); Florida MCLs are available http://www.floridahealth.gov/environmental-health/drinking-water/_documents/hal-list.pdf (accessed 4/9/2018).

c. NA – Not applicable; groundwater cleanup goal is not an ARAR. Risk-based cleanup goals are evaluated in Appendix K.

d. MCL for total chromium.

µg/L = micrograms per liter

BHC = Hexachlorocyclohexane

APPENDIX K – SCREENING-LEVEL RISK REVIEW

Table K-1: Review of Risk-Based Groundwater Cleanup Goals

Groundwater COC	Groundwater Cleanup Goal (µg/L)	Residential Tapwater RSL[a] (µg/L)		Screening-level Risk Evaluation	
		10^{-6} Risk	HQ = 1	Risk[b]	HQ[c]
Total naphthalenes	100	0.17	6.1	**5.9×10^{-3}**	**16.4**
4,4-DDD	0.1	0.032	0.063	3.1×10^{-5}	**1.6**
alpha-BHC	0.05	0.0072	97	6.9×10^{-5}	0.001
beta-BHC	0.1	0.025	--[d]	4.0×10^{-5}	--

Notes:

a) EPA's tapwater RSLs, dated November 2017, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017, accessed 04/10/2018.

b) Risk calculated using the following equation, based on the fact that RSLs are derived based on 1×10^{-6} risk: risk = (cleanup goal/cancer-based RSL) x 10^{-6}.

c) Noncancer HQ calculated using the following equation: noncancer hazard index = cleanup goal/noncancer RSL.

d) -- = EPA has not finalized a noncarcinogenic toxicity value for this compound.

µg/L= micrograms per liter

BHC = Hexachlorocyclohexane

Bold result indicates calculated risk exceeds EPA's risk management range of 1×10^{-4} to 1×10^{-6} or a HQ of 1.

Table K-2: Review of Target Soil Concentrations

Soil COC	TSC (mg/kg)	Industrial Soil RSL[a] (mg/kg)		Screening-level Risk Evaluation	
		10^{-6} Risk	HQ = 1	Risk[b]	HQ[c]
alpha-BHC	0.120	0.36	6,600	3×10^{-6}	0.00002
beta-BHC	0.077	1.3	--	5.9×10^{-7}	--
delta-BHC	1.386	--	--	--	--
gamma-BHC (Lindane)	0.180	2.5	300	7.2×10^{-7}	0.001
Chlordane	50[d]	7.7	450	6.5×10^{-5}	0.1

Notes:

a. EPA's industrial soil RSLs, dated November 2017, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017, accessed 04/11/2018.

b. Risk calculated using the following equation, based on the fact that RSLs are derived based on 1×10^{-6} risk: risk = (cleanup goal/cancer-based RSL) x 10^{-6}.

c. Noncancer HQ calculated using the following equation: Noncancer hazard index = cleanup goal/noncancer RSL.

d. The lower value of the TSC for surface soil (50 mg/kg) and subsurface soil (100 mg/kg).

-- = EPA has not finalized toxicity values for this compound.

mg/kg = milligrams per kilogram

BHC = Hexachlorocyclohexane

APPENDIX L – SEPTEMBER 2018 WELL SURVEY

MEMO

ARCADIS Design & Consultancy for natural and built assets

To:
Mr. Karl Wilson
United States Environmental Protection Agency – Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303-8960

Copies:
Mark Hendrickson, CEMC
Tracie Vaught, FDEP
Anthony Larenas, Arcadis

Arcadis U.S., Inc.
320 Commerce
Suite 200
Irvine
California 92602
Tel 714 730 9052
Fax 714 730 9345

From:
Allen C. Just, P.E.

Date:
September 13, 2018

Arcadis Project No.:
B0048264.0000.00005

Subject:
Chevron Chemical Company (Ortho Division) Superfund Site
Well Survey

Arcadis U.S., Inc. conducted a well survey to determine if any privately and publicly owned potable wells are located within 1 mile of the subject facility. None were located within 1 mile of the facility.

The following databases were searched on September 6, 2018:

Florida Department of Environmental Protection (FDEP) FDEPOpenDataPortal - Public Water Supply Wells – Map attached
https://ca.dep.state.fl.us/mapdirect/?focus=waterdatacentral

Metadata link:
https://www.arcgis.com/sharing/rest/content/items/e0b832a3c8ca45598c79a9b290653bd7/info/metadata/metadata.xml?format=default&output=html

Florida Department of Health (FDOH) Environmental Health Well Surveillance – Map attached
https://gis.flhealth.gov/ehwater/

Metadata link: http://www.floridahealth.gov/environmental-health/drinking-water/well-surveys.html

In addition, there are multiple active FDEP tank sites in the vicinity and surrounding the subject, which also have well surveillance requirements, so the well locations in the vicinity of the subject facility have been verified multiple times during these surveys. Map of active FDEP tank sites is attached.

Please contact me at 714.508.2677 or via e-mail at Allen.Just@arcadis.com should you have any questions or need additional information.

Sincerely,

Arcadis U.S., Inc.

Allen Just, P.E.
Principal Engineer

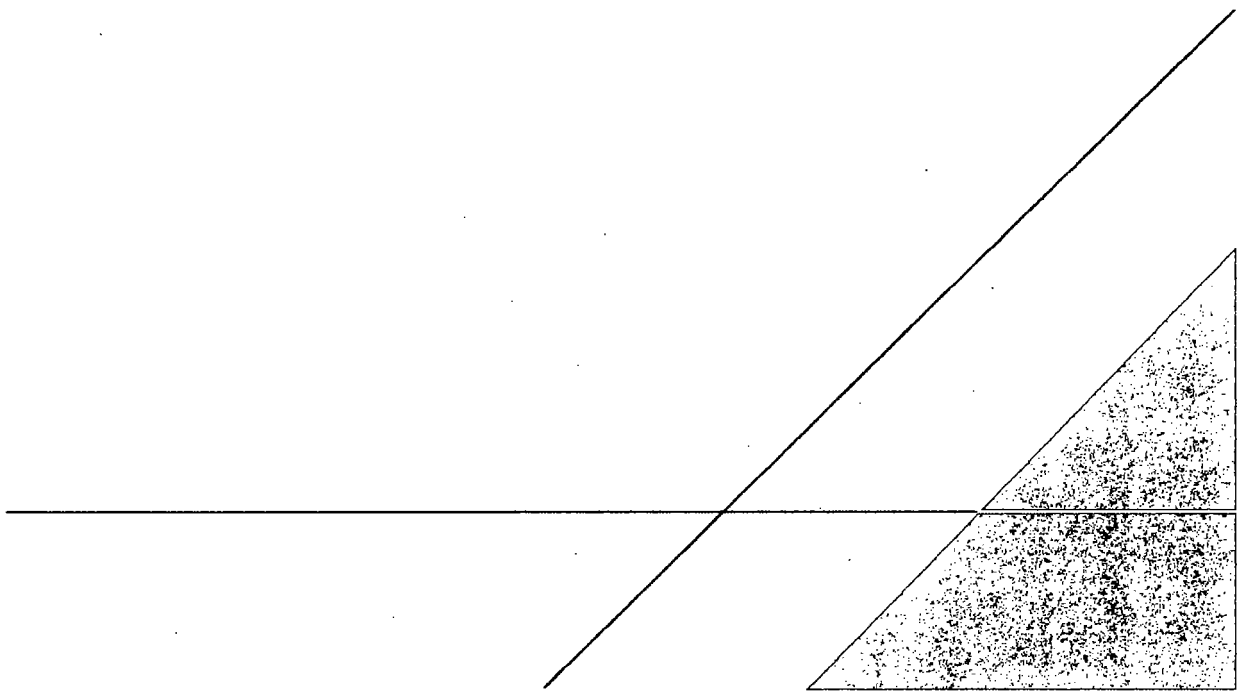
Attachments

1 FDEP Public Supply Wells Map – 1 mile radius

2 FDOH Environmental Health Well Surveillance – 1 mile radius

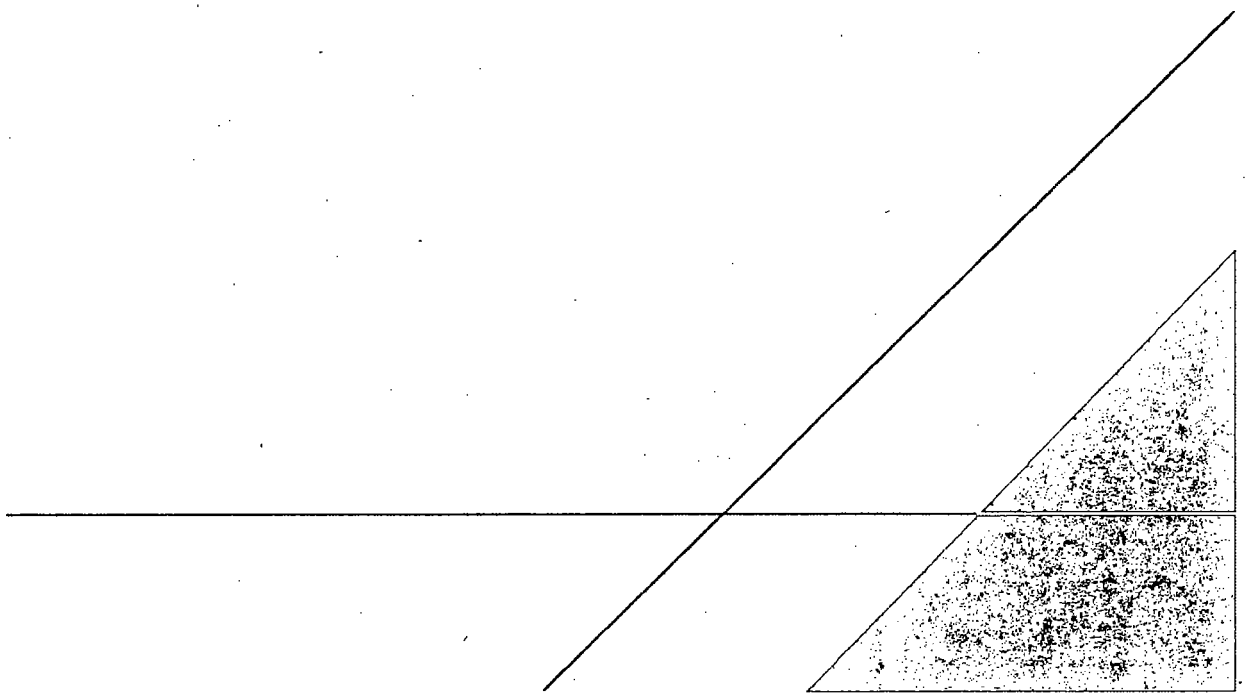
3 FDEP tank sites in vicinity of subject facility

ATTACHMENTS

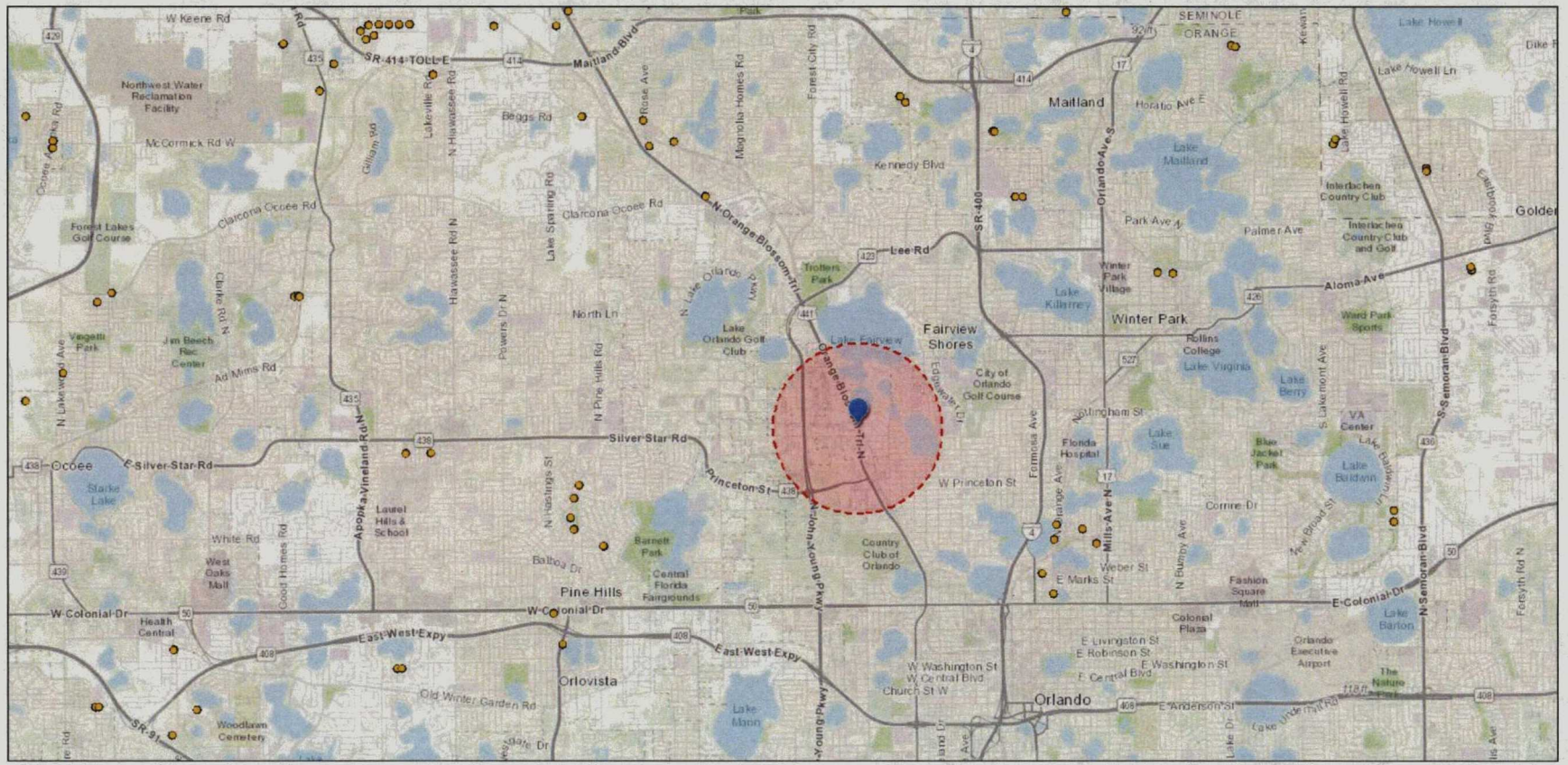


ATTACHMENT 1

FDEP Public Supply Wells Map – 1 mile radius



Marker shows 3100 N Orange Blossom Trl, Orlando, Florida, 32804



September 6, 2018

- Public Water Supply (PWS) Wells (Non-Federal)

1:72,224

0 0.75 1.5 3 mi

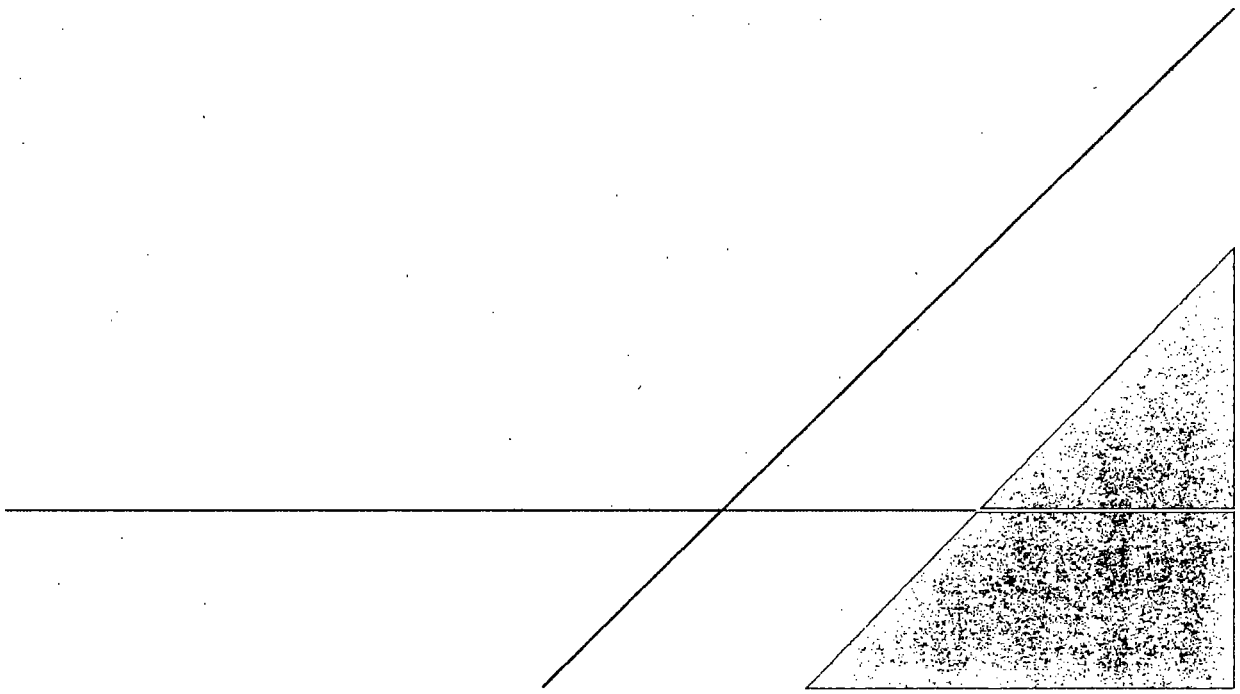
0 1.25 2.5 5 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Map created by Map Direct, powered by ESRI.

ATTACHMENT 2

FDOH Environmental Health Well Surveillance – 1 mile radius



FL DOH EH Water Printout

September 6, 2018

Override 1

County Boundaries

1:36,112

0 0.38 0.75 1.5 mi

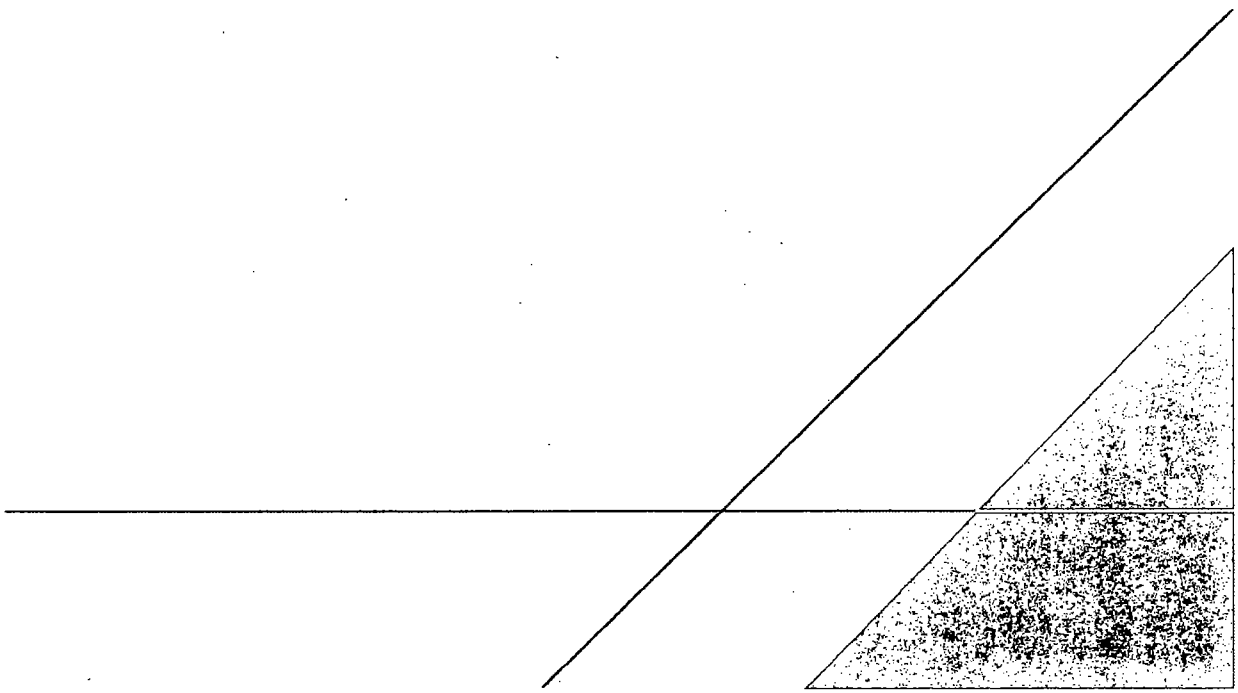
0 0.5 1 2 km

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

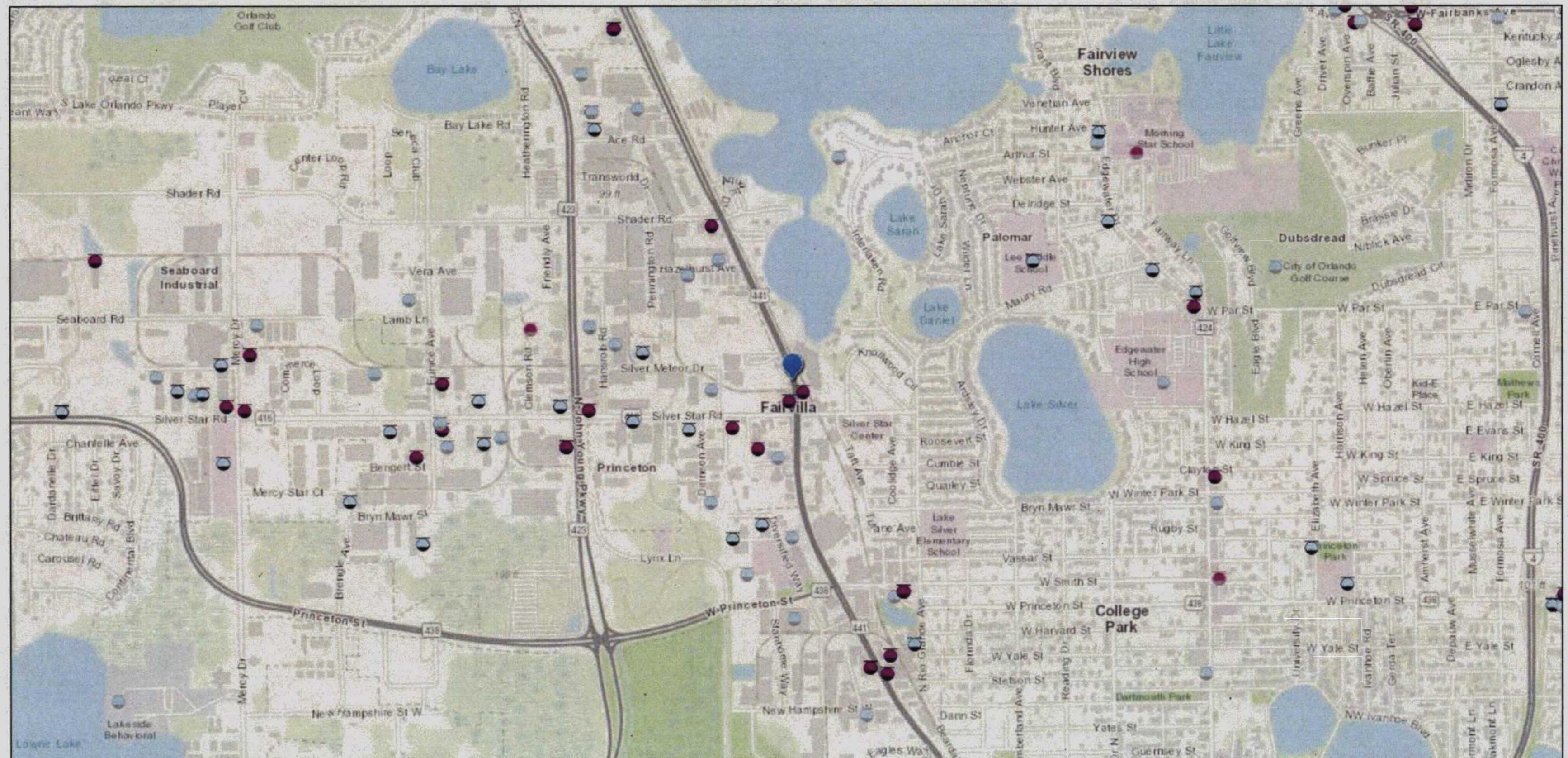
FL DOH
FL DOH

ATTACHMENT 3

FDEP tank sites in vicinity of subject facility



Marker shows 3100 N Orange Blossom Trl, Orlando, Florida, 32804



September 6, 2018

Petroleum Contamination Monitoring (PCTS) Discharges from STCM

- ELIGIBLE DISCHARGES OPEN
- INELIGIBLE DISCHARGES OPEN
- ELIGIBLE DISCHARGES COMPLETED
- INELIGIBLE DISCHARGES COMPETED

1:18,056

0 0.2 0.4 0.8 mi

0 0.35 0.7 1.4 km

FDEP, DWM
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User

Map created by Map Direct, powered by ESRI.

APPENDIX M – EPA COMMENTS ON PRB INSTALLATION WORK PLAN, AUGUST 2017

United States Environmental Protection Agency
Region 4
Atlanta Federal Center
61 Forsyth St. SW, Atlanta, GA 30303-8960

August 17, 2017

MEMORANDUM

SUBJECT: PRB Installation Work Plan, Chevron Orlando Superfund Site, Orlando, Florida

FROM: James Ferreira, Hydrogeologist
Scientific Support Section

THROUGH: Glenn Adams, Chief
Scientific Support Section

TO: Karl Wilson
Remedial Project Manager

Thank you for the opportunity to have the Scientific Support Section (SSS) staff review the Permeable Reactive Barrier (PRB) Installation Work Plan (Work Plan) for the Chevron Orlando Superfund Site (Site), located in Orlando Florida. Refer to the Reference Section for supplemental documents reviewed. If there is any other pertinent documentation related to the Chevron Orlando Superfund Site not included in the Reference Section that should be reviewed, please forward that documentation to the SSS staff for review.

The potentially responsible party (PRP) is proposing to enhance the existing PRBs located at the Site (Figure 1). The purpose for the installation of additional PRBs is an effort to prevent any further migration of residual dissolved-phase pesticide concentrations (alpha-hexachlorocyclohexane [BHC], beta-, delta-, gamma-, and 4,4-dichlorodiphenyltrichloroethane) migrating downgradient from the Site's Remediated Areas. The proposed scope of work will include 17 boreholes adjacent to monitoring well MW-47D and 16 boreholes downgradient of Remediation Area No. 3. Each of the proposed borings will be advanced with a hollow-stem auger drilling rig to a depth between 30 and 40 feet below ground surface. Approximately 230 to 300 pounds of EHC® (food-based carbon source and zero-valent iron) will be mixed with water to produce a slurry (approximately 30% solids), and used to backfill each borehole. Each borehole will be capped with bentonite grout, and concrete or soil to match the existing surface material.

Comments and Recommendations

1. As stated by the PRP, the O&M Plan for the Site includes procedures for evaluating the effectiveness of the PRBs. This evaluation includes reviewing the groundwater analytical results for concentration trends over a period of three quarters, with the focus being on the chlorinated pesticides associated with the Site. The objective of this evaluation is to determine if additional monitoring or corrective actions are warranted, such as enhancing, expanding or installing new PRBs at the Site. The PRP conducted the Mann-Kendall Test to statistically evaluate the groundwater analytical data for specific monitoring wells (MW-1D, -26D, -29D, -32D, -47D and -49D) from the First Quarter 2012 through the Fourth Quarter 2016 sampling events. The statistical evaluation was not provided, but an overview of the results was provided within the Work Plan. Monitoring wells MW-26D, -29D, -32D, -47D and -49D had upward trends for alpha-BHC and beta-BHC. With the exception of monitoring wells MW-29D and -47D had no trend identified for beta-BHC, and monitoring well MW-32D had a downward trend for beta-BHC.

   The SSS staff has reviewed the statistical results for groundwater analytical data pertaining to specific monitoring wells listed above. The PRP stated due to the potential hazards associated with the railroad tracks along Orange Blossom Trail and the potential impacts to the only entrance into the Lake Fairview Commerce Center, installing PRBs immediately upgradient of monitoring wells MW-26D and MW-32D is not feasible. The SSS staff is also assuming that the proposed location upgradient of MW-47D is also based on Site access restrictions. The PRP is proposing to extend the existing PRB located upgradient of monitoring well MW-47D (PRB No. 12.0, Figure 1) with the addition of 17 boreholes filled with EHC®. Based on the historic use, similar construction, and success of the existing PRBs at the Site using EHC® the SSS staff is **concurring** with the proposed installation of the 17 boreholes used to modify the existing PRB upgradient of MW-47D.

2. The PRP is also proposing the install of a new PRB downgradient of Remediation Area No. 3 (PRB No. 13.0, Figure 1) in an effort to reduce the dissolved-phase pesticide concentrations migrating from this area. Monitoring well MW-52S is located within Remediation Area No. 3, this well has had historical elevated detections in groundwater for pesticides (alpha-BHC and beta-BHC). The proposed PRB will require the installation of 16 boreholes, each filled with EHC®. Based on the historic use, similar construction, and success of the existing PRBs with EHC® at the Site, the SSS staff is **concurring** with the proposed installation of the 16 boreholes used to establish the PRB downgradient of Remediation Area No. 3.

3. The existing and proposed PRBs at the Site may not be adequately addressing the dissolved-phase pesticide groundwater contaminant migration on-site and potentially off-site. The SSS staff is **recommending** further review of Site conditions and a performance review of the several PRBs at the Site and their effectiveness in treating the dissolved-phase pesticide.

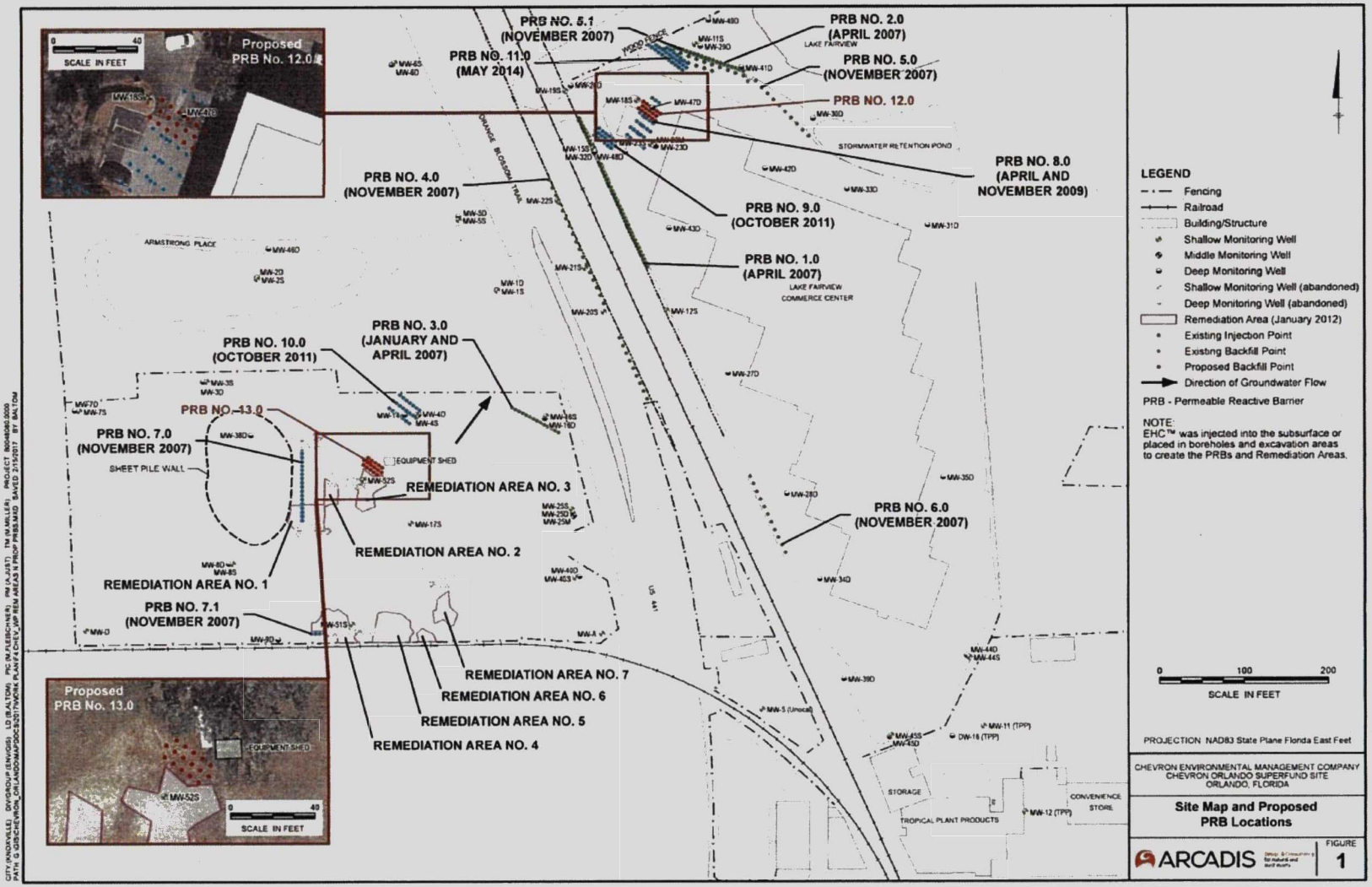
4. The *Operation and Maintenance Plan* (O&M Plan) for the Chevron Orlando Site was approved by the USEPA in their letter dated February 1, 2017, and submitted as "final" on May 5, 2017. The O&M Plan provides detailed descriptions and standard operating procedures for routine and non-routine activities at the site. The O&M Plan also includes a procedure for evaluating the effectiveness of the PRB. The SSS staff has **not** reviewed the above document.

If you have any questions, please feel free to contact me at ferreira.james@epa.gov or (404) 562-9383.

References

Arcadis, PRB Installation Work Plan for the Chevron Orlando Superfund Site, Orlando Florida. June 21, 2017.

Arcadis, Site Status Update for the Chevron Orlando Superfund Site, Orlando Florida. April 4, 2017.


PRB NO. 5.1 (NOVEMBER 2007)
PRB NO. 11.0 (MAY 2014)
PRB NO. 2.0 (APRIL 2007)
PRB NO. 5.0 (NOVEMBER 2007)
PRB NO. 12.0
PRB NO. 8.0 (APRIL AND NOVEMBER 2009)
PRB NO. 4.0 (NOVEMBER 2007)
PRB NO. 9.0 (OCTOBER 2011)
PRB NO. 1.0 (APRIL 2007)
PRB NO. 3.0 (JANUARY AND APRIL 2007)
PRB NO. 10.0 (OCTOBER 2011)
PRB NO. 13.0
PRB NO. 7.0 (NOVEMBER 2007)
PRB NO. 6.0 (NOVEMBER 2007)
PRB NO. 7.1 (NOVEMBER 2007)
REMEDIATION AREA NO. 1
REMEDIATION AREA NO. 2
REMEDIATION AREA NO. 3
REMEDIATION AREA NO. 4
REMEDIATION AREA NO. 5
REMEDIATION AREA NO. 6
REMEDIATION AREA NO. 7
Proposed PRB No. 12.0
Proposed PRB No. 13.0
SCALE IN FEET
EQUIPMENT SHED
SHEET PILE WALL
ORANGE BLOSSOM TRAIL
ARMSTRONG PLACE
LAKE FAIRVIEW
LAKE FAIRVIEW COMMERCE CENTER
STORMWATER RETENTION POND
STORAGE
CONVENIENCE STORE
TROPICAL PLANT PRODUCTS
US 441
LEGEND
Fencing
Railroad
Building/Structure
Shallow Monitoring Well
Middle Monitoring Well
Deep Monitoring Well
Shallow Monitoring Well (abandoned)
Deep Monitoring Well (abandoned)
Remediation Area (January 2012)
Existing Injection Point
Existing Backfill Point
Proposed Backfill Point
Direction of Groundwater Flow
PRB - Permeable Reactive Barrier
NOTE:
EHC™ was injected into the subsurface or placed in boreholes and excavation areas to create the PRBs and Remediation Areas.
0 100 200
SCALE IN FEET
PROJECTION NAD83 State Plane Florida East Feet
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
CHEVRON ORLANDO SUPERFUND SITE
ORLANDO, FLORIDA
Site Map and Proposed PRB Locations
ARCADIS
FIGURE 1

M-4