UNDERGROUND STORAGE TANK
CORRECTIVE ACTION PLAN

FORMER VIRGINIA SHELL
559 VIRGINIA STREET
MOBILE, MOBILE COUNTY, ALABAMA
ADEM FACILITY I. D. NO.: 25118-097-014263
UST INCIDENT NO.: UST 20-10-05
ADEM FILE CODE: UST201005/PLAN09902

DECEMBER 2024

Prepared for:

Mr. Lawson Brown, P.E.
Alabama Department of Transportation
3700 Fairground Road
Montgomery, AL, 36110

PROJECT NO.: 23-1101-0102

Mary J Huettemann

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Cade Burgin, P.E.
Project Engineer

CERTIFICATION PAGE

I certify under penalty of law that this Corrective Action Plan and all plans, specifications, and technical data submitted within were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiring of the person or persons who directly gathered the enclosed information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information.

ALABAMA LICENSED No. 40475 PROFESSIONAL ENGINEER CADE BURGIN
12/20/2024

Cade Burgin, P.E.
Registration Number 40475

Date

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

APPENDICES

LIST OF ACRONYMS

ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
ARBCA	Alabama Risk Based Corrective Action
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, Total Xylenes
btoc	Below Top of Casing
CASEMR	Corrective Action System Effectiveness Monitoring Report
CAL	Corrective Action Limit
CAP	Corrective Action Plan
COC	Chemical of Concern
DNAPLs	Dense non-aqueous phase liquids
EISOPQAM	USEPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
ISCO	In-Situ Chemical Oxidation
LNAPLs	Light non-aqueous phase liquids
mg/kg	milligrams/kilogram
mg/L	milligram/liter
MTBE	Methyl Tert Butyl Ether
MW	Monitoring Well
msl	Mean Sea Level
MPE/DPE	Multi-phase Extraction/Dual-phase Extraction
NGVD	National Geodetic Vertical Datum
NOI	Notice of Intent
O&M	Operations and Maintenance
PE	Professional Engineer
PG	Professional Geologist
PI	Preliminary Investigation
POC	Point of Compliance
QA/QC	Quality Assurance/Quality Control
RNA	Remediation by Natural Attenuation
ROW	Right of Way
SI	Secondary Investigation
SSCALs	Site Specific Corrective Action Limits
SVE	Soil Vapor Extraction
TPH	Total Petroleum Hydrocarbon
UIC	Underground Injection Control
UST	Underground Storage Tank

UST RELEASE FACT SHEET

GENERAL INFORMATION:

SITE NAME: Former Virginia Shell

ADDRESS: 559 Virginia Street, Mobile, Mobile County, Alabama

FACILITY I.D. NO.: 25118-097-014263

UST INCIDENT NO.: UST 20-10-05

RESULTS OF EXPOSURE ASSESSMENT:

How many private drinking water wells are located within 1,000 ft. of site?	None
How many public water supply wells are located within one mile of the site?	None
Have any drinking water supply wells been impacted by contamination from this release?	No
Is there an imminent threat of contamination to any drinking water wells?	( ) Yes (X) No
Have vapors or contaminated groundwater posed a threat to the public?	( ) Yes (X) No
Are any underground utilities impacted or imminently threatened by the release?	( ) Yes (X) No
Have surface waters been impacted by the release?	( ) Yes (X) No
Is there an imminent threat of contamination to surface waters?	( ) Yes (X) No
What is the type of surrounding population?	Residential

CONTAMINATION DESCRIPTION:

Type of contamination at site: (X) Gasoline ( ) Diesel( ) Waste Oil ( ) Kerosene ( ) Other,

Free product present in wells? ( ) Yes (X) No Maximum thickness measured: MW-3: 0.05 inches thick (2Q)

Maximum BETX concentrations measured in soil: Benzene= <25.9 mg/kg, Toluene= 269 mg/kg, Ethylbenzene= 114 mg/kg, and Xylenes= 717 mg/kg (all max concentrations were reported during the Secondary Investigation in October 2020).

Maximum BETX or PAH concentrations measured in groundwater: Benzene=59.5 mg/L (MW-1-Prelim), Toluene=74.2 mg/L (MW-1-Prelim), Ethylbenzene=5.59 mg/L (MW-3-Second), Xylenes=27.8 mg/L (MW-1-Prelim), Naphthalene=0.978 mg/L (MW-3Prelim), MTBE= 12.9 mg/L (MW-1-Prelim)

ADEM UST Form - 001 (04/22/93)

ADEM GROUNDWATER BRANCH
UST SITE CLASSIFICATION SYSTEM CHECKLIST

Please read all of the following statements and mark either yes or no if the statement applies to your site. If you have conducted a Preliminary or Secondary Investigation, all questions should be answered. Closure site assessment reports may not provide you with all the necessary information but answer the statements with the knowledge obtained during the closure site assessment.

SITE NAME:	Former Virginia Shell
SITE ADDRESS:	559 Virginia Street
	Mobile, Mobile County, Alabama
FACILITY I.D. NO.:	25118-097-014263
UST INCIDENT NO.:	UST 20-10-05
OWNER NAME:	Mr. Lawson Brown, Alabama Department of Transportation
OWNER ADDRESS:	3700 Fairground Road, Montgomery, AL 36110
NAME & ADDRESS OF PERSON COMPLETING THIS FORM:	Mary Brandon Huettemann, Thompson Engineering, Inc.
	2970 Cottage Hill Road, Suite 190, Mobile, Alabama 36606

CLASSIFICATION	***DESCRIPTION***	***YES***	***NO***
CLASS A	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
A.1	Vapor concentrations at or approaching explosive levels that could cause health effects, are present in a residence or building.		X
A.2	Vapor concentrations at or approaching explosive levels are present in subsurface utility system(s), but no buildings or residences are impacted.		X
CLASS B	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
B.1	An active public water supply well, public water supply line or public surface water intake is impacted or immediately threatened.		X
B.2	An active domestic water supply well, domestic water supply line or domestic surface water intake is impacted or immediately threatened.		X
B.3	The release is located within a designated Wellhead Protection Area I.		X
CLASS C	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
C.1	Ambient vapor/particulate concentrations exceed concentrations of concern from an acute exposure, or safety viewpoint.		X
C.2	Free product is present on the groundwater, at ground surface, on surface water bodies, in utilities other than water supply lines, or in surface water runoff.		X

CLASSIFICATION	***DESCRIPTION***	***YES***	***NO***
CLASS D	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
D.1	There is a potential for explosive levels, or concentrations of vapors that could cause acute effects, to accumulate in a residence or other building.		X
D.2	A non-potable water supply well is impacted or immediately threatened.		X
D.3	Shallow contaminated surface soils are open to public access, and dwellings, parks, playgrounds, day care centers, schools or similar use facilities are within 500 feet of those soils.		X
CLASS E	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
E.1	A sensitive habitat or sensitive resources (sport fish, economically important species, threatened and endangered species, etc.) are impacted and affected.		X
CLASS F	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
F.1	Groundwater is impacted and a public well is located within 1 mile of the site.		X
F.2	Groundwater is impacted and a domestic well is located within 1,000 feet of the site.		X
F.3	Contaminated soils and/or groundwater are located within designated Wellhead Protection Areas (Areas II or III).		X
CLASS G	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
G.1	Contaminated soils and/or groundwater are located within areas vulnerable to contamination from surface sources.		X
GLASS H	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
H.1	Impacted surface water, stormwater or groundwater discharges within 500 feet of a surface water body used for human drinking water, whole body water-contact sports, or habitat to a protected or listed endangered plant and animal species.		X
CLASS I	LONG TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
I.1.	Site has contaminated soils and/or groundwater but does not meet any of the above mentioned criteria.	X	

ADDITIONAL COMMENTS:

Complete the classification evaluation questions listed above. Upon completion, determine the highest rank of the site (A.1 is the highest rank) based on the statements answered with a yes.

Enter the determined classification ranking:	I.1

ADEM GROUNDWATER BRANCH
SITE CLASSIFICATION CHECKLIST
(5/8/95)

1.0 INTRODUCTION

Thompson Engineering has completed this Corrective Action Plan (CAP) to address contaminated soil and groundwater at the Former Virginia Shell site located at 559 Virginia Street, Mobile, Mobile County, Alabama (Figure 1, Appendix A). Authorization to proceed with development of the CAP was issued by Mr. Scott W. George, representing the Alabama Department of Transportation (ALDOT).

1.1 Purpose of the Plan

The purpose of this plan is to provide a professional evaluation of practical corrective actions at the former Virginia Shell site located at 559 Virginia Street, Mobile, Mobile County, Alabama. This plan is in response to ALDOT approved funding for aggressive remediation at this site and their purchase of a portable ozone system for use at several of their cleanup sites. The scope of this plan is intended to conform to the Alabama Department of Environmental Management (ADEM) Administrative Code 335-6-15-.29, Corrective Action Plan.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Location

The project site is located at 559 Virginia Street, Mobile, Mobile County, Alabama. The site is located at Latitude 30° 40’ 16.8” North and Longitude 88° 02’ 55.5” West. The property is in an area consisting primarily of residential properties. The property is bordered to the north by Virginia Street and the City of Mobile maintenance building, to the east by interstate I-10, to the south by a residential neighborhood, and to the west by a church. A land use map is depicted in Figure 2 provided in Appendix A.

2.2 Physical Setting

The site topography is characterized by a relatively level ground surface with an approximate elevation of 12 feet Mean Sea Level (MSL). The elevation difference surrounding the site is approximately 1 to 2 feet. The site is currently inactive, and onsite structures have been demolished. The majority of the surface is paved with concrete with the exception of the former UST pit area and dispenser/pipelines trenches which were backfilled during closure. A Site Plan is provided as Figure 3 in Appendix A.

There are no surface water bodies within 500 feet of the site.

2.3 Site History

The site is currently inactive and had four USTs, a 10,000-gallon diesel tank, and three 10,000-gallon gasoline tanks. The USTs were removed on October 24, 2019. The USTs were located on the western portion of the property (Figure 2, Appendix A). The piping associated with the USTs was removed on October 24, 2019. The UST pit and pipe trench were backfilled on October 25, 2019. The site has no record or documentation of release prior to the October 24, 2019, UST Closure. Upon completion of the UST removal, the structures on the site were demolished and removed. The concrete foundation for the store and all concrete surfaces, excluding those above the UST pit and the pipe trench, remain in place. A UST Release Report was submitted to ADEM on November 27, 2019. In January 2020, Thompson Engineering performed on-site preliminary investigation (PI) activities and submitted a PI report in March 2020. Based on the results obtained from the PI, Thompson Engineering performed secondary investigation (SI) activities and submitted a SI report in December 2020.

During the December 2020 investigation, it was determined that the lateral and horizontal extent of the petroleum contamination was not confirmed. Thompson Engineering recommended an Off-Site SI be performed. In November 2021, Thompson Engineering submitted the Off-Site SI.

A groundwater monitoring report was submitted in September 2022 and December 2024. Several constituents exceeded their EPA screening levels. A groundwater monitoring well location map is provided as Figure 4. The most recent groundwater potentiometric surface map is provided as Figure 5. The groundwater analytical results for the June 27, 2024, sampling event are summarized in Figure 6. Groundwater isoconcentration maps are provided as Figures 7, 8, 9, and 10.

Two MEME events were conducted at the site on January 17, 2024 (Event 1) and February 28, 2024 (Event 2). Prior to Event 1, Separate-phase hydrocarbons (SPH) were detected in MW-1 (0.01 feet). Event 1 was conducted for eight hours at two extraction points, MW-1 and MW-7. SPH was not detected during post-extraction gauging. During Event 1, a calculated total of 279 pounds of vapor-phase petroleum hydrocarbons (approximately 46 equivalent gallons of gasoline) were removed. The hydrocarbon removal rate ranged from 30 to 39 pounds per hour during Event 1. A dual internal combustion engine (DICE) unit was utilized throughout the event to treat effluent vapor generated during extraction. Pretreatment vapor concentrations ranged from 34,000 to 42,000 parts per million by volume (PPM V) during this EFR® event. The vapor flow rate ranged from 75 to 79 actual cubic feet per minute (ACFM). A calculated total of 0.13 pounds of hydrocarbons was released into the atmosphere, a destruction efficiency of 99.95%.

Prior to and upon completion of Event 2, SPH was not detected in any of the gauged monitoring wells. This event was conducted for eight hours at the same two extraction points, MW-1 and MW-7. During Event 2, a calculated total of 195 pounds of vapor-phase petroleum hydrocarbons (approximately 32 equivalent gallons of gasoline) were removed. This recovery total is less than the total attained during Event 1. The hydrocarbon removal rate ranged from 17 to 37 pounds per hour during Event 2, which is lower than those attained during Event 1. Pretreatment vapor concentrations ranged from 18,000 to 40,000 PPM V during Event 2, as compared to concentrations of 34,000 to 42,000 PPMV detected during Event 1. The vapor flow rate ranged from 77 to 80 ACFM, as compared to flow rates of 75 to 79 ACFM measured during Event 1. A calculated total of 0.14 pounds of hydrocarbons was released into the atmosphere, a destruction efficiency of 99.93%.

3.0 EXPOSURE ASSESSMENT

ARBCA Tier 1 and 2 evaluations were performed by Thompson Engineering and submitted to ADEM in November 2023. It was recommended in the ARBCA evaluation that a pilot test, with MEME events, be performed, followed with compliance monitoring of groundwater.

Comparison of Tier 2 SSTLs with representative on and off-site concentrations (Forms 26) indicated no exceedances.

Tier 2 groundwater resource protection target concentrations (Forms 27) indicated source soil exceedances at MW-7 for benzene (11.96 mg/kg), toluene (135.76 mg/kg), and naphthalene (16.46 mg/kg) for source soils. Source groundwater at MW-7 had exceedances for benzene (23 mg/l) and MTBE (5.5 mg/l). Compliance Well MW-1 had exceedances for benzene (41.7 mg/l) and MTBE (2.69 mg/l); and Compliance Well MW-9 had an exceedance for benzene (1.46 mg/l).

Point Of Compliance (POC) documentation data is provided in Appendix C.

4.0 CORRECTIVE ACTION ALTERNATIVES FEASIBLILTY EVALUATION

4.1 General Considerations

The objective of the corrective action alternatives feasibility evaluation is to formulate an optimum approach which may be implemented upon approval by the regulatory agency to satisfactorily provide adequate protection of human health and the environment. Within the context of this objective, this evaluation provides a review of alternatives which are applicable to the site.

This feasibility evaluation is preliminary in scope and is based upon information obtained in the current and prior assessments. These investigations provided the basis for initial characterization of the subsurface conditions and are considered sufficient to allow the evaluation of alternate remedial approaches. It is the intent that this evaluation will provide a level of review satisfactory for decision making at this stage of the process. Accordingly, the costs of corrective actions should be recognized as preliminary estimates.

The following two (2) alternatives were selected for evaluation:

- Ozone Sparging
- Natural Attenuation

A conceptual description of each remedial alternative is provided, along with a description of how the alternative could be implemented at the site. The relative attributes of each alternative, (pros and cons), if necessary, are discussed.

The remedial alternatives are considered with an understanding of the following:

- The USTs and appurtenances have been removed.
- The former site is now part of the State Right of Way (ROW), and no structures may be built within the ROW.
- On a monthly basis, ALDOT personnel will use a bailer to remove any free product present at the site.

- Contaminant levels in groundwater have been detected in the majority of on-site wells. The contaminated groundwater plume is approximately 27,000 sq. ft.,
- Contaminant levels have been detected in soil samples throughout the site. Residual contamination in soils remaining may still release dissolved phase chemicals of concern (COCs),
- The nearest receptor (north of the downgradient groundwater flow direction) is approximately 523 ft. based on the ARBCA evaluation. The contaminant plume covers the western half of the site, appears to be stable, and not expanding,
- The area surrounding the site is zoned residential and commercial,
- No surface water bodies, or other sensitive environments were identified within a 500-ft. radius of the site,
- Utilities within the vicinity of the site include stormwater drains, sanitary sewer, telephone, potable water, and power.

4.2 Description of Remedial Alternatives

4.2.1 Ozone Sparging

Ozone sparging involves injecting ozone into the groundwater through a microporous oxidation point that is placed below the water table. The injected ozone migrates outward and upward through the groundwater. As the ozone moves through the saturated region, chemical oxidation of the contaminants takes place. Although ozone gas is typically injected into the water table for groundwater remediation, it can be injected into the vadose zone for soil treatment. The advantage of ozone sparging is that contaminants are chemically destroyed in-situ rather than transferred from the dissolved state to the vapor state. At some sites, soil vapor extraction is not required with ozone sparging because contaminants are fully destroyed in place and therefore no further cleanup is necessary.

Ozone sparging addresses both soil and groundwater contamination. Ozone injection points would be strategically placed across the areas of impact to provide overlap of the oxidant injections. An ozone generator using electrical current to convert oxygen to ozone would be required to be installed on-site.

Ozone sparging is favorable for this site because the contaminated soil does not need to be excavated and because the ozone leaves virtually no byproduct traces (unlike chemical treatment). The in-situ ozone sparging is both an economical and effective solution for soil and groundwater remediation. ALDOT has a mobile ozone unit for use at their cleanup sites in which ozone sparging would be suitable. The use of ALDOT's own portable ozone unit would allow for monthly sparging events up to 16 hours each. Ozone sparging event durations and frequencies would be dependent upon ALDOT funding.

4.2.2 Natural Attenuation

Natural attenuation relies solely on natural processes to degrade petroleum residuals within the affected media. These natural processes may include volatilization, biodegradation, leaching, and adsorption. The primary advantage of natural attenuation is the minimal initial capital costs. Specifically, costs for natural attenuation are associated with site-specific monitoring and a preliminary feasibility evaluation of the soils natural degradation potential. The primary disadvantages of this type of remediation are the unknown time duration required for natural degradation to occur, associated long-term monitoring, and the potential for off-site plume migration to locations currently unaffected by the petroleum release based on existing data.

Enhancement of natural attenuation processes, especially bioremediation, is available through stimulation of the subsurface soil conditions by adding nutrients and oxygen. The effectiveness of this technology is dependent upon subsurface conditions, including sufficient oxygen and nutrients to sustain microbial growth. Again, this process may involve a long remediation period and may not control the migration of petroleum contaminants into the groundwater. Primary lines of natural attenuation are being measured, i.e., BTEX values and secondary lines of evidence are also being monitored, i.e., iron, sulfate and nitrate. Natural attenuation is not favorable, in by itself, for this site as the only means of corrective action because the groundwater contaminant levels, while stable, remain relatively high at many monitoring well locations throughout the site.

5.0 PROPOSED CORRECTIVE ACTION

5.1 Suggested Alternative Overview

Based upon the estimated costs, knowledge of the site conditions and current ALDOT funding, the most effective option at this time is considered to be mobile ozone sparging over a one-year period in combination with natural attenuation. At the completion of one year of ozone sparging, the corrective action will be reevaluated. Next steps will be determined based on the efficiency of the proposed action. Next steps may include, but is not limited to a decrease in sparging events, no change in frequency of the sparging events, or an increase in sparging events. Thompson Engineering recommends that a phased approach be implemented at this site in an effort to achieve remedial objectives in a timely and cost-effective manner.

The first phase of corrective action should consist of ozone injection techniques to provide COC mass reduction. The second phase of the corrective action should consist of remediation by natural attenuation (RNA). This second phase is intended to address dissolved COC concentrations that may be at or near the proposed SSCALs, but do not warrant further ozone injection efforts.

Should this remedial approach prove to be ineffective at reducing COCs to concentrations below SSCALs, optimization corrective actions such as implementing surfactant injection/extraction followed by in-situ ISCO injection may be necessary. Such implementation would be dependent upon ALDOT funding.

Groundwater monitoring is also recommended throughout the corrective action activities to assess the overall effectiveness of the remedial approach and to aid in selecting the future course of actions at the site.

5.2 Mobile Ozone Sparging

5.2.1 Permits

An underground injection control (UIC) permit is required to inject ozone at this site. Upon receiving the CAP approval from both ALDOT and ADEM, an ADEM Class V UIC Notice of Intent (NOI) will be prepared and submitted using ADEM's online eNOI system.

5.2.2 Ozone Sparge Points

Thompson Engineering recommends that ozone be applied by means of up to twelve (12) sparge points (SP-1 through SP-12) strategically placed on the property. The placement of each sparge point is determined based on the radius of influence (ROI), plume dimensions, and groundwater flow direction. This site consists of clayey and silty sands, so the anticipated ROI is approximately 10 ft. The placement of the proposed sparge points is provided on Figure 11 in Appendix A.

5.2.3 Ozone Unit

The ozone sparging events will be implemented using ALDOT's mobile H2O Model No. MOSU20-104 ozone unit. The unit is capable of producing up to 5.5 pounds per day (ppd) of ozone for remedial efforts. The ozone delivery pump can sparge ozone for each sparge point at a rate of up to 4 cubic feet per minute (cfm) at a maximum of 50 pounds per square inch (psi). The ozone manifold has the capacity for 20 sparge point connections.

System components that are in contact with ozone are manufactured of ozone resistant material to maintain acceptable runtime during the project. Components can be easily replaced during maintenance intervals recommended by the equipment manufacturer. Detailed information regarding the unit is presented in Appendix D.

5.3 Remediation by Natural Attenuation

If dissolved COC concentrations are at or relatively near proposed SSCALs, an RNA monitoring program will be implemented at the site. It is anticipated that ozone injection will not only reduce the overall contaminant mass but will leave residual dissolved oxygen (post-reaction) which creates conditions conducive to microbial activity. If so, an RNA monitoring program will be necessary to ensure that active remediation is no longer warranted at the site.

Anticipated site response to active remediation followed by a period of RNA monitoring cannot be adequately predicted at this time, as it is unknown what site conditions will be upon completion of the active remediation efforts. However, efforts will be made to obtain site remedial objectives within four years of implementing corrective action activities outlined in the CAP pending ALDOT funding.

6.0 OZONE SYSTEM INSTALLATION

6.1 Ozone Sparge Point Installation

Up to twelve (12) sparge points will be installed at the site for use as delivery of ozone into the subsurface. The sparge points will be advanced to a total depth of twenty (20) feet bgs based on previous groundwater elevation readings. The intent of this completion depth is to sparge ozone into the upper extent of the saturated zone. Actual depths will vary during drilling completion activities since site groundwater elevations in the shallow monitoring wells have ranged from approximately 7-9 ft. below top of casing (btoc). Based on field observations during installation, the sparge points will be extended at least 10 feet into the water table at each location.

Ozone injection points will be constructed of 1-inch I.D. Schedule PVC risers extending from just below the land surface to approximately 18 inches above the bottom of the boring. A 1.5-inch outside diameter oxidation point approximately 18 inches long will be connected to the bottom of the solid riser. The risers and oxidation points will be joined using threaded, flush joint connections complete with ozone-resistant fittings.

Well-graded sand will be placed in the boring annulus for each proposed sparge point from the bottom of the boring to at least 4 ft. above the top of the oxidation point. A bentonite seal approximately 2 ft. thick will be constructed at the top of the sand pack. A cement/bentonite grout will be placed above the bentonite seal to within approximately 1 ft. bgs. The bentonite seal and grout are intended to reduce the potential for ozone escaping up the boring to the land surface.

The proposed sparge points will be set within a 12-inch diameter cast iron manhole cover and surrounded by a concrete pad. The larger diameter manhole cover is necessary to facilitate easy access to the well head connections. The manhole cover will extend slightly above the existing land surface in an effort to reduce the potential for inflow from the land surface. Each sparge point will be completed with a wellhead connection that will facilitate ozone delivery and measurement of sparge pressures. A typical sparge point schematic provided by the equipment manufacturer is included in Appendix D.

6.2 Sparge Point Configuration

Up to twelve (12) sparge points will be utilized for soil and groundwater remediation efforts. The areas selected for treatment at the site are focused in and around the source of COC impact and in the down gradient area of impact.

Sparge point specifications will consist of the following:

- Installation of a 12-inch diameter by 12-inch-deep manhole cover at each proposed sparge point,
- Installation of a well head connection including a schedule 80 flush threaded cap, a type 316 stainless steel tee, and a compression fitting, and
- Connection of the delivery tubing to the well head via the compression fitting.

6.3 Delivery Tubing

Ozone resistant tubing (1/2-inch outer diameter by 3/8-inch inner diameter) will be used to convey the ozone from the system to each sparge point. Due to the limited duration of the ozone unit being on-site, the delivery tubing will not be trenched at the site. Upon arrival for each ozone sparging event, the delivery tubing will be connected to the ozone manifold via compression fittings. When the ozone unit is not on-site, the delivery tubing will be stored off-site.

6.4 Utility Hookup

A temporary power pole will be set on-site within ALDOT's ROW for Alabama Power to set a meter. A certified electrical subcontractor will provide the connection from the service provider to the system's disconnect. Electrical work will be performed in accordance with applicable federal, state, and local codes.

7.0 SYSTEM OPERATION AND GROUNDWATER MONITORING

7.1 Ozone System Operation

ALDOT currently has funding for monthly ozone sparging events to be performed utilizing their mobile ozone unit. During each event, ALDOT/Thompson Engineering's field personnel will connect the ozone unit to the site's power outlet, connect each sparge point to the system manifold using the ozone delivery tubing, and program the system to inject ozone into the sparge points over a 16-hour period.

7.2 Effectiveness Monitoring

The progress of corrective action activities will be monitored to evaluate if the remedial objectives are being met. Results from previous groundwater sampling events will be used to gauge the progress of groundwater remediation efforts.

Thompson Engineering recommends groundwater sampling events be continued on a semi-annual basis. Groundwater samples will be collected from all monitoring wells and analyzed for BTEX, MTBE, PAH, nitrate, sulfate, and iron. Analytical data obtained during these events will be evaluated to ascertain if modifications to the ozone sparge program are warranted. This may include increasing the duration of the ozone sparging events or modifying the number of sparge points used. Ozone sparging will not occur within 24 hours of each scheduled monitoring event.

8.0 COST ESTIMATE

The work elements for this CAP have received funding approval from ALDOT. Initiation of the scope of work associated with implementation of the CAP will be performed following CAP approval. Cost estimates are provided in Table 1 below.

TABLE 1

PROPOSED APPROACH TO CORRECTIVE ACTION
ALDOT FORMER VIRGINIA SHELL
FACILITY I. D. NO.: 25118-097-014263
UST INCIDENT NO.: UST 20-10-05

TASK	TIME-FRAME	PERMIT FEES	UNIT COST/EVENT	TASK TOTAL
UIC Permit Application and Approval	45 days	$6,490	$1,500	$7,990
Installation of Ozone Sparge Points and Reporting	2-months	$0.00	$35,000	$35,000
Twelve monthly Ozone Sparging Events	12-months	$0.00	$1,200	$14,400
Semi-annual Groundwater Monitoring Events and Corrective Action System Effectiveness Monitoring Reports	12-months (2 events and 2 reports)	$0.00	$11,000	$22,000

9.0 CLOSURE EVALUATION

The length of time required to obtain cleanup objectives cannot be accurately predicted at this time, as it is unknown what site conditions will be upon completion of the active remediation efforts. Following the first year of implementation, Thompson Engineering will evaluate the effectiveness of the approved remediation and will make recommendations for continued operations or modifications of the CAP. ALDOT has approved funding to perform twelve ozone sparging events and two semi-annual groundwater monitoring events. Any additional work beyond the 12 months of CAP implementation will be dependent on ALDOT funding at that time.

Criteria for considering termination of remedial activities will include reduction of COC concentrations to at or below SSCALs or ALDOT funding. Recent results of groundwater sampling efforts will be used to evaluate if the cleanup criteria have been met.

Remedial measures will be terminated following approval from ADEM. The site will be monitored for potential increases in COC concentrations (rebound) once corrective actions have ceased. Recommendations will be made concerning further remedial action should COC concentrations rebound. Approval for such actions would be dependent on ALDOT funding at that time.

Appendix E provides the qualifications of environmental professionals participating in this CAP while a Quality Assurance/Quality Control (QA/QC) Plan to support the CAP is provided in Appendix F.

10.0 PROPOSED REPORTING REQUIREMENTS

Thompson Engineering will submit reports in accordance with ADEM requirements. These reports will include:

1. Report of Corrective Action Implementation—This report will be submitted within 60 days of system startup and will include: a description of installation activities and drawings of the system layout.

2. Semi-annual Corrective Action System Effectiveness Monitoring Reports—Thompson Engineering proposes to submit semi-annual progress reports, which summarize field activities and progress of the system toward reducing COC concentrations below SSCALs. These reports will include an evaluation of the system effectiveness, groundwater analytical results, groundwater elevation data, system runtime, and recommendations concerning any additional modifications or change in remedial approaches that may be necessary. This may include ceasing of the mobile ozone sparging events and implementation of RNA monitoring at the site. ADEM Corrective Action System Effectiveness Monitoring Report (CASEMR) forms will be included with each report.

3. Request for Cessation of Corrective Action (Closure Evaluation)—This report will include data that shows that remediation goals have been achieved.

4. Site Closure Report—This report will describe in detail the closure of the site including monitoring well abandonment activities and the removal of any remediation related equipment.

11.0 REFERENCE SOURCES

PUBLICATIONS AND REPORTS

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MAPS

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APPENDIX A

FIGURES

1:36,000

0 3,000 6,000 Feet

1 inch = 3,000 feet

N

***NOT A SURVEY - For representation purposes only.**

USGS Mobile Quadrangle

FORMER VIRGINIA SHELL
559 VIRGINIA STREET
FACILITY I.D. No. 25118-97-14263
CITY OF MOBILE, MOBILE COUNTY, ALABAMA

thompson ENGINEERING

FIGURE 1
SITE VICINITY MAP

PROJECT NO.:	DATE:
23-1101-0102	DECEMBER 2024

LEGEND

- Project Site*
- Mobile County Parcels (2023)

1:3,600

0 300 600 Feet

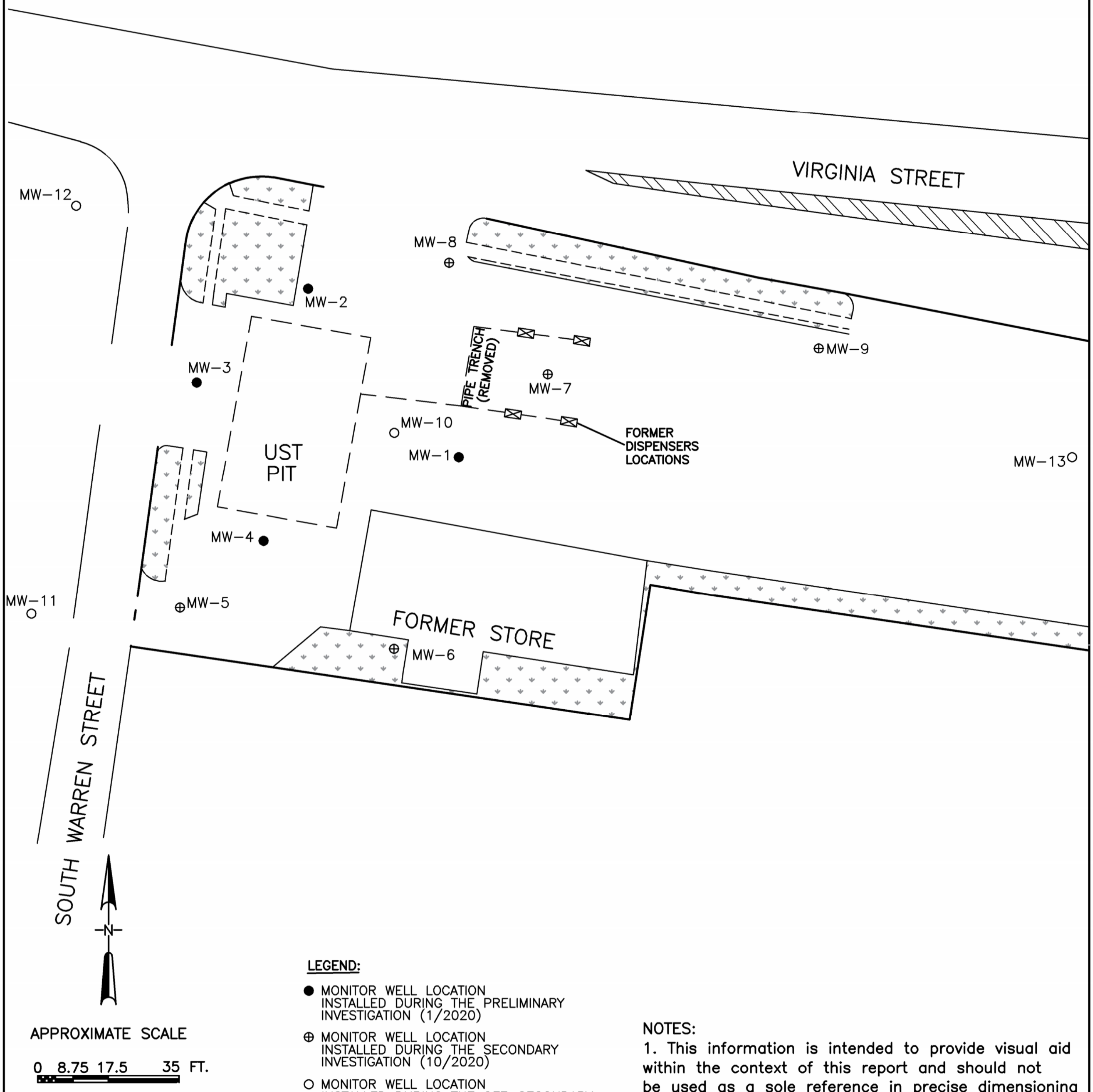
1 inch = 300 feet

N

*NOT A SURVEY - For representation purposes only.
Mobile County Parcel Data (April 2023), Mobile County 2021 Imagery - 3 Inch Resolution

P:\2023\Projects\1101\23-1101-0102 ALDOT Virginia St ARBCA CAP\Working\Environmental\GIS\MXD\NEW\FIG3.mxd

FORMER VIRGINIA SHELL 559 VIRGINIA STREET FACILITY I.D. No. 25118-97-14263 CITY OF MOBILE, MOBILE COUNTY, ALABAMA	thompson ENGINEERING	FIGURE 2 LAND USE MAP PROJECT NO.: 23-1101-0102 DATE: DECEMBER 2024



LEGEND:

- ● MONITOR WELL LOCATION INSTALLED DURING THE PRELIMINARY INVESTIGATION (1/2020)
- ⊕ MONITOR WELL LOCATION INSTALLED DURING THE SECONDARY INVESTIGATION (10/2020)
- ○ MONITOR WELL LOCATION INSTALLED DURING THE OFF-SECONDARY INVESTIGATION (5/2021)

NOTES:
1. This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.

FORMER VIRGINIA SHELL
559 VIRGINIA STREET
FACILITY I.D. NO. 25118-97-14263
MOBILE, MOBILE COUNTY, ALABAMA

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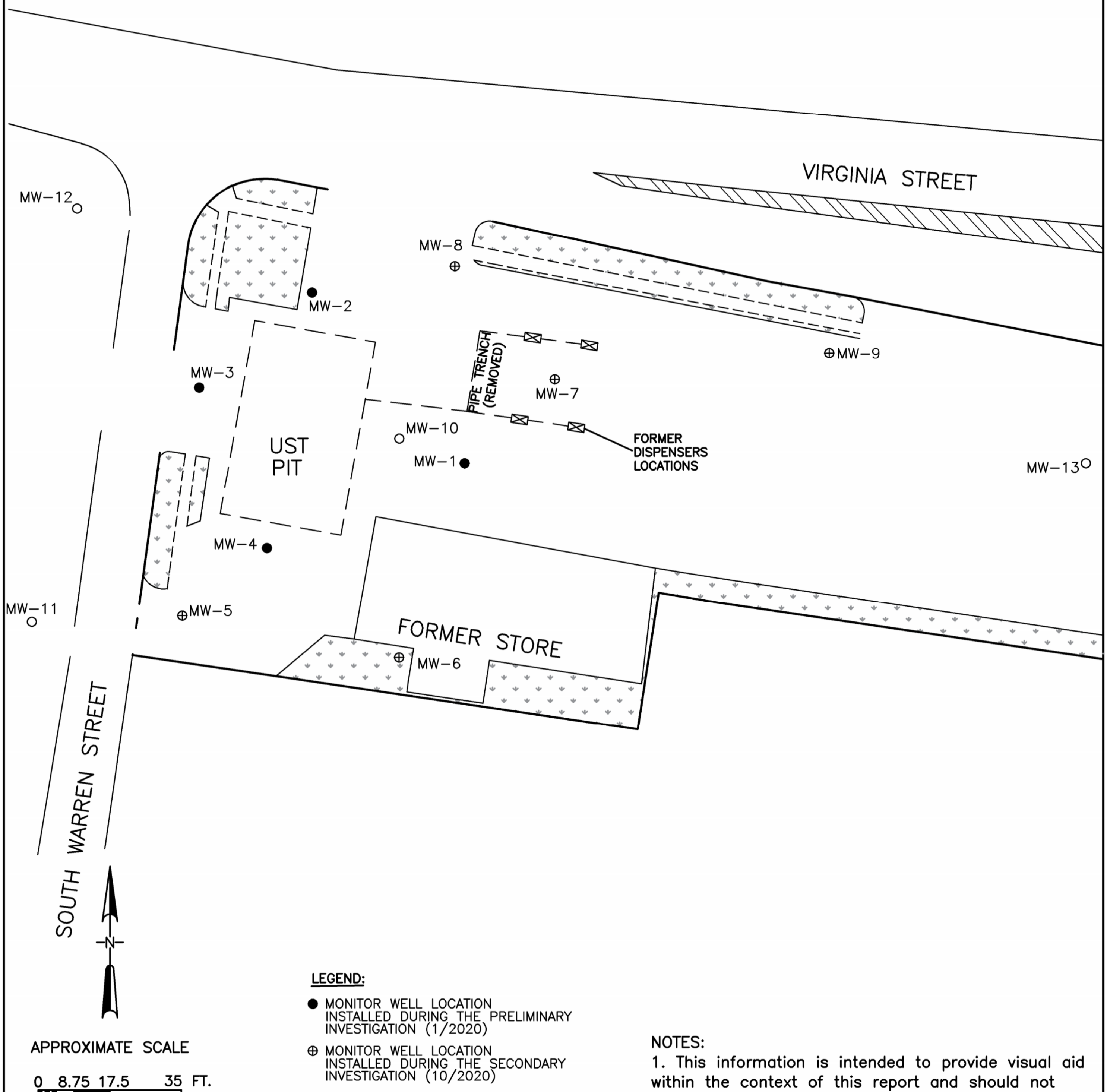
FIGURE 3
SITE MAP

PROJECT NO: 23-1101-0102

DATE: DECEMBER 2024



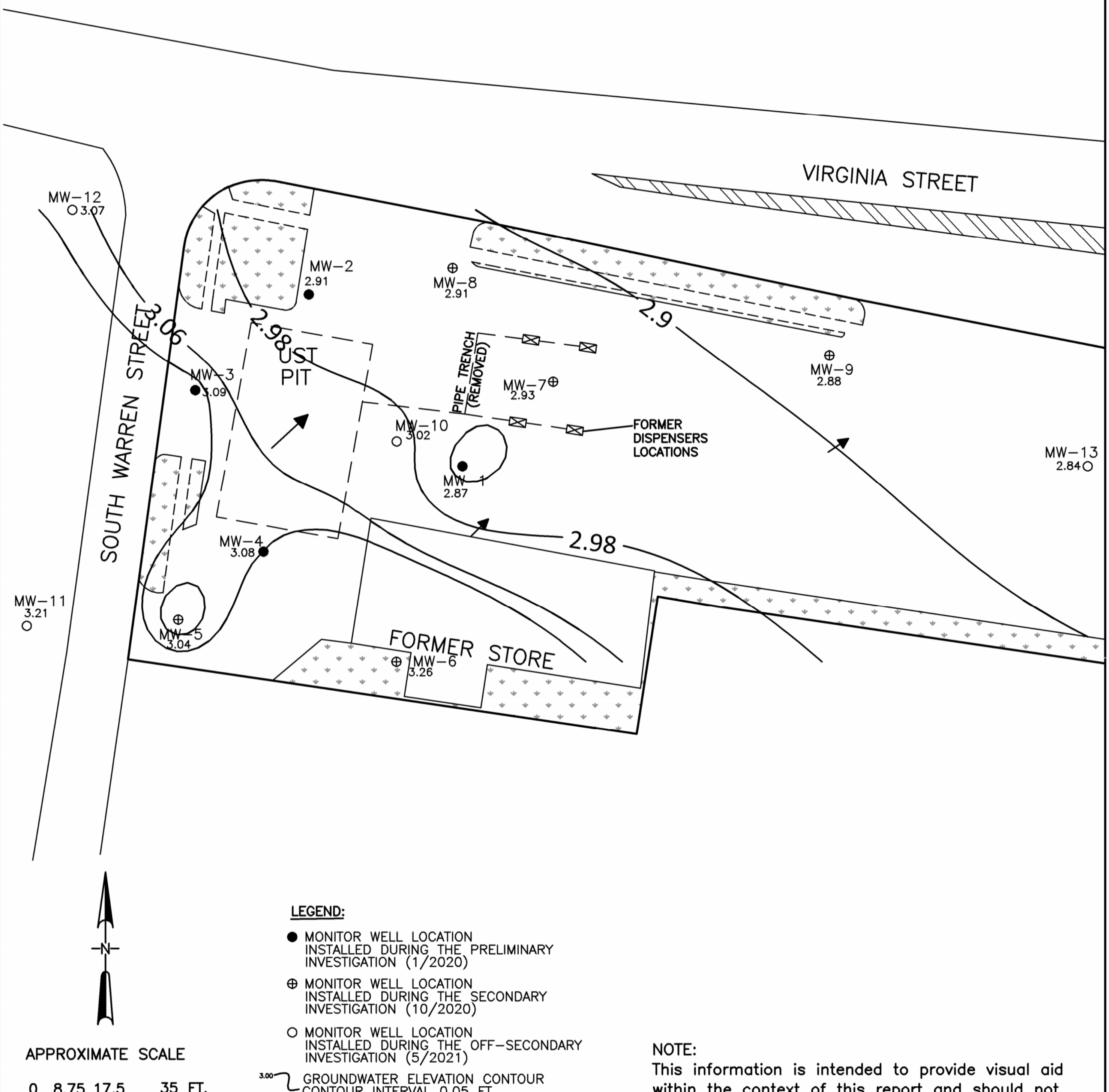
LEGEND:

- ● MONITOR WELL LOCATION INSTALLED DURING THE PRELIMINARY INVESTIGATION (1/2020)
- ⊕ MONITOR WELL LOCATION INSTALLED DURING THE SECONDARY INVESTIGATION (10/2020)
- ○ MONITOR WELL LOCATION INSTALLED DURING THE OFF-SECONDARY INVESTIGATION (5/2021)

NOTES:

1. This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.

FORMER VIRGINIA SHELL 559 VIRGINIA STREET FACILITY I.D. NO. 25118-97-14263 MOBILE, MOBILE COUNTY, ALABAMA	thompson ENGINEERING	FIGURE 4 GROUNDWATER MONITORING WELL LOCATION MAP PROJECT NO: 23-1101-0102 DATE: DECEMBER 2024



LEGEND:

- ● MONITOR WELL LOCATION INSTALLED DURING THE PRELIMINARY INVESTIGATION (1/2020)
- ⊕ MONITOR WELL LOCATION INSTALLED DURING THE SECONDARY INVESTIGATION (10/2020)
- ○ MONITOR WELL LOCATION INSTALLED DURING THE OFF-SECONDARY INVESTIGATION (5/2021)
- 3.00 GROUNDWATER ELEVATION CONTOUR CONTOUR INTERVAL 0.05 FT

APPROXIMATE SCALE

0 8.75 17.5 35 FT.

NOTE:
This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.

FORMER VIRGINIA SHELL
559 VIRGINIA STREET
FACILITY I.D. NO. 25118-97-14263
MOBILE, MOBILE COUNTY, ALABAMA

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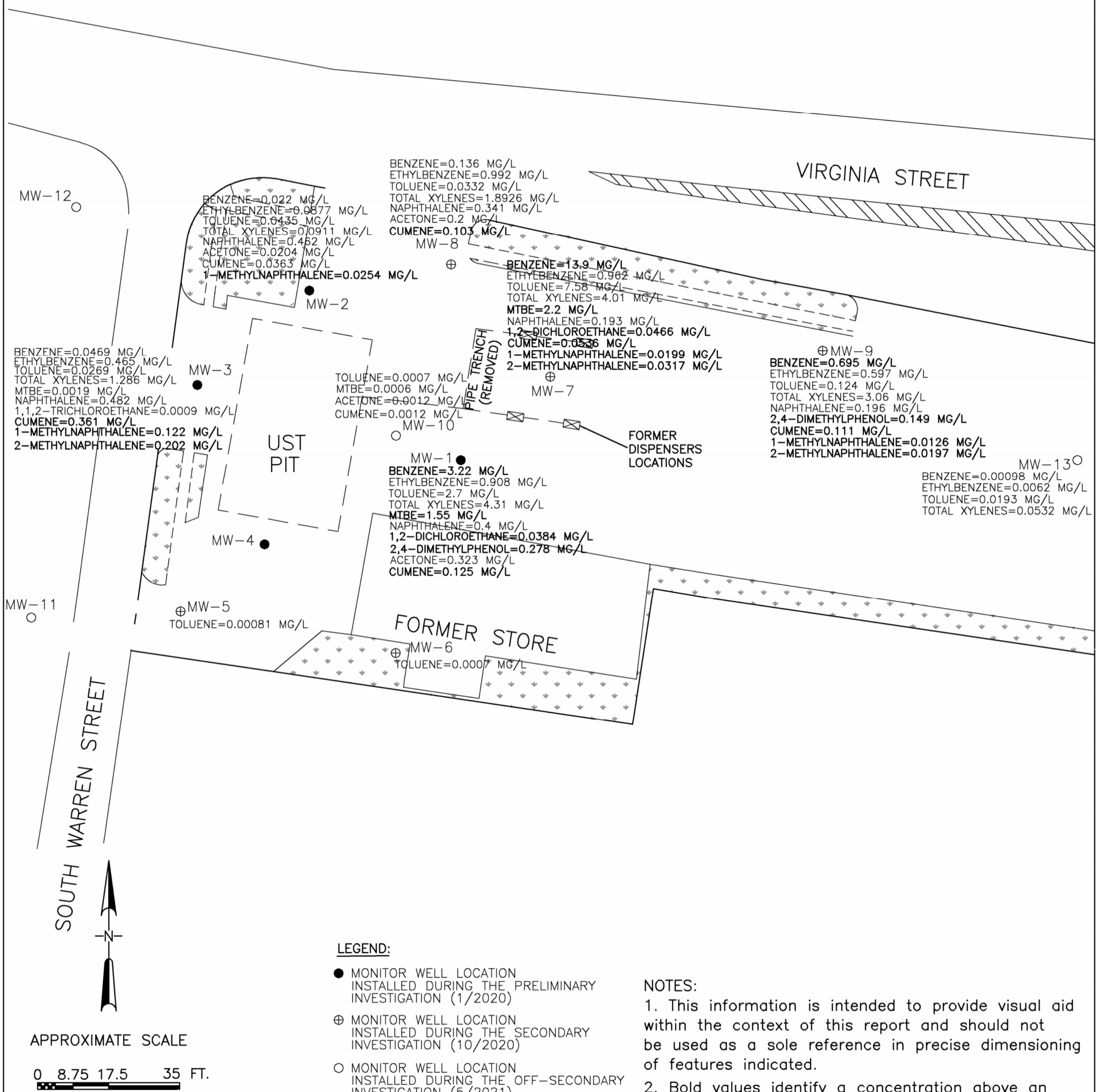
FIGURE 5
GROUNDWATER POTENTIOMETRIC SURFACE MAP
JUNE 27, 2024

PROJECT NO:	DATE:
23-1101-0102	DECEMBER 2024



NOTES:

1. This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
2. Bold values identify a concentration above an established screening level.

FORMER VIRGINIA SHELL
559 VIRGINIA STREET
FACILITY I.D. NO. 25118-97-14263
MOBILE, MOBILE COUNTY, ALABAMA

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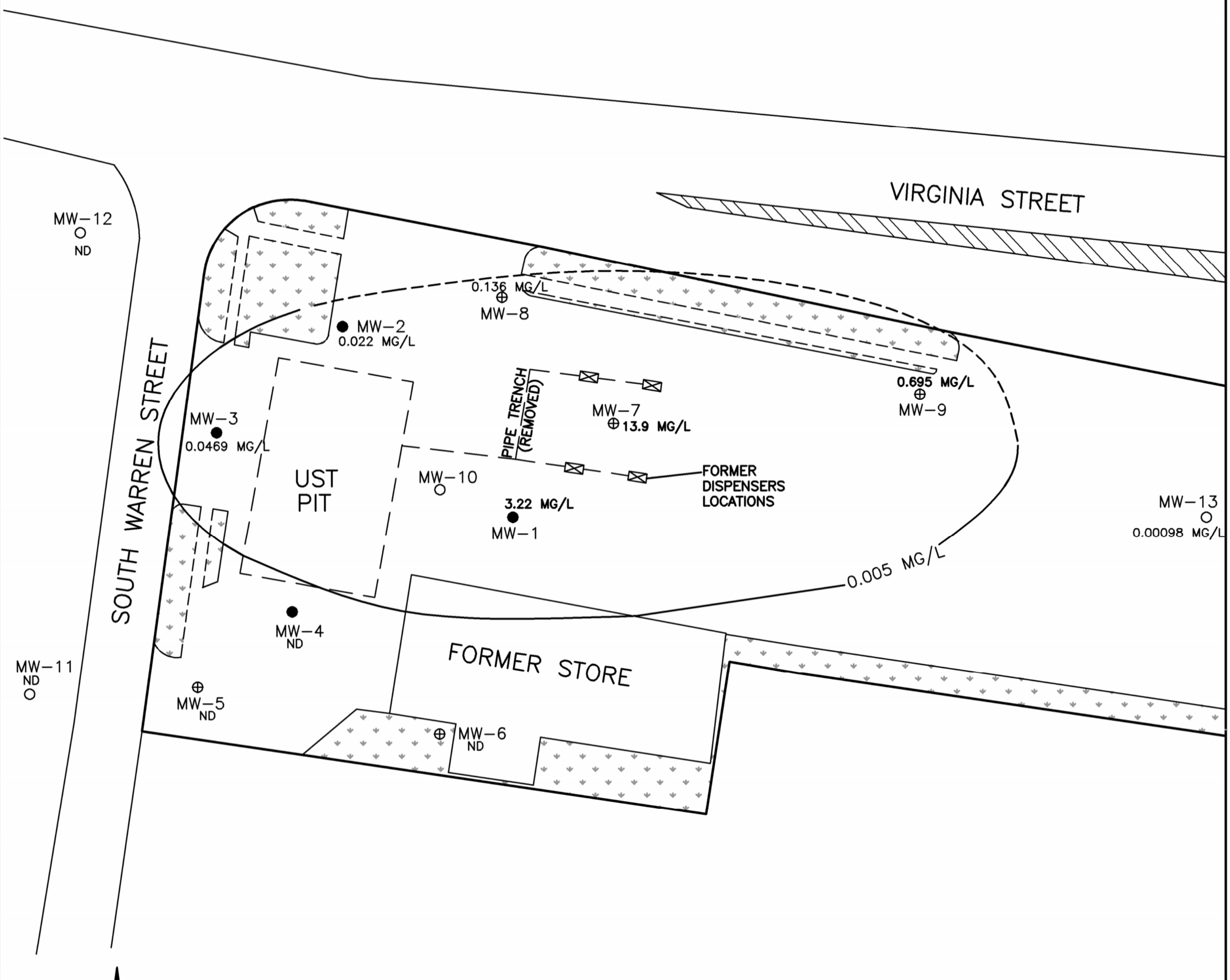
FIGURE 6
GROUNDWATER ANALYTICAL MAP
June 27, 2024

PROJECT NO:	DATE:
23-1101-0102	DECEMBER 2024



N

APPROXIMATE SCALE

0 8.75 17.5 35 FT.

LEGEND:

● MONITOR WELL LOCATION INSTALLED DURING THE PRELIMINARY INVESTIGATION (1/2020)

⊕ MONITOR WELL LOCATION INSTALLED DURING THE SECONDARY INVESTIGATION (10/2020)

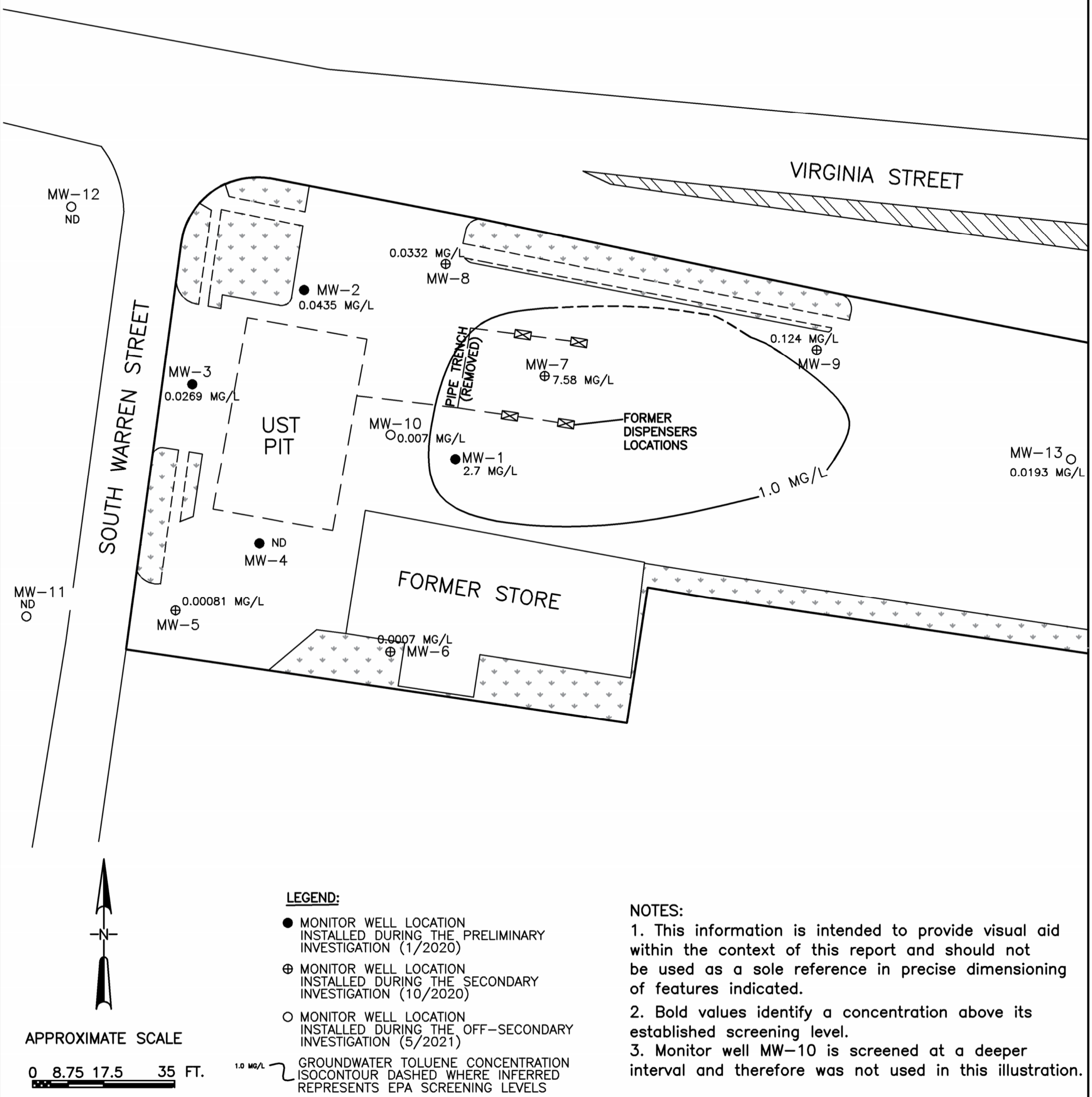
○ MONITOR WELL LOCATION INSTALLED DURING THE OFF-SECONDARY INVESTIGATION (5/2021)

0.005 MG/L GROUNDWATER BENZENE CONCENTRATION ISOCONTOUR DASHED WHERE INFERRED REPRESENTS EPA SCREENING LEVELS

NOTES:

1. This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
2. Bold values identify a concentration above its established screening level.
3. Monitor well MW-10 is screened at a deeper interval and therefore was not used in this illustration.

FORMER VIRGINIA SHELL 559 VIRGINIA STREET FACILITY I.D. NO. 25118-97-14263 MOBILE, MOBILE COUNTY, ALABAMA	thompson ENGINEERING	FIGURE 7 GROUNDWATER BENZENE ISOCONTRATION MAP June 27, 2024 PROJECT NO: 23-1101-0102 DATE: DECEMBER 2024



LEGEND:

- ● MONITOR WELL LOCATION INSTALLED DURING THE PRELIMINARY INVESTIGATION (1/2020)
- ⊕ MONITOR WELL LOCATION INSTALLED DURING THE SECONDARY INVESTIGATION (10/2020)
- ○ MONITOR WELL LOCATION INSTALLED DURING THE OFF-SECONDARY INVESTIGATION (5/2021)
- 1.0 MG/L GROUNDWATER TOLUENE CONCENTRATION ISOCONTOUR DASHED WHERE INFERRED REPRESENTS EPA SCREENING LEVELS

NOTES:

1. This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
2. Bold values identify a concentration above its established screening level.
3. Monitor well MW-10 is screened at a deeper interval and therefore was not used in this illustration.

FORMER VIRGINIA SHELL
559 VIRGINIA STREET
FACILITY I.D. NO. 25118-97-14263
MOBILE, MOBILE COUNTY, ALABAMA

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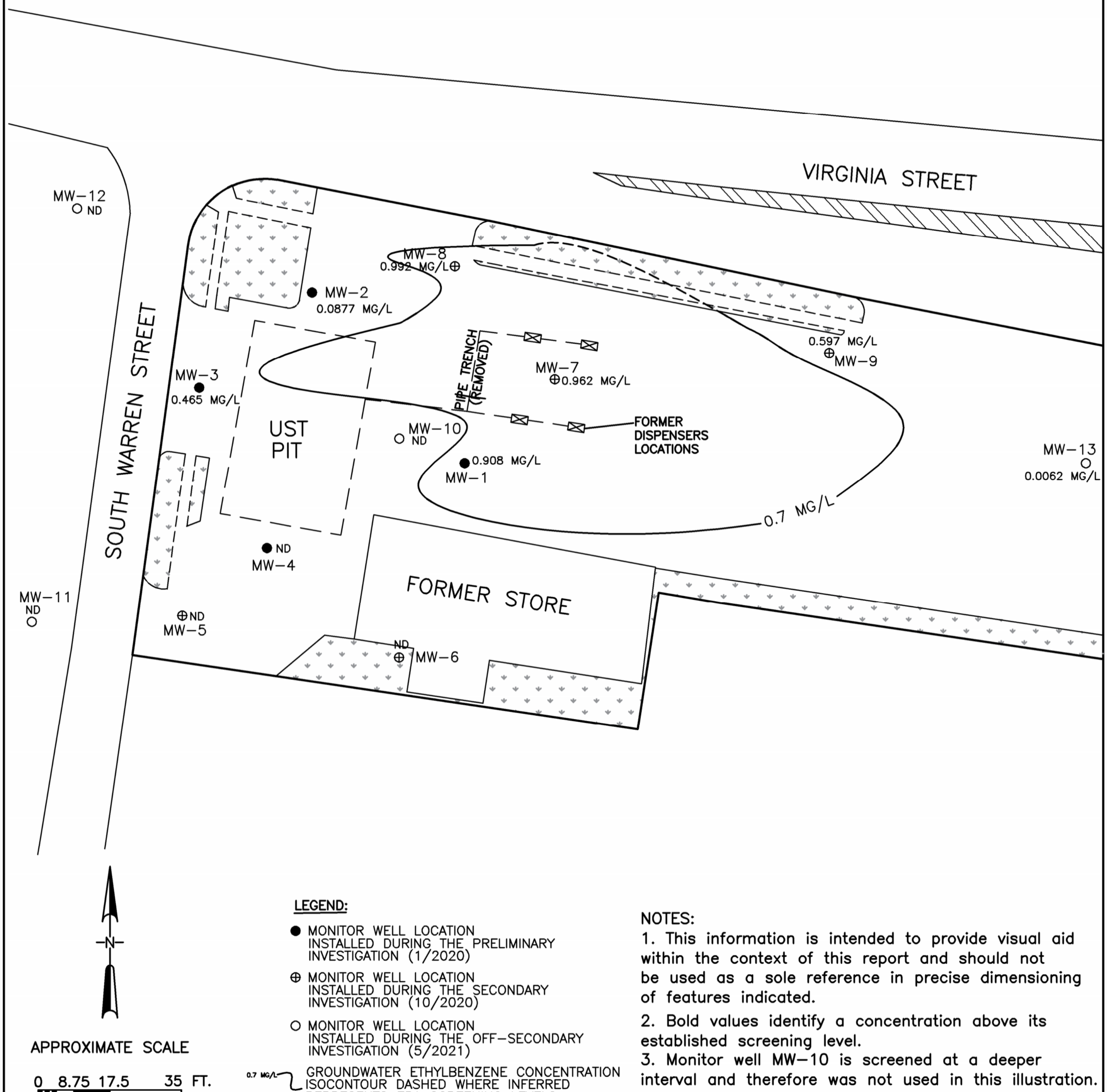
FIGURE 8
GROUNDWATER TOLUENE ISOCONCENTRATION MAP
June 27, 2024

PROJECT NO: 23-1101-0102

DATE: DECEMBER 2024

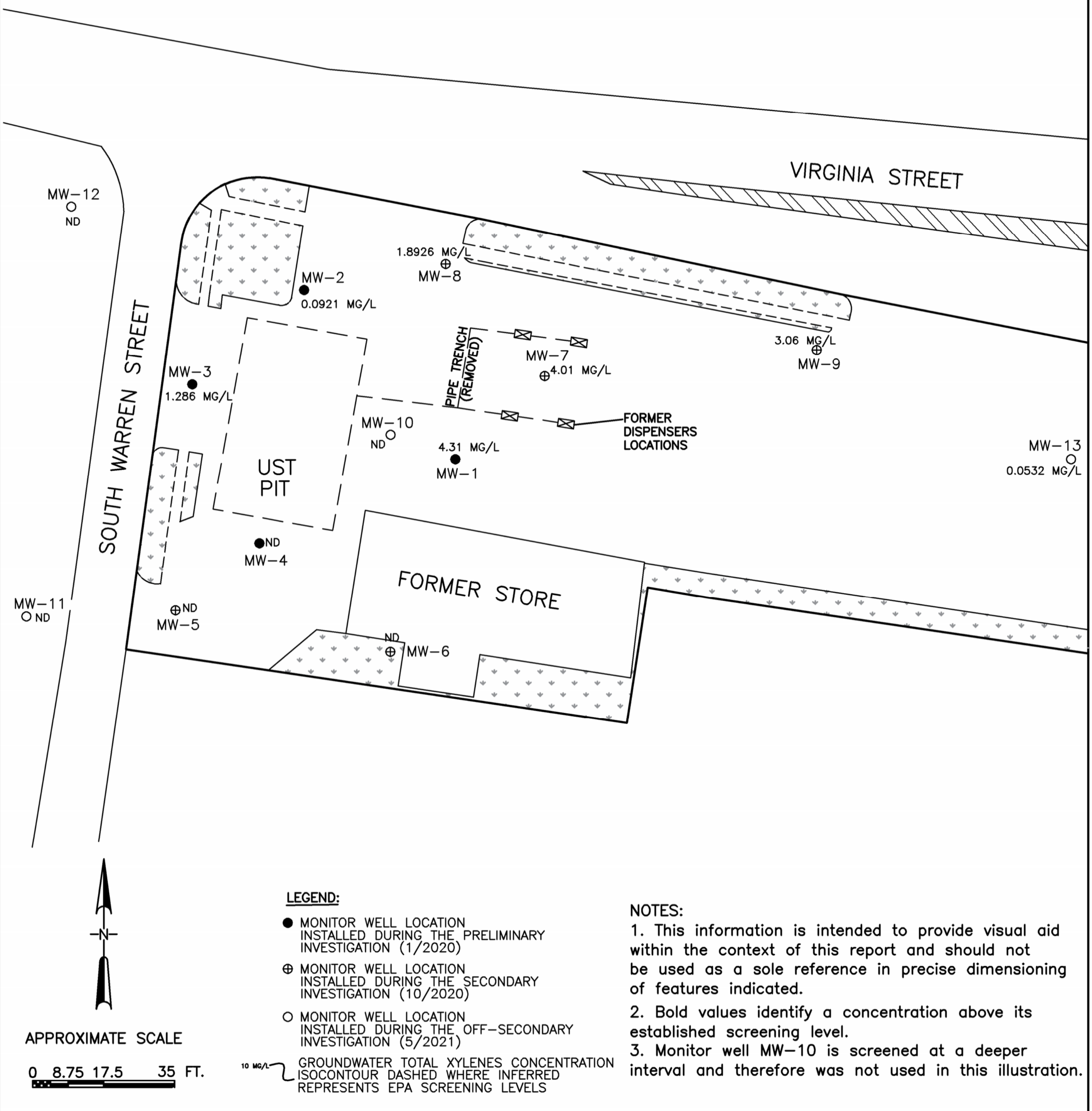


LEGEND:

- ● MONITOR WELL LOCATION INSTALLED DURING THE PRELIMINARY INVESTIGATION (1/2020)
- ⊕ MONITOR WELL LOCATION INSTALLED DURING THE SECONDARY INVESTIGATION (10/2020)
- ○ MONITOR WELL LOCATION INSTALLED DURING THE OFF-SECONDARY INVESTIGATION (5/2021)
- 0.7 MG/L GROUNDWATER ETHYLBENZENE CONCENTRATION ISOCONTOUR DASHED WHERE INFERRED REPRESENTS EPA SCREENING LEVELS

NOTES:
1. This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
2. Bold values identify a concentration above its established screening level.
3. Monitor well MW-10 is screened at a deeper interval and therefore was not used in this illustration.

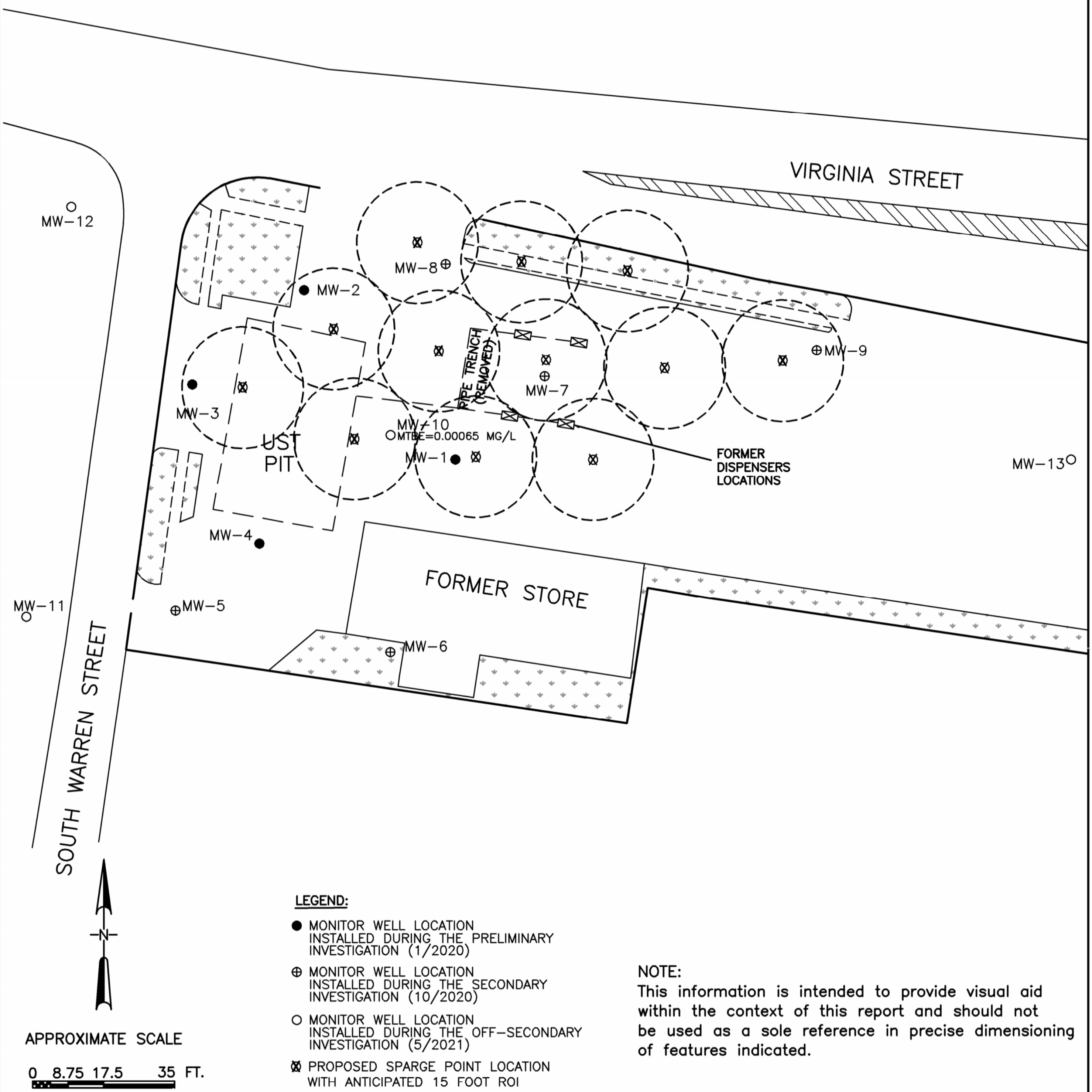
FORMER VIRGINIA SHELL 559 VIRGINIA STREET FACILITY I.D. NO. 25118-97-14263 MOBILE, MOBILE COUNTY, ALABAMA	thompson ENGINEERING	FIGURE 9 GROUNDWATER ETHYLBENZENE ISOCONCENTRATION MAP June 27, 2024 PROJECT NO: 23-1101-0102 DATE: DECEMBER 2024



NOTES:

1. This information is intended to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
2. Bold values identify a concentration above its established screening level.
3. Monitor well MW-10 is screened at a deeper interval and therefore was not used in this illustration.

FORMER VIRGINIA SHELL 559 VIRGINIA STREET FACILITY I.D. NO. 25118-97-14263 MOBILE, MOBILE COUNTY, ALABAMA	thompson ENGINEERING	FIGURE 10 GROUNDWATER TOTAL XYLENES ISOCONCENTRATION MAP June 27, 2024 PROJECT NO: 23-1101-0102 DATE: DECEMBER 2024



FORMER VIRGINIA SHELL
559 VIRGINIA STREET
FACILITY I.D. NO. 25118-97-14263
MOBILE, MOBILE COUNTY, ALABAMA

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FIGURE 11
PROPOSED SPARGE POINT LOCATION MAP

PROJECT NO: 23-1101-0102

DATE: DECEMBER 2024

APPENDIX B

SOIL BORING LOGS WITH MONITOR WELL CONSTRUCTION DETAILS

thompson ENGINEERING

AASHTO R18

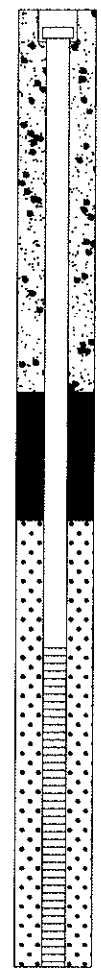
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORATION **T.O.C ELEVATION:** 12.47' above MSL

PROJECT: VIRGINIA SHELL PRELIMINARY INVESTIGATION

JOB NO.: 19-1101-0286 **DATE DRILLED:** JANUARY 20, 2020 **GR. WATER DEPTH:** 9' bgs

BORING NO.: MW-01 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE SURFACE	2 INCH DIAMETER PVC WITH 5 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
		BROWN AND BLACK SILT; DRY			
3					
6		BROWN TO GRAY SILTY CLAYEY SAND; SLIGHT PLASTICITY			
9		BROWN TO TAN CLAYEY SAND; SATURATED			
12		LIGHT TAN, WHITE, AND GRAY SAND WITH TRACE SILTS; SOFT			
15		BT @ 15'			
18					
21					

thompson ENGINEERING

AASHTO R18

SOIL BORING/MONITORING WELL CONSTRUCTION LOG

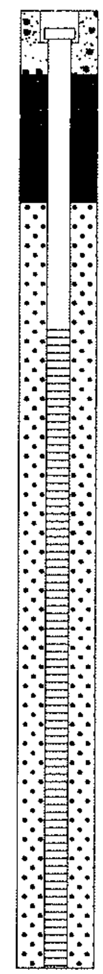
CLIENT: ALABAMA DEPARTMENT OF TRANSPORATION **T.O.C ELEVATION:** 12.17' above MSL

PROJECT: VIRGINIA SHELL PRELIMINARY INVESTIGATION

JOB NO.: 19-1101-0286 **DATE DRILLED:** JANUARY 20, 2020 **GR. WATER DEPTH:** 9.5' bgs

BORING NO.: MW-02 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE SURFACE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
		BROWN SILT WITH TRACE SAND; DRY			
3					
6		BROWN TO DARK BROWN CLAY WITH TRACE SILT; HARD; MODERATE PLASTICITY			
9		LIGHT BROWN TO GRAY SAND; SATURATED SATU			
12		WHITE SAND			
15		BT @ 15'			
18					
21					



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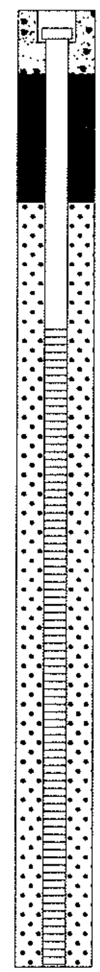
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORATION **T.O.C ELEVATION:** 11.38' above MSL

PROJECT: VIRGINIA SHELL PRELIMINARY INVESTIGATION

JOB NO.: 19-1101-0286 **DATE DRILLED:** JANUARY 20, 2020 **GR. WATER DEPTH:** 9.5' bgs

BORING NO.: MW-03 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE SURFACE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
		BROWN SILT WITH TRACE SAND; DRY			
3					
6		BROWN AND ORANGE SILTY CLAY; DRY			
9		GRAY TO TAN SAND WITH TRACE SILTS AND CLAYS; SATURATED			
12					
		ORANGE SAND; SATURATED			
15		BT @ 15'			
18					
21					

thompson ENGINEERING

AASHTO R18

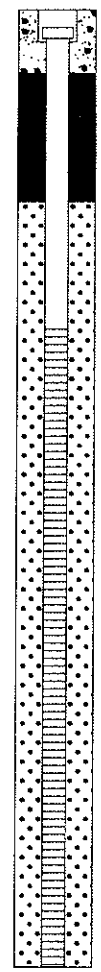
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORATION **T.O.C ELEVATION:** 11.57' above MSL

PROJECT: VIRGINIA SHELL PRELIMINARY INVESTIGATION

JOB NO.: 19-1101-0286 **DATE DRILLED:** JANUARY 20, 2020 **GR. WATER DEPTH:** 10' bgs

BORING NO.: MW-04 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

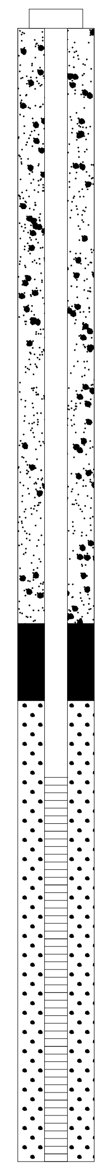
DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE SURFACE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
		BROWN SILT WITH TRACE SAND; DRY			
3					
6		BROWN, BLACK, AND GRAY CLAYEY SILT WITH TRACE SAND; MOIST TO DAMP			
9					
12		LIGHT GRAY SILTY SAND; LIGHT BROWN TO TAN CLAYEY SAND			
15		BT @ 15'			
18					
21					

SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION
T.O.C ELEVATION: 11.64' ABOVE MSL

PROJECT: VIRGINIA SHELL SECONDARY INVESTIGATION

JOB NO.: 20-1101-0158
DATE DRILLED: OCTOBER 13, 2020
GR. WATER DEPTH: 20'
BORING NO.: MW-05
LOCATION: SEE FIGURE 6
TYPE BORING: DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE SURFACE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
5					
10		TAN SILTY/SANDY CLAY; NO ODOR PRESENT			
15					
20		GROUNDWATER @ 20' BGS			
25					
30		BT @ 30' BGS			
35					

thompson ENGINEERING

AASHTO R18

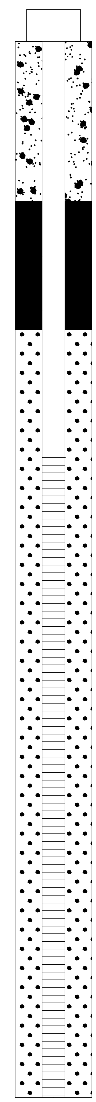
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION **T.O.C ELEVATION:** 12.61' ABOVE MSL

PROJECT: VIRGINIA SHELL SECONDARY INVESTIGATION

JOB NO.: 20-1101-0158 **DATE DRILLED:** OCTOBER 13, 2020 **GR. WATER DEPTH:** 12' BGS

BORING NO.: MW-06 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		TOPSOIL	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY GROUT CASING	
3					
6		TAN BROWN SILTY SAND; STRONG ODOR @ 3'-5' AND 10'-12' BGS			
9					
12		GROUNDWATER @ 12' BGS			
15					
18		BT @ 17' BGS			
21					

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AASHTO R18

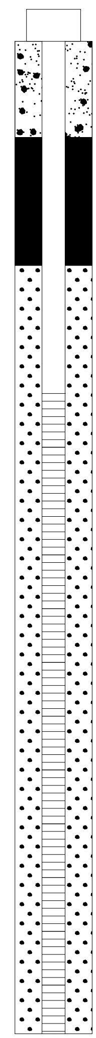
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION **T.O.C ELEVATION:** 12.13' ABOVE MSL

PROJECT: VIRGINIA SHELL SECONDARY INVESTIGATION

JOB NO.: 20-1101-0158 **DATE DRILLED:** OCTOBER 13, 2020 **GR. WATER DEPTH:** 11' BGS

BORING NO.: MW-07 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
3					
6		TAN BROWN SILTY SAND; STRONG ODOR THROUGHOUT			
9					
12		GROUNDWATER @ 11' BGS			
15					
		BT @ 16' BGS			
18					
21					

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AASHTO R18

SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION

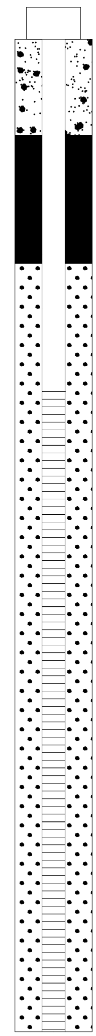
T.O.C ELEVATION: 11.72' ABOVE MSL

PROJECT: VIRGINIA SHELL SECONDARY INVESTIGATION

JOB NO.: 20-1101-0158
DATE DRILLED: OCTOBER 13, 2020
GR. WATER DEPTH: 11' BGS

BORING NO.: MW-08
LOCATION: SEE FIGURE 6
TYPE BORING: DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
3					
6		TAN SILTY SANDY CLAY; STRONG ODOR THROUGHOUT			
9					
12		GROUNDWATER @ 11' BGS			
15					
18		BT @ 16' BGS			
21					



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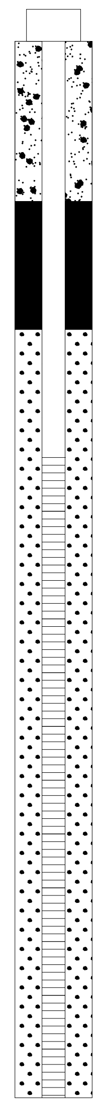
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION
T.O.C ELEVATION: 11.56' ABOVE MSL

PROJECT: VIRGINIA SHELL SECONDARY INVESTIGATION

JOB NO.: 20-1101-0158
DATE DRILLED: OCTOBER 13, 2020
GR. WATER DEPTH: 11' BGS
BORING NO.: MW-09
LOCATION: SEE FIGURE 6
TYPE BORING: DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
3					
6		TAN SILTY SANDY CLAY; STRONG ODOR FROM 8' BGS TO BORING TERMINATION			
9					
12		GROUNDWATER @ 11' BGS			
15					
18		BT @ 17' BGS			
21					

thompson ENGINEERING

AASHTO R18

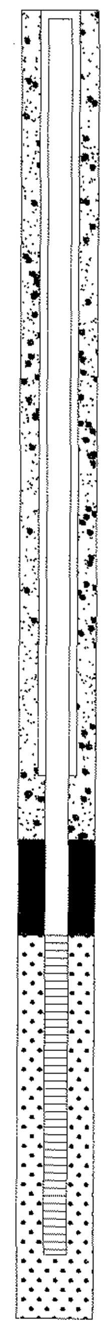
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION **T.O.C ELEVATION:** 11.92' ABOVE MSL

PROJECT: FORMER VIRGINIA SHELL

JOB NO.: 21-1101-0085 **DATE DRILLED:** MAY 10, 2021 **GR. WATER DEPTH:** 13' BGS

BORING NO.: SB/MW-10 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN WITH 8 INCH PVC ENCASEMENT	SECURITY CASING GROUT	
		BROWN, DARK BROWN, TAN, AND ORANGE SILT WITH LITTLE CLAY; SLIGHTLY PLASTIC; STRONG ODOR AT SURFACE			
6					
12					
		ORANGE AND GRAY SAND; SATURATED; SLIGHT ODOR			
18		GRAY AND BROWN SILTY CLAYEY SAND			
24		CLAY			
		WHITE SAND; NO ODOR			
30					
36					
		BT @ APPROX. 39' BGS			
42					

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AASHTO R18

SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION

T.O.C ELEVATION: 11.23' ABOVE MSL

PROJECT: FORMER VIRGINIA SHELL

JOB NO.: 21-1101-0085

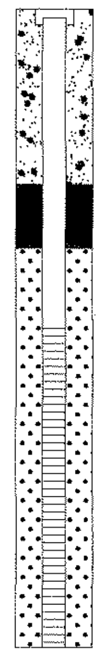
BORING NO.: SB/MW-11

DATE DRILLED: MAY 11, 2021

LOCATION: SEE FIGURE 6

GR. WATER DEPTH: 11' BGS

TYPE BORING: DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE	2 INCH DIAMTER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
		BROWN TO TAN SANDY SILT; DRY; NO ODOR			
6		BROWN, ORANGE,TAN, AND GRAY SILTY CLAY; NO ODOR; DAMP; SLIGHT PLASTICITY			
12		BROWN, ORANGE AND TAN SILTY CLAYEY SAND; SATURATED; NO ODOR			
18					
		BT @ APPROX. 20' BGS			
24					
30					
36					
42					

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AASHTO R18

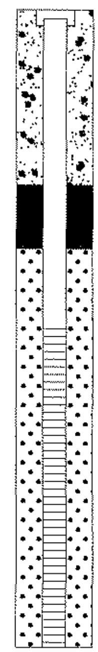
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION **T.O.C ELEVATION:** 11.08' ABOVE MSL

PROJECT: FORMER VIRGINIA SHELL

JOB NO.: 21-1101-0085 **DATE DRILLED:** MAY 10, 2021 **GR. WATER DEPTH:** 10' BGS

BORING NO.: SB/MW-12 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		TOPSOIL	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
		BROWN TO TAN SANDY SILT; DRY; NO ODOR			
6		BROWN, ORANGE, AND TAN SILTY CLAY; MODERATE PLASTICITY; DAMP			
12		BROWN, TAN, AND ORANGE SILTY SAND WITH LITTLE CLAY; SATURATED; NO ODOR			
18					
		BT @ APPROX. 20' BGS			
24					
30					
36					
42					

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AASHTO R18

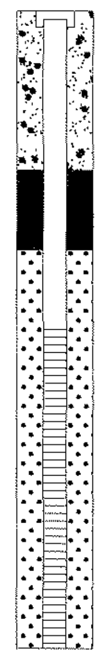
SOIL BORING/MONITORING WELL CONSTRUCTION LOG

CLIENT: ALABAMA DEPARTMENT OF TRANSPORTATION **T.O.C ELEVATION:** 11.04' ABOVE MSL

PROJECT: FORMER VIRGINIA SHELL

JOB NO.: 21-1101-0085 **DATE DRILLED:** MAY 10, 2021 **GR. WATER DEPTH:** 12' BGS

BORING NO.: SB/MW-13 **LOCATION:** SEE FIGURE 6 **TYPE BORING:** DPT

DEPTH IN FEET	SYMBOL	DESCRIPTION	WELL MATERIALS	ANNULAR MATERIALS	WELL DIAGRAM
0		CONCRETE BROWN SILT WITH SOME CLAY; NO ODOR	2 INCH DIAMETER PVC WITH 10 FEET OF 0.010 SLOTTED SCREEN	SECURITY CASING GROUT	
6					
12		SATURATED			
18					
		BT @ APPROX. 20' BGS			
24					
30					
36					
42					

APPENDIX C

POINT OF COMPLIANCE DOCUMENTATION DATA

POC Well (MW-1)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	11	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	1.100	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.367	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.055	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-1)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE	Allowable GW Conc.	
				for POC	for POE		at a POC Protective of a POE	at the Source Protective of a POE
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]	[mg/L]	[mg/L]
ORGANICS								
Benzene	5.00E-03	6.01E-01	1	1.00E+00	6.93E+01	5.76E-01	3.46E-01	3.46E-01
Toluene	1.00E+00	2.82E-01	1	1.00E+00	6.93E+01	2.45E+02	6.93E+01	6.93E+01
Ethylbenzene	7.00E-01	1.97E-01	1	1.00E+00	6.93E+01	2.46E+02	4.85E+01	4.85E+01
Xylenes (mixed)	1.00E+01	1.63E-01	1	1.00E+00	6.93E+01	4.51E+02 *	1.75E+02 #	1.75E+02 #
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.36E+00	1	1.00E+00	6.93E+01	5.88E-01	1.39E+00	1.39E+00
Anthracene	4.34E-02	1.79E-03	1	1.00E+00	6.93E+01	1.02E+01 *	4.34E-02 #	4.34E-02 #
Benzo(a)anthracene	1.17E-03	1.17E-04	1	1.00E+00	6.93E+01	3.37E+01 *	9.40E-03 #	9.40E-03 #
Benzo(a)pyrene	2.00E-04	4.33E-05	1	1.00E+00	6.93E+01	1.57E+01 *	1.62E-03 #	1.62E-03 #
Benzo(b)fluoranthene	1.17E-03	3.41E-05	1	1.00E+00	6.93E+01	1.85E+01 *	1.50E-03 #	1.50E-03 #
Benzo(g,h,i)perylene	7.00E-04	2.66E-05	1	1.00E+00	6.93E+01	1.11E+01 *	7.00E-04 #	7.00E-04 #
Benzo(k)fluoranthene	8.00E-04	3.41E-05	1	1.00E+00	6.93E+01	9.84E+00 *	8.00E-04 #	8.00E-04 #
Chrysene	1.60E-03	1.05E-04	1	1.00E+00	6.93E+01	6.37E+00 *	1.60E-03 #	1.60E-03 #
Fluoranthene	2.06E-01	8.55E-04	1	1.00E+00	6.93E+01	1.01E+02 *	2.06E-01 #	2.06E-01 #
Fluorene	1.46E+00	5.44E-03	1	1.00E+00	6.93E+01	1.53E+02 *	1.98E+00 #	1.98E+00 #
Naphthalene	2.00E-02	3.51E-02	1	1.00E+00	6.93E+01	3.95E+01	1.39E+00	1.39E+00
Phenanthrene	1.00E+00	2.97E-03	1	1.00E+00	6.93E+01	1.41E+02 *	1.00E+00 #	1.00E+00 #
Pyrene	1.35E-01	6.17E-04	1	1.00E+00	6.93E+01	9.18E+01 *	1.35E-01 #	1.35E-01 #
METALS								
Arsenic	5.00E-02	6.54E-03	1	1.00E+00	6.93E+01	5.30E+02	3.46E+00	3.46E+00
Barium	2.00E+00	1.02E-02	1	1.00E+00	6.93E+01	1.36E+04	1.39E+02	1.39E+02
Cadmium	5.00E-03	5.59E-03	1	1.00E+00	6.93E+01	6.20E+01	3.46E-01	3.46E-01
Chromium VI	1.00E-01	2.20E-02	1	1.00E+00	6.93E+01	3.15E+02	6.93E+00	6.93E+00
Lead	1.50E-02	3.44E-03	1	1.00E+00	6.93E+01	3.02E+02	1.04E+00	1.04E+00
Zinc	2.00E+00	6.76E-03	1	1.00E+00	6.93E+01	2.05E+04	1.39E+02	1.39E+02

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-2)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	*Calculated*
Transverse Dispersivity	α_y	ft	variable	17.433	*Calculated*
Vertical Dispersivity	α_z	ft	variable	2.615	*Calculated*
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	7	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.700	*Calculated*
Transverse Dispersivity	α_y	ft	variable	0.233	*Calculated*
Vertical Dispersivity	α_z	ft	variable	0.035	*Calculated*

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-2)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE		Allowable GW Conc.			
				for POC	for POE			at a POC Protective of a POE		at the Source Protective of a POE	
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]		[mg/L]		[mg/L]	
ORGANICS											
Benzene	5.00E-03	6.01E-01	1	1.00E+00	6.93E+01	5.76E-01		3.46E-01		3.46E-01	
Toluene	1.00E+00	2.82E-01	1	1.00E+00	6.93E+01	2.45E+02		6.93E+01		6.93E+01	
Ethylbenzene	7.00E-01	1.97E-01	1	1.00E+00	6.93E+01	2.46E+02		4.85E+01		4.85E+01	
Xylenes (mixed)	1.00E+01	1.63E-01	1	1.00E+00	6.93E+01	4.51E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.36E+00	1	1.00E+00	6.93E+01	5.88E-01		1.39E+00		1.39E+00	
Anthracene	4.34E-02	1.79E-03	1	1.00E+00	6.93E+01	1.02E+01	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	1.17E-04	1	1.00E+00	6.93E+01	3.37E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	4.33E-05	1	1.00E+00	6.93E+01	1.57E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	3.41E-05	1	1.00E+00	6.93E+01	1.85E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	2.66E-05	1	1.00E+00	6.93E+01	1.11E+01	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	3.41E-05	1	1.00E+00	6.93E+01	9.84E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	1.05E-04	1	1.00E+00	6.93E+01	6.37E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	8.55E-04	1	1.00E+00	6.93E+01	1.01E+02	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	5.44E-03	1	1.00E+00	6.93E+01	1.53E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	3.51E-02	1	1.00E+00	6.93E+01	3.95E+01		1.39E+00		1.39E+00	
Phenanthrene	1.00E+00	2.97E-03	1	1.00E+00	6.93E+01	1.41E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	6.17E-04	1	1.00E+00	6.93E+01	9.18E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	6.54E-03	1	1.00E+00	6.93E+01	5.30E+02		3.46E+00		3.46E+00	
Barium	2.00E+00	1.02E-02	1	1.00E+00	6.93E+01	1.36E+04		1.39E+02		1.39E+02	
Cadmium	5.00E-03	5.59E-03	1	1.00E+00	6.93E+01	6.20E+01		3.46E-01		3.46E-01	
Chromium VI	1.00E-01	2.20E-02	1	1.00E+00	6.93E+01	3.15E+02		6.93E+00		6.93E+00	
Lead	1.50E-02	3.44E-03	1	1.00E+00	6.93E+01	3.02E+02		1.04E+00		1.04E+00	
Zinc	2.00E+00	6.76E-03	1	1.00E+00	6.93E+01	2.05E+04		1.39E+02		1.39E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-3)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	9	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.900	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.300	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.045	***Calculated***

Note: The input values in red are calculated and cannot be changed.

Source Well (MW-7)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	0	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.000	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.000	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.000	***Calculated***

Note: The input values in red are calculated and cannot be changed.

Source Well (MW-7)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE	Allowable GW Conc.	
				for POC	for POE		at a POC Protective of a POE	at the Source Protective of a POE
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]	[mg/L]	[mg/L]
ORGANICS								
Benzene	5.00E-03	6.01E-01	1	1.00E+00	6.93E+01	5.76E-01	3.46E-01	3.46E-01
Toluene	1.00E+00	2.82E-01	1	1.00E+00	6.93E+01	2.45E+02	6.93E+01	6.93E+01
Ethylbenzene	7.00E-01	1.97E-01	1	1.00E+00	6.93E+01	2.46E+02	4.85E+01	4.85E+01
Xylenes (mixed)	1.00E+01	1.63E-01	1	1.00E+00	6.93E+01	4.51E+02 *	1.75E+02 #	1.75E+02 #
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.36E+00	1	1.00E+00	6.93E+01	5.88E-01	1.39E+00	1.39E+00
Anthracene	4.34E-02	1.79E-03	1	1.00E+00	6.93E+01	1.02E+01 *	4.34E-02 #	4.34E-02 #
Benzo(a)anthracene	1.17E-03	1.17E-04	1	1.00E+00	6.93E+01	3.37E+01 *	9.40E-03 #	9.40E-03 #
Benzo(a)pyrene	2.00E-04	4.33E-05	1	1.00E+00	6.93E+01	1.57E+01 *	1.62E-03 #	1.62E-03 #
Benzo(b)fluoranthene	1.17E-03	3.41E-05	1	1.00E+00	6.93E+01	1.85E+01 *	1.50E-03 #	1.50E-03 #
Benzo(g,h,i)perylene	7.00E-04	2.66E-05	1	1.00E+00	6.93E+01	1.11E+01 *	7.00E-04 #	7.00E-04 #
Benzo(k)fluoranthene	8.00E-04	3.41E-05	1	1.00E+00	6.93E+01	9.84E+00 *	8.00E-04 #	8.00E-04 #
Chrysene	1.60E-03	1.05E-04	1	1.00E+00	6.93E+01	6.37E+00 *	1.60E-03 #	1.60E-03 #
Fluoranthene	2.06E-01	8.55E-04	1	1.00E+00	6.93E+01	1.01E+02 *	2.06E-01 #	2.06E-01 #
Fluorene	1.46E+00	5.44E-03	1	1.00E+00	6.93E+01	1.53E+02 *	1.98E+00 #	1.98E+00 #
Naphthalene	2.00E-02	3.51E-02	1	1.00E+00	6.93E+01	3.95E+01	1.39E+00	1.39E+00
Phenanthrene	1.00E+00	2.97E-03	1	1.00E+00	6.93E+01	1.41E+02 *	1.00E+00 #	1.00E+00 #
Pyrene	1.35E-01	6.17E-04	1	1.00E+00	6.93E+01	9.18E+01 *	1.35E-01 #	1.35E-01 #
METALS								
Arsenic	5.00E-02	6.54E-03	1	1.00E+00	6.93E+01	5.30E+02	3.46E+00	3.46E+00
Barium	2.00E+00	1.02E-02	1	1.00E+00	6.93E+01	1.36E+04	1.39E+02	1.39E+02
Cadmium	5.00E-03	5.59E-03	1	1.00E+00	6.93E+01	6.20E+01	3.46E-01	3.46E-01
Chromium VI	1.00E-01	2.20E-02	1	1.00E+00	6.93E+01	3.15E+02	6.93E+00	6.93E+00
Lead	1.50E-02	3.44E-03	1	1.00E+00	6.93E+01	3.02E+02	1.04E+00	1.04E+00
Zinc	2.00E+00	6.76E-03	1	1.00E+00	6.93E+01	2.05E+04	1.39E+02	1.39E+02

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-8)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	*Calculated*
Transverse Dispersivity	α_y	ft	variable	17.433	*Calculated*
Vertical Dispersivity	α_z	ft	variable	2.615	*Calculated*
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	16	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	1.600	*Calculated*
Transverse Dispersivity	α_y	ft	variable	0.533	*Calculated*
Vertical Dispersivity	α_z	ft	variable	0.080	*Calculated*

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-8)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE	Allowable GW Conc.	
				for POC	for POE		at a POC Protective of a POE	at the Source Protective of a POE
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]	[mg/L]	[mg/L]
ORGANICS								
Benzene	5.00E-03	6.01E-01	1	1.00E+00	6.93E+01	5.76E-01	3.46E-01	3.46E-01
Toluene	1.00E+00	2.82E-01	1	1.00E+00	6.93E+01	2.45E+02	6.93E+01	6.93E+01
Ethylbenzene	7.00E-01	1.97E-01	1	1.00E+00	6.93E+01	2.46E+02	4.85E+01	4.85E+01
Xylenes (mixed)	1.00E+01	1.63E-01	1	1.00E+00	6.93E+01	4.51E+02 *	1.75E+02 #	1.75E+02 #
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.36E+00	1	1.00E+00	6.93E+01	5.88E-01	1.39E+00	1.39E+00
Anthracene	4.34E-02	1.79E-03	1	1.00E+00	6.93E+01	1.02E+01 *	4.34E-02 #	4.34E-02 #
Benzo(a)anthracene	1.17E-03	1.17E-04	1	1.00E+00	6.93E+01	3.37E+01 *	9.40E-03 #	9.40E-03 #
Benzo(a)pyrene	2.00E-04	4.33E-05	1	1.00E+00	6.93E+01	1.57E+01 *	1.62E-03 #	1.62E-03 #
Benzo(b)fluoranthene	1.17E-03	3.41E-05	1	1.00E+00	6.93E+01	1.85E+01 *	1.50E-03 #	1.50E-03 #
Benzo(g,h,i)perylene	7.00E-04	2.66E-05	1	1.00E+00	6.93E+01	1.11E+01 *	7.00E-04 #	7.00E-04 #
Benzo(k)fluoranthene	8.00E-04	3.41E-05	1	1.00E+00	6.93E+01	9.84E+00 *	8.00E-04 #	8.00E-04 #
Chrysene	1.60E-03	1.05E-04	1	1.00E+00	6.93E+01	6.37E+00 *	1.60E-03 #	1.60E-03 #
Fluoranthene	2.06E-01	8.55E-04	1	1.00E+00	6.93E+01	1.01E+02 *	2.06E-01 #	2.06E-01 #
Fluorene	1.46E+00	5.44E-03	1	1.00E+00	6.93E+01	1.53E+02 *	1.98E+00 #	1.98E+00 #
Naphthalene	2.00E-02	3.51E-02	1	1.00E+00	6.93E+01	3.95E+01	1.39E+00	1.39E+00
Phenanthrene	1.00E+00	2.97E-03	1	1.00E+00	6.93E+01	1.41E+02 *	1.00E+00 #	1.00E+00 #
Pyrene	1.35E-01	6.17E-04	1	1.00E+00	6.93E+01	9.18E+01 *	1.35E-01 #	1.35E-01 #
METALS								
Arsenic	5.00E-02	6.54E-03	1	1.00E+00	6.93E+01	5.30E+02	3.46E+00	3.46E+00
Barium	2.00E+00	1.02E-02	1	1.00E+00	6.93E+01	1.36E+04	1.39E+02	1.39E+02
Cadmium	5.00E-03	5.59E-03	1	1.00E+00	6.93E+01	6.20E+01	3.46E-01	3.46E-01
Chromium VI	1.00E-01	2.20E-02	1	1.00E+00	6.93E+01	3.15E+02	6.93E+00	6.93E+00
Lead	1.50E-02	3.44E-03	1	1.00E+00	6.93E+01	3.02E+02	1.04E+00	1.04E+00
Zinc	2.00E+00	6.76E-03	1	1.00E+00	6.93E+01	2.05E+04	1.39E+02	1.39E+02

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-9)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	55	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	5.500	***Calculated***
Transverse Dispersivity	α_y	ft	variable	1.833	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.275	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-9)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE		Allowable GW Conc.			
				for POC	for POE			at a POC Protective of a POE		at the Source Protective of a POE	
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]		[mg/L]		[mg/L]	
ORGANICS											
Benzene	5.00E-03	6.01E-01	1	1.42E+00	6.93E+01	5.76E-01		2.44E-01		3.46E-01	
Toluene	1.00E+00	2.82E-01	1	1.42E+00	6.93E+01	2.45E+02		4.87E+01		6.93E+01	
Ethylbenzene	7.00E-01	1.97E-01	1	1.42E+00	6.93E+01	2.46E+02		3.41E+01		4.85E+01	
Xylenes (mixed)	1.00E+01	1.63E-01	1	1.42E+00	6.93E+01	4.51E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.36E+00	1	1.42E+00	6.93E+01	5.88E-01		9.74E-01		1.39E+00	
Anthracene	4.34E-02	1.79E-03	1	1.42E+00	6.93E+01	1.02E+01	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	1.17E-04	1	1.42E+00	6.93E+01	3.37E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	4.33E-05	1	1.42E+00	6.93E+01	1.57E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	3.41E-05	1	1.42E+00	6.93E+01	1.85E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	2.66E-05	1	1.42E+00	6.93E+01	1.11E+01	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	3.41E-05	1	1.42E+00	6.93E+01	9.84E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	1.05E-04	1	1.42E+00	6.93E+01	6.37E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	8.55E-04	1	1.42E+00	6.93E+01	1.01E+02	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	5.44E-03	1	1.42E+00	6.93E+01	1.53E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	3.51E-02	1	1.42E+00	6.93E+01	3.95E+01		9.74E-01		1.39E+00	
Phenanthrene	1.00E+00	2.97E-03	1	1.42E+00	6.93E+01	1.41E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	6.17E-04	1	1.42E+00	6.93E+01	9.18E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	6.54E-03	1	1.42E+00	6.93E+01	5.30E+02		2.44E+00		3.46E+00	
Barium	2.00E+00	1.02E-02	1	1.42E+00	6.93E+01	1.36E+04		9.74E+01		1.39E+02	
Cadmium	5.00E-03	5.59E-03	1	1.42E+00	6.93E+01	6.20E+01		2.44E-01		3.46E-01	
Chromium VI	1.00E-01	2.20E-02	1	1.42E+00	6.93E+01	3.15E+02		4.87E+00		6.93E+00	
Lead	1.50E-02	3.44E-03	1	1.42E+00	6.93E+01	3.02E+02		7.31E-01		1.04E+00	
Zinc	2.00E+00	6.76E-03	1	1.42E+00	6.93E+01	2.05E+04		9.74E+01		1.39E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-10)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	8	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.800	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.267	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.040	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-10)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE [mg/L]	Dry Leaching Factor to Groundwater (LFsw) [mg/L]/[mg/kg]	User Specified Unsaturated Zone DAF [--]	Saturated Zone DAF for POC [--]	Saturated Zone DAF for POE [--]	Allowable Soil Conc. Protective of GW at the POE [mg/kg]		Allowable GW Conc. at a POC Protective of a POE [mg/L]		Allowable GW Conc. at the Source Protective of a POE [mg/L]	
ORGANICS											
Benzene	5.00E-03	6.01E-01	1	1.00E+00	6.93E+01	5.76E-01		3.46E-01		3.46E-01	
Toluene	1.00E+00	2.82E-01	1	1.00E+00	6.93E+01	2.45E+02		6.93E+01		6.93E+01	
Ethylbenzene	7.00E-01	1.97E-01	1	1.00E+00	6.93E+01	2.46E+02		4.85E+01		4.85E+01	
Xylenes (mixed)	1.00E+01	1.63E-01	1	1.00E+00	6.93E+01	4.51E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.36E+00	1	1.00E+00	6.93E+01	5.88E-01		1.39E+00		1.39E+00	
Anthracene	4.34E-02	1.79E-03	1	1.00E+00	6.93E+01	1.02E+01	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	1.17E-04	1	1.00E+00	6.93E+01	3.37E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	4.33E-05	1	1.00E+00	6.93E+01	1.57E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	3.41E-05	1	1.00E+00	6.93E+01	1.85E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	2.66E-05	1	1.00E+00	6.93E+01	1.11E+01	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	3.41E-05	1	1.00E+00	6.93E+01	9.84E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	1.05E-04	1	1.00E+00	6.93E+01	6.37E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	8.55E-04	1	1.00E+00	6.93E+01	1.01E+02	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	5.44E-03	1	1.00E+00	6.93E+01	1.53E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	3.51E-02	1	1.00E+00	6.93E+01	3.95E+01		1.39E+00		1.39E+00	
Phenanthrene	1.00E+00	2.97E-03	1	1.00E+00	6.93E+01	1.41E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	6.17E-04	1	1.00E+00	6.93E+01	9.18E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	6.54E-03	1	1.00E+00	6.93E+01	5.30E+02		3.46E+00		3.46E+00	
Barium	2.00E+00	1.02E-02	1	1.00E+00	6.93E+01	1.36E+04		1.39E+02		1.39E+02	
Cadmium	5.00E-03	5.59E-03	1	1.00E+00	6.93E+01	6.20E+01		3.46E-01		3.46E-01	
Chromium VI	1.00E-01	2.20E-02	1	1.00E+00	6.93E+01	3.15E+02		6.93E+00		6.93E+00	
Lead	1.50E-02	3.44E-03	1	1.00E+00	6.93E+01	3.02E+02		1.04E+00		1.04E+00	
Zinc	2.00E+00	6.76E-03	1	1.00E+00	6.93E+01	2.05E+04		1.39E+02		1.39E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-1)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	11	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	1.100	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.367	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.055	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-1)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE		Allowable GW Conc.			
				for POC	for POE			at a POC Protective of a POE		at the Source Protective of a POE	
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]		[mg/L]		[mg/L]	
ORGANICS											
Benzene	5.00E-03	9.19E-01	1	1.00E+00	5.70E+01	3.10E-01		2.85E-01		2.85E-01	
Toluene	1.00E+00	4.88E-01	1	1.00E+00	5.70E+01	1.17E+02		5.70E+01		5.70E+01	
Ethylbenzene	7.00E-01	3.53E-01	1	1.00E+00	5.70E+01	1.13E+02		3.99E+01		3.99E+01	
Xylenes (mixed)	1.00E+01	2.95E-01	1	1.00E+00	5.70E+01	3.70E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.10E+00	1	1.00E+00	5.70E+01	5.43E-01		1.14E+00		1.14E+00	
Anthracene	4.34E-02	3.47E-03	1	1.00E+00	5.70E+01	7.82E+00	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	2.28E-04	1	1.00E+00	5.70E+01	2.58E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	8.41E-05	1	1.00E+00	5.70E+01	1.20E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	6.63E-05	1	1.00E+00	5.70E+01	1.41E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	5.16E-05	1	1.00E+00	5.70E+01	8.47E+00	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	6.63E-05	1	1.00E+00	5.70E+01	7.53E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	2.05E-04	1	1.00E+00	5.70E+01	4.88E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	1.66E-03	1	1.00E+00	5.70E+01	7.75E+01	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	1.05E-02	1	1.00E+00	5.70E+01	1.17E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	6.70E-02	1	1.00E+00	5.70E+01	1.70E+01		1.14E+00		1.14E+00	
Phenanthrene	1.00E+00	5.77E-03	1	1.00E+00	5.70E+01	1.08E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	1.20E-03	1	1.00E+00	5.70E+01	7.03E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	9.71E-03	1	1.00E+00	5.70E+01	2.93E+02		2.85E+00		2.85E+00	
Barium	2.00E+00	1.51E-02	1	1.00E+00	5.70E+01	7.52E+03		1.14E+02		1.14E+02	
Cadmium	5.00E-03	8.30E-03	1	1.00E+00	5.70E+01	3.43E+01		2.85E-01		2.85E-01	
Chromium VI	1.00E-01	3.25E-02	1	1.00E+00	5.70E+01	1.75E+02		5.70E+00		5.70E+00	
Lead	1.50E-02	5.11E-03	1	1.00E+00	5.70E+01	1.67E+02		8.55E-01		8.55E-01	
Zinc	2.00E+00	1.00E-02	1	1.00E+00	5.70E+01	1.14E+04		1.14E+02		1.14E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-2)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	7	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.700	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.233	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.035	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-2)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE		Allowable GW Conc.			
				for POC	for POE			at a POC Protective of a POE		at the Source Protective of a POE	
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]		[mg/L]		[mg/L]	
ORGANICS											
Benzene	5.00E-03	9.19E-01	1	1.00E+00	5.70E+01	3.10E-01		2.85E-01		2.85E-01	
Toluene	1.00E+00	4.88E-01	1	1.00E+00	5.70E+01	1.17E+02		5.70E+01		5.70E+01	
Ethylbenzene	7.00E-01	3.53E-01	1	1.00E+00	5.70E+01	1.13E+02		3.99E+01		3.99E+01	
Xylenes (mixed)	1.00E+01	2.95E-01	1	1.00E+00	5.70E+01	3.70E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.10E+00	1	1.00E+00	5.70E+01	5.43E-01		1.14E+00		1.14E+00	
Anthracene	4.34E-02	3.47E-03	1	1.00E+00	5.70E+01	7.82E+00	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	2.28E-04	1	1.00E+00	5.70E+01	2.58E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	8.41E-05	1	1.00E+00	5.70E+01	1.20E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	6.63E-05	1	1.00E+00	5.70E+01	1.41E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	5.16E-05	1	1.00E+00	5.70E+01	8.47E+00	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	6.63E-05	1	1.00E+00	5.70E+01	7.53E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	2.05E-04	1	1.00E+00	5.70E+01	4.88E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	1.66E-03	1	1.00E+00	5.70E+01	7.75E+01	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	1.05E-02	1	1.00E+00	5.70E+01	1.17E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	6.70E-02	1	1.00E+00	5.70E+01	1.70E+01		1.14E+00		1.14E+00	
Phenanthrene	1.00E+00	5.77E-03	1	1.00E+00	5.70E+01	1.08E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	1.20E-03	1	1.00E+00	5.70E+01	7.03E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	9.71E-03	1	1.00E+00	5.70E+01	2.93E+02		2.85E+00		2.85E+00	
Barium	2.00E+00	1.51E-02	1	1.00E+00	5.70E+01	7.52E+03		1.14E+02		1.14E+02	
Cadmium	5.00E-03	8.30E-03	1	1.00E+00	5.70E+01	3.43E+01		2.85E-01		2.85E-01	
Chromium VI	1.00E-01	3.25E-02	1	1.00E+00	5.70E+01	1.75E+02		5.70E+00		5.70E+00	
Lead	1.50E-02	5.11E-03	1	1.00E+00	5.70E+01	1.67E+02		8.55E-01		8.55E-01	
Zinc	2.00E+00	1.00E-02	1	1.00E+00	5.70E+01	1.14E+04		1.14E+02		1.14E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-3)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	9	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.900	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.300	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.045	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-3)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE		Allowable GW Conc.			
				for POC	for POE			at a POC Protective of a POE		at the Source Protective of a POE	
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]		[mg/L]		[mg/L]	
ORGANICS											
Benzene	5.00E-03	9.19E-01	1	1.00E+00	5.70E+01	3.10E-01		2.85E-01		2.85E-01	
Toluene	1.00E+00	4.88E-01	1	1.00E+00	5.70E+01	1.17E+02		5.70E+01		5.70E+01	
Ethylbenzene	7.00E-01	3.53E-01	1	1.00E+00	5.70E+01	1.13E+02		3.99E+01		3.99E+01	
Xylenes (mixed)	1.00E+01	2.95E-01	1	1.00E+00	5.70E+01	3.70E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.10E+00	1	1.00E+00	5.70E+01	5.43E-01		1.14E+00		1.14E+00	
Anthracene	4.34E-02	3.47E-03	1	1.00E+00	5.70E+01	7.82E+00	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	2.28E-04	1	1.00E+00	5.70E+01	2.58E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	8.41E-05	1	1.00E+00	5.70E+01	1.20E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	6.63E-05	1	1.00E+00	5.70E+01	1.41E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	5.16E-05	1	1.00E+00	5.70E+01	8.47E+00	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	6.63E-05	1	1.00E+00	5.70E+01	7.53E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	2.05E-04	1	1.00E+00	5.70E+01	4.88E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	1.66E-03	1	1.00E+00	5.70E+01	7.75E+01	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	1.05E-02	1	1.00E+00	5.70E+01	1.17E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	6.70E-02	1	1.00E+00	5.70E+01	1.70E+01		1.14E+00		1.14E+00	
Phenanthrene	1.00E+00	5.77E-03	1	1.00E+00	5.70E+01	1.08E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	1.20E-03	1	1.00E+00	5.70E+01	7.03E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	9.71E-03	1	1.00E+00	5.70E+01	2.93E+02		2.85E+00		2.85E+00	
Barium	2.00E+00	1.51E-02	1	1.00E+00	5.70E+01	7.52E+03		1.14E+02		1.14E+02	
Cadmium	5.00E-03	8.30E-03	1	1.00E+00	5.70E+01	3.43E+01		2.85E-01		2.85E-01	
Chromium VI	1.00E-01	3.25E-02	1	1.00E+00	5.70E+01	1.75E+02		5.70E+00		5.70E+00	
Lead	1.50E-02	5.11E-03	1	1.00E+00	5.70E+01	1.67E+02		8.55E-01		8.55E-01	
Zinc	2.00E+00	1.00E-02	1	1.00E+00	5.70E+01	1.14E+04		1.14E+02		1.14E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

Source Well (MW-7)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	0	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.000	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.000	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.000	***Calculated***

Note: The input values in red are calculated and cannot be changed.

Source Well (MW-7)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE [mg/L]	Dry Leaching Factor to Groundwater (LFsw) [mg/L]/[mg/kg]	User Specified Unsaturated Zone DAF [--]	Saturated Zone DAF for POC [--]	Saturated Zone DAF for POE [--]	Allowable Soil Conc. Protective of GW at the POE [mg/kg]		Allowable GW Conc. at a POC Protective of a POE [mg/L]		Allowable GW Conc. at the Source Protective of a POE [mg/L]	
ORGANICS											
Benzene	5.00E-03	9.19E-01	1	1.00E+00	5.70E+01	3.10E-01		2.85E-01		2.85E-01	
Toluene	1.00E+00	4.88E-01	1	1.00E+00	5.70E+01	1.17E+02		5.70E+01		5.70E+01	
Ethylbenzene	7.00E-01	3.53E-01	1	1.00E+00	5.70E+01	1.13E+02		3.99E+01		3.99E+01	
Xylenes (mixed)	1.00E+01	2.95E-01	1	1.00E+00	5.70E+01	3.70E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.10E+00	1	1.00E+00	5.70E+01	5.43E-01		1.14E+00		1.14E+00	
Anthracene	4.34E-02	3.47E-03	1	1.00E+00	5.70E+01	7.82E+00	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	2.28E-04	1	1.00E+00	5.70E+01	2.58E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	8.41E-05	1	1.00E+00	5.70E+01	1.20E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	6.63E-05	1	1.00E+00	5.70E+01	1.41E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	5.16E-05	1	1.00E+00	5.70E+01	8.47E+00	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	6.63E-05	1	1.00E+00	5.70E+01	7.53E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	2.05E-04	1	1.00E+00	5.70E+01	4.88E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	1.66E-03	1	1.00E+00	5.70E+01	7.75E+01	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	1.05E-02	1	1.00E+00	5.70E+01	1.17E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	6.70E-02	1	1.00E+00	5.70E+01	1.70E+01		1.14E+00		1.14E+00	
Phenanthrene	1.00E+00	5.77E-03	1	1.00E+00	5.70E+01	1.08E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	1.20E-03	1	1.00E+00	5.70E+01	7.03E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	9.71E-03	1	1.00E+00	5.70E+01	2.93E+02		2.85E+00		2.85E+00	
Barium	2.00E+00	1.51E-02	1	1.00E+00	5.70E+01	7.52E+03		1.14E+02		1.14E+02	
Cadmium	5.00E-03	8.30E-03	1	1.00E+00	5.70E+01	3.43E+01		2.85E-01		2.85E-01	
Chromium VI	1.00E-01	3.25E-02	1	1.00E+00	5.70E+01	1.75E+02		5.70E+00		5.70E+00	
Lead	1.50E-02	5.11E-03	1	1.00E+00	5.70E+01	1.67E+02		8.55E-01		8.55E-01	
Zinc	2.00E+00	1.00E-02	1	1.00E+00	5.70E+01	1.14E+04		1.14E+02		1.14E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-8)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	16	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	1.600	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.533	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.080	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-8)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE	Allowable GW Conc.	
				for POC	for POE		at a POC Protective of a POE	at the Source Protective of a POE
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]	[mg/L]	[mg/L]
ORGANICS								
Benzene	5.00E-03	9.19E-01	1	1.00E+00	5.70E+01	3.10E-01	2.85E-01	2.85E-01
Toluene	1.00E+00	4.88E-01	1	1.00E+00	5.70E+01	1.17E+02	5.70E+01	5.70E+01
Ethylbenzene	7.00E-01	3.53E-01	1	1.00E+00	5.70E+01	1.13E+02	3.99E+01	3.99E+01
Xylenes (mixed)	1.00E+01	2.95E-01	1	1.00E+00	5.70E+01	3.70E+02 *	1.75E+02 #	1.75E+02 #
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.10E+00	1	1.00E+00	5.70E+01	5.43E-01	1.14E+00	1.14E+00
Anthracene	4.34E-02	3.47E-03	1	1.00E+00	5.70E+01	7.82E+00 *	4.34E-02 #	4.34E-02 #
Benzo(a)anthracene	1.17E-03	2.28E-04	1	1.00E+00	5.70E+01	2.58E+01 *	9.40E-03 #	9.40E-03 #
Benzo(a)pyrene	2.00E-04	8.41E-05	1	1.00E+00	5.70E+01	1.20E+01 *	1.62E-03 #	1.62E-03 #
Benzo(b)fluoranthene	1.17E-03	6.63E-05	1	1.00E+00	5.70E+01	1.41E+01 *	1.50E-03 #	1.50E-03 #
Benzo(g,h,i)perylene	7.00E-04	5.16E-05	1	1.00E+00	5.70E+01	8.47E+00 *	7.00E-04 #	7.00E-04 #
Benzo(k)fluoranthene	8.00E-04	6.63E-05	1	1.00E+00	5.70E+01	7.53E+00 *	8.00E-04 #	8.00E-04 #
Chrysene	1.60E-03	2.05E-04	1	1.00E+00	5.70E+01	4.88E+00 *	1.60E-03 #	1.60E-03 #
Fluoranthene	2.06E-01	1.66E-03	1	1.00E+00	5.70E+01	7.75E+01 *	2.06E-01 #	2.06E-01 #
Fluorene	1.46E+00	1.05E-02	1	1.00E+00	5.70E+01	1.17E+02 *	1.98E+00 #	1.98E+00 #
Naphthalene	2.00E-02	6.70E-02	1	1.00E+00	5.70E+01	1.70E+01	1.14E+00	1.14E+00
Phenanthrene	1.00E+00	5.77E-03	1	1.00E+00	5.70E+01	1.08E+02 *	1.00E+00 #	1.00E+00 #
Pyrene	1.35E-01	1.20E-03	1	1.00E+00	5.70E+01	7.03E+01 *	1.35E-01 #	1.35E-01 #
METALS								
Arsenic	5.00E-02	9.71E-03	1	1.00E+00	5.70E+01	2.93E+02	2.85E+00	2.85E+00
Barium	2.00E+00	1.51E-02	1	1.00E+00	5.70E+01	7.52E+03	1.14E+02	1.14E+02
Cadmium	5.00E-03	8.30E-03	1	1.00E+00	5.70E+01	3.43E+01	2.85E-01	2.85E-01
Chromium VI	1.00E-01	3.25E-02	1	1.00E+00	5.70E+01	1.75E+02	5.70E+00	5.70E+00
Lead	1.50E-02	5.11E-03	1	1.00E+00	5.70E+01	1.67E+02	8.55E-01	8.55E-01
Zinc	2.00E+00	1.00E-02	1	1.00E+00	5.70E+01	1.14E+04	1.14E+02	1.14E+02

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-9)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	55	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	5.500	***Calculated***
Transverse Dispersivity	α_y	ft	variable	1.833	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.275	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-9)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE		Allowable GW Conc.			
				for POC	for POE			at a POC Protective of a POE		at the Source Protective of a POE	
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]		[mg/L]		[mg/L]	
ORGANICS											
Benzene	5.00E-03	9.19E-01	1	1.35E+00	5.70E+01	3.10E-01		2.11E-01		2.85E-01	
Toluene	1.00E+00	4.88E-01	1	1.35E+00	5.70E+01	1.17E+02		4.22E+01		5.70E+01	
Ethylbenzene	7.00E-01	3.53E-01	1	1.35E+00	5.70E+01	1.13E+02		2.95E+01		3.99E+01	
Xylenes (mixed)	1.00E+01	2.95E-01	1	1.35E+00	5.70E+01	3.70E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.10E+00	1	1.35E+00	5.70E+01	5.43E-01		8.44E-01		1.14E+00	
Anthracene	4.34E-02	3.47E-03	1	1.35E+00	5.70E+01	7.82E+00	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	2.28E-04	1	1.35E+00	5.70E+01	2.58E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	8.41E-05	1	1.35E+00	5.70E+01	1.20E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	6.63E-05	1	1.35E+00	5.70E+01	1.41E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	5.16E-05	1	1.35E+00	5.70E+01	8.47E+00	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	6.63E-05	1	1.35E+00	5.70E+01	7.53E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	2.05E-04	1	1.35E+00	5.70E+01	4.88E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	1.66E-03	1	1.35E+00	5.70E+01	7.75E+01	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	1.05E-02	1	1.35E+00	5.70E+01	1.17E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	6.70E-02	1	1.35E+00	5.70E+01	1.70E+01		8.44E-01		1.14E+00	
Phenanthrene	1.00E+00	5.77E-03	1	1.35E+00	5.70E+01	1.08E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	1.20E-03	1	1.35E+00	5.70E+01	7.03E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	9.71E-03	1	1.35E+00	5.70E+01	2.93E+02		2.11E+00		2.85E+00	
Barium	2.00E+00	1.51E-02	1	1.35E+00	5.70E+01	7.52E+03		8.44E+01		1.14E+02	
Cadmium	5.00E-03	8.30E-03	1	1.35E+00	5.70E+01	3.43E+01		2.11E-01		2.85E-01	
Chromium VI	1.00E-01	3.25E-02	1	1.35E+00	5.70E+01	1.75E+02		4.22E+00		5.70E+00	
Lead	1.50E-02	5.11E-03	1	1.35E+00	5.70E+01	1.67E+02		6.33E-01		8.55E-01	
Zinc	2.00E+00	1.00E-02	1	1.35E+00	5.70E+01	1.14E+04		8.44E+01		1.14E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

POC Well (MW-10)

GROUNDWATER RESOURCE PROTECTION

Parameter	Symbol	Unit	Tier 1 Values	Values Used	Source
SITE PARAMETERS:					
Distance from the Downgradient Edge of the Groundwater Source to the Point of Exposure (Xpoe)	Xpoe	ft	variable	523	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	52.300	***Calculated***
Transverse Dispersivity	α_y	ft	variable	17.433	***Calculated***
Vertical Dispersivity	α_z	ft	variable	2.615	***Calculated***
Distance from the Downgradient Edge of the Groundwater Source to the Point of Compliance (Xpoc)	Xpoc	ft	variable	8	Site-specific
Longitudinal Dispersivity	α_x	ft	variable	0.800	***Calculated***
Transverse Dispersivity	α_y	ft	variable	0.267	***Calculated***
Vertical Dispersivity	α_z	ft	variable	0.040	***Calculated***

Note: The input values in red are calculated and cannot be changed.

POC Well (MW-10)

GROUNDWATER RESOURCE PROTECTION - WITHOUT BIODEGRADATION

CHEMICALS OF CONCERN	Target Groundwater Conc.at POE	Dry Leaching Factor to Groundwater (LFsw)	User Specified Unsaturated Zone DAF	Saturated Zone DAF		Allowable Soil Conc. Protective of GW at the POE		Allowable GW Conc.			
				for POC	for POE			at a POC Protective of a POE		at the Source Protective of a POE	
	[mg/L]	[mg/L]/[mg/kg]	[--]	[--]	[--]	[mg/kg]		[mg/L]		[mg/L]	
ORGANICS											
Benzene	5.00E-03	9.19E-01	1	1.00E+00	5.70E+01	3.10E-01		2.85E-01		2.85E-01	
Toluene	1.00E+00	4.88E-01	1	1.00E+00	5.70E+01	1.17E+02		5.70E+01		5.70E+01	
Ethylbenzene	7.00E-01	3.53E-01	1	1.00E+00	5.70E+01	1.13E+02		3.99E+01		3.99E+01	
Xylenes (mixed)	1.00E+01	2.95E-01	1	1.00E+00	5.70E+01	3.70E+02	*	1.75E+02	#	1.75E+02	#
Methyl-tert-butyl-ether (MTBE)*	2.00E-02	2.10E+00	1	1.00E+00	5.70E+01	5.43E-01		1.14E+00		1.14E+00	
Anthracene	4.34E-02	3.47E-03	1	1.00E+00	5.70E+01	7.82E+00	*	4.34E-02	#	4.34E-02	#
Benzo(a)anthracene	1.17E-03	2.28E-04	1	1.00E+00	5.70E+01	2.58E+01	*	9.40E-03	#	9.40E-03	#
Benzo(a)pyrene	2.00E-04	8.41E-05	1	1.00E+00	5.70E+01	1.20E+01	*	1.62E-03	#	1.62E-03	#
Benzo(b)fluoranthene	1.17E-03	6.63E-05	1	1.00E+00	5.70E+01	1.41E+01	*	1.50E-03	#	1.50E-03	#
Benzo(g,h,i)perylene	7.00E-04	5.16E-05	1	1.00E+00	5.70E+01	8.47E+00	*	7.00E-04	#	7.00E-04	#
Benzo(k)fluoranthene	8.00E-04	6.63E-05	1	1.00E+00	5.70E+01	7.53E+00	*	8.00E-04	#	8.00E-04	#
Chrysene	1.60E-03	2.05E-04	1	1.00E+00	5.70E+01	4.88E+00	*	1.60E-03	#	1.60E-03	#
Fluoranthene	2.06E-01	1.66E-03	1	1.00E+00	5.70E+01	7.75E+01	*	2.06E-01	#	2.06E-01	#
Fluorene	1.46E+00	1.05E-02	1	1.00E+00	5.70E+01	1.17E+02	*	1.98E+00	#	1.98E+00	#
Naphthalene	2.00E-02	6.70E-02	1	1.00E+00	5.70E+01	1.70E+01		1.14E+00		1.14E+00	
Phenanthrene	1.00E+00	5.77E-03	1	1.00E+00	5.70E+01	1.08E+02	*	1.00E+00	#	1.00E+00	#
Pyrene	1.35E-01	1.20E-03	1	1.00E+00	5.70E+01	7.03E+01	*	1.35E-01	#	1.35E-01	#
METALS											
Arsenic	5.00E-02	9.71E-03	1	1.00E+00	5.70E+01	2.93E+02		2.85E+00		2.85E+00	
Barium	2.00E+00	1.51E-02	1	1.00E+00	5.70E+01	7.52E+03		1.14E+02		1.14E+02	
Cadmium	5.00E-03	8.30E-03	1	1.00E+00	5.70E+01	3.43E+01		2.85E-01		2.85E-01	
Chromium VI	1.00E-01	3.25E-02	1	1.00E+00	5.70E+01	1.75E+02		5.70E+00		5.70E+00	
Lead	1.50E-02	5.11E-03	1	1.00E+00	5.70E+01	1.67E+02		8.55E-01		8.55E-01	
Zinc	2.00E+00	1.00E-02	1	1.00E+00	5.70E+01	1.14E+04		1.14E+02		1.14E+02	

*: Calculated concentrations exceeded saturated soil concentration and hence saturated soil concentrations are listed soil concentrations protective of groundwater.

#: Calculated concentrations exceeded pure component water solubility and hence water solubilities are listed as allowable groundwater concentrations at the POE and/or POC.

Soil concentrations are presented on a dry weight basis.

NA: Not available

APPENDIX D

MANUFACTURER'S EQUIPMENT DETAILS

AND

TYPICAL SPARGE POINT SCHEMATIC

Thompson Engineering

Chambers County ALDOT

10/16/2017

Prepared by

Kevin Gomes | kgomes@h2oengineering.com | 805-547-0303

1 Executive Summary

H2O Engineering is pleased to provide Thompson Engineering with the following proposal to supply a detailed engineering package and fabricated MOSU20-104 ozone sparge unit. In this proposal, you will find all of the commercial and technical details for the water treatment solution designed, fabricated and packaged by H2O Engineering, Inc.

During communication with Melissa Montgomery regarding this project, several needs were identified. These include:

- Select a firm who has deep water treatment experience with engineering, PLC programming and fabrication capabilities in-house
- Select a firm who has experience manufacturing water treatment systems of this scale and complexity with strict performance and safety requirements.
- Provide an optimum equipment arrangement with an objective to minimize footprint.
- Provide start-up assistance, training and service as needed.

A detailed scope of supply for the equipment and services proposed are provided in the following sections.

If you have any questions regarding our proposal, please do not hesitate to contact me.

Sincerely,

Kevin Gomes
Water Treatment Technologist
H2O Engineering Inc.

189 Granada Drive
San Luis Obispo, CA 93401
Email: kgomes@h2oengineering.com
Tel: (805) 547-0303
Cell: (805) 704-1337

Table of Contents

2 H2O Engineering Scope of Supply

2.1 Mobile Ozone Sparge System

All ozone wetted parts to be of ozone compatible materials (i.e., stainless steel, glass, PVDF, PTFE, and Viton)

Ozone output verification will be performed upon completion of fabricating the ozone sparge system. This system is an air-cooled piece of equipment. Adequate ventilation is required to ensure reliable operation.

2.1.1 Design basis

- The sparge system is rated to produce 104 g/h (5.5 lb/day) of ozone. Ozone pressure will be boosted through a diaphragm pump to a maximum 50 psi.
- Oxygen will be created by two oxygen concentrators, each providing 90-95% pure oxygen at 30 SCFH at 10 psi
- Blend air will be supplied from a compressor, providing 3.5 SCFM at up to 90 PSI
- Generated ozone will be routed through a 20-point manifold.
- Manifold will connect to up to 20 sparge points using ½-inch OD PFA tubing
- Sparge flow rate for each sparge point is up to 4 SCFM
- Maximum sparge pressure is 50 PSIG, breakthrough sparge pressure is 90 PSIG

2.2 Kaeser 5 HP Air tower,

- Built in tank and refrigerated dryer.
- Maximum air / breakthrough sparge pressure of 90 PSI

2.2.1 Oxygen Concentrators, 2 each

- Each calibrated to deliver 30 SCFH of 90 to 95% purity oxygen at a maximum delivery pressure of 10 PSIG

2.2.2 Oxygen Purity Monitor

- Oxygen purity monitor located upstream of ozone generators to alarm if purity falls below 85%

2.2.3 Ozone Generators, 2 each

- 104 g/h total (5.5 lb/day) at up to 5% by weight ozone from oxygen at 60 SCFH, 10 PSIG
- Integrated alarms with dry contact to PLC
- Backpressure regulators downstream of generators to control feed gas pressure, provide optimum ozone output, and isolate ozone generators from variable manifold pressure

2.2.4 Ozone Delivery Pump

- Inlet pressure at 10 PSIG
- Outlet pressure at up to 50 PSIG

2.2.5 Ozone Delivery Manifold

- Delivery flow and pressure displayed and logged via PLC, viewable from HMI and telemetry
- Maximum air / breakthrough sparge pressure of 90 PSI
- 20 solenoid valves
- 1/2" OD Kynar compression fittings

2.3 Mobile Ozone Sparge System Enclosure

2.3.1 Dimensions

- Overall Dimensions: 11'9"L x 6'9"Wx 6'8"H

2.3.2 Trailer

- Single axle, spare tire, stabilizer jacks, 2" ball hitch, hitch lock, 4 way flat trailer plug
- Access ports in walls/floors, as appropriate, for ventilation, air supply lines and ozone discharge lines
- Exterior painted white
- Exterior service disconnect/emergency switch located on side wall of trailer
- Interior lighting and 10A convenience outlet

2.3.3 Interior ozone monitor

- Connected to system PLC
- Alarm set point: 1.0 ppmv

2.3.4 Temperature Control

- Wall mount electric heater
- Interior foam-board and plywood insulation of walls and roof
- PLC controlled fan ventilation
- One 12" exhaust fan in side wall

2.3.5 Other

- Startup Service Kit included for initial 6 months of O&M
- Full one-year warranty includes materials and workmanship
- Service contracts and start-up assistance available

2.4 Control System

- Automatic regression from ozone to air / breakthrough mode upon high pressure detection
- User selectable delivery gas for each sequence step (ozone or oxygen, either with or without air flow boost, or air flow boost only)
- Independent time duration control for each sequence step (programmable from 1 to 120 minutes)
- User configurable valve sparge sequence ordering, allows user to repeat valves within the sequence or change sparge sequence order without plumbing changes
- Variable ozone output can be individually configured for each valve (10-100%)
- Automated maintenance notifications
- Automated email alarm notifications, up to 3 email addresses
- PLC based system located on interior wall of trailer
- Total system power consumption monitored by PLC
- Allen Bradley PanelView Plus 400 4" Human Machine Interface (HMI) with touch pad to allow modification to programming while operating
- Cell-phone based telemetry system included (Verizon Wireless service contract required)
- Onboard VNC Server to allow control and monitoring of system from multiple computers, tablets, smartphones (free apps available)

2.5 Electrical Requirements

- Final electric service connection (240V/60 Hz, 60A) by others
- All control panel components to be UL 508A listed

2.5.1 Sparge Well Material Specifications

2.5.1.1 In-situ Oxidation Point: IOP100-12-P

- Stainless Steel Body
- (16) 3/8" x 1-1/2" Outlets
- 50 mesh internal stainless screen
- 1" x 8 T.P.I. F-480 Male Flush Thread w/ Viton® O-ring

2.5.1.2 Riser Pipe: RP100

- 1"ID x 10'L with Viton® O-ring
- Sch. 80
- 1" x 8 T.P.I. F-480 Male Flush Thread

2.5.1.3 Riser Pipe: RP100-5

- 1"ID x 5'L with Viton® O-ring
- Sch. 80
- 1" x 8 T.P.I. F-480 Male Flush Thread

2.5.1.4 Well Head Connection: WHC10

- ¼" Stainless Steel Tee
- ¼" Stainless Steel Plug

- ¼” Stainless Steel Nipple
- 1/2” Compression fitting for ozone delivery tubing
- 1” Slip Sch. 80 Union with insert

2.5.1.5 Ozone Delivery Tubing: TUB-PFA-8

- PFA
- 1/2” OD x 3/8” ID

2.5.1.6 Ozone Resistant Monitoring Well Plugs

- Available in 2” and 4” sizes
- Standard monitoring well plugs cannot withstand ozone gas and will leak over a short period of time
- Ozone resistant sealing gasket prevents ozone from short circuiting from an active sparge well to a nearby monitoring well

2.5.2 Other Equipment and Service Options

2.5.2.1 Portable Oxygen Purity Analyzer: ACC-112

- Range: 0-100 % O2
- Display: digital readout in .01 % increments
- Includes flow cell and 10 ft. cable
- Size: 4.62 x 2.5 x 1.5 in.
- Weight: 1.37 lb
- Power requirements: 9V battery
- Battery Lifetime: 1400 hours approx.

2.5.2.2 Hand-held Passive Ambient Ozone Monitor: ACC-105

- Range: 0-10 ppm; sensitivity as low as .02 ppm
- Display: digital readout in .01 ppm increments
- Measurement principle: HMOS (heated metal oxide semiconductor) sensor
- Size: 50 × 100 × 25 mm (2 × 4 × 1 in)
- Weight: 170 grams (6 oz)
- Power requirements: 12 VDC unregulated; AC adapters available worldwide
- Battery: Rechargeable batteries last more than 8 hours

2.5.2.3 Portable Gas Leak Detector: ACC-175 + ACC-175a

- Range: Ozone, 0-5/200 PPM (20 PPM Std.)
- Display: Back-lit graphics liquid crystal display
- Accuracy: ± 5% of value
- Sensitivity: 1% of sensor module range
- Outputs: RS-232 output of stored gas values
- Memory: 12,000 data points
- Storage Interval: Programmable from 1 minute to 60 minutes
- Typical Capacity: 8 days at 1 minute storage interval
- Alarms: Three concentration alarms (caution, warning, and alarm with adjustable setpoints)
- Low flow and low battery alarms
- Alarms displayed on LCD & Indicated by audible beeper
- Power: D cell battery, alkaline recommended, 75 hours operation

- Internal rechargeable Nicad for backup power, 6 hours operation
- 120 or 220 VAC chargers available
- Operating Temp.: -25º to +55ºC
- Humidity: 0-95% Non-condensing
- Detector Material: Glass Filled Polycarbonate
- Includes Carrying Case
- Size: 3.5”(W) x 9”(H) x 5.5”(D)
- Shipping Weight: 7 lbs. (3.2 Kg.)

2.5.3 Service & Maintenance Kit Specifications

2.5.3.1 6-Month Service Kit: SKM52-06-B

(Parts are subject to change based on final design specifications.)

- (4) V-C-104 1/4' MPT 316SS Check Valve
- (1) S-IFS-100-F Filter Element for 1/4' Bowl
- (2) S-IFS-101-F Filter Element for 3/8' Bowl
- (3) S-FB-100-F Water Separator Filter & O-Ring

2.5.3.2 12-Month Service Kit: SKM52-12-B

(Parts are subject to change based on final design specifications.)

- (4) V-C-104 1/4' MPT 316SS Check Valve
- (2) MI-100 Oxygen Moisture Indicator
- (1) S-ECH-O3-200-A O3 Sensor, 0-2ppm Replacement Ozone Sensor
- (1) V-PR-101 Manifold Pressure Relief Valve, 100psi
- (2) V-PR-207 Oxygen Pressure Relief Valve, 45psi
- (1) S-IFS-100-F Filter Element for 1/4' Bowl
- (2) S-IFS-101-F Filter Element for 3/8' Bowl
- (3) S-FB-100-F Water Separator Filter & O-Ring
- (1) S-V-S-103-SK Solenoid Valve Rebuild Kit
- (1) S-CMP-O3-100-SK ODP Compressor Rebuild Kit
- (2) S-CMP-O2-110-SK Oxygen Compressor Rebuild Kit (GSE)
- (1) S-CMP-AFB-100-SK Air Flow Booster Compressor Rebuild Kit

2.5.4 Disclosures

2.5.4.1 General

All quotes/proposals are good for 30 days from date of submission to the Customer. H2O Engineering reserves the right to increase previously quoted pricing after the 30 days.
Any and all recommendations specific to the site remediation strategies made by H2O Engineering, Inc., are based solely on the data provided by client.

2.5.4.2 Rentals

Rentals are available on a first-come, first-served basis. A rental is considered reserved when a signed rental agreement, security deposit and first month's rent are received by H2O Engineering.
Rate does not include sales tax, handling, freight or transportation costs to location, or loading/off-loading, unless otherwise indicated.
All shipments are FOB San Luis Obispo, CA.
Shipping, installation and start-up assistance of system are quoted separately, unless otherwise indicated.
Rental delivery lead time is based on availability.

2.5.4.3 Purchases

Price does not include sales tax, handling, freight or transportation costs to location, or loading/off-loading, unless otherwise indicated.
All shipments are FOB San Luis Obispo, CA.

2.5.4.4 Sparge Well Materials

Price does not include sales tax, handling, freight or transportation costs to location.
All shipments are FOB San Luis Obispo, CA.
Materials delivery lead time is based on availability.

2.5.4.5 Start-Up Assistance Estimate

Based on onsite labor, travel, prep reporting, accommodations, meals, transportation and fuel.
Company vehicles mileage expenses will be invoiced at $.55/mile.
Hotel, airfare, rental car and related travel expenses will be invoiced at 1.15 times the cost.
Meal, unless otherwise indicated, will be invoiced at $52.00 per day.

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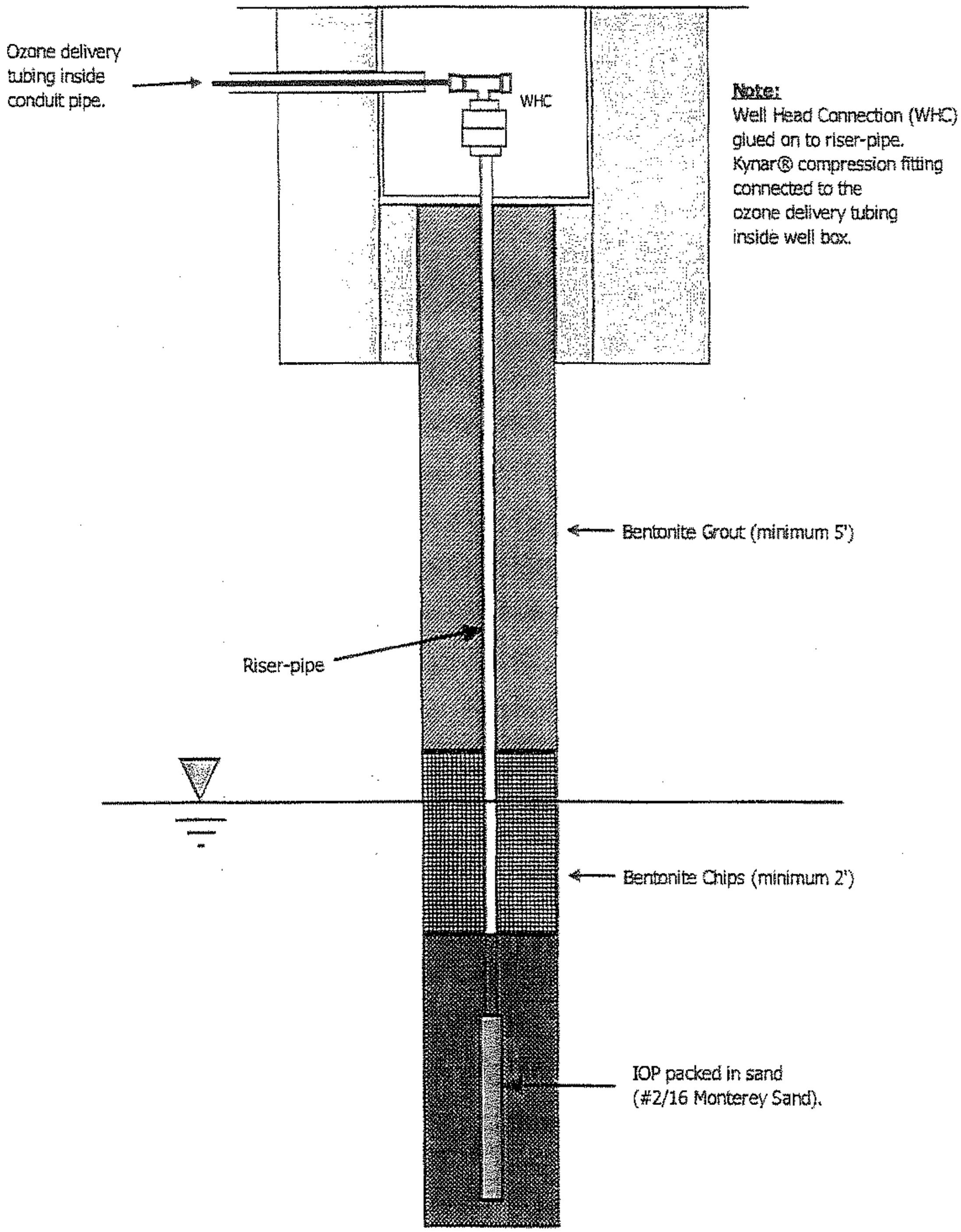
In Situ Oxidation Point (IOP) Sparge Well Installation Diagram



H2O Engineering Inc.

* This is a typical sparge well installation. Please check your state and local requirements for an engineering standard sparge well construction. California Department of Water Resources Bulletin No.74-81 and 74-90: "Water Well Standards: State of California"

APPENDIX E

QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS PARTICIPATING IN THIS CORRECTIVE ACTION PLAN

CADE BURGIN, PE

ENVIRONMENTAL AL TEAM LEADER

YEARS OF EXPERIENCE

Thompson: 1 years
Total: 7 years

EDUCATION

BS, Environmental Engineering, Louisiana State University, 2016

REGISTRATIONS

Professional Engineer:
AL #40475
FL #98413
LA #0048131
MS #34289
TN #129457

ADDITIONAL SKILLS

OSHA 40-Hour Safety Training for Hazardous Waste

USACE 30 HR General Industry Course

USACE Anti-Terrorism Level 1

USACE Controlled Unclassified Information (CUI)

USACE Defensive Driving

Mr. Burgin is an Environmental Engineer with a strong background in site restoration. Prior to joining Thompson, Mr. Burgin managed multiple task orders for the Hazardous, Toxic, and Radiological Waste section of the U.S. Army Corps of Engineers. Task orders consisted of Installation Restoration Program support to include specific tasks such as monitoring well installation, groundwater monitoring, soil remediation, soil sampling, landfill cap inspections, and landfill cap maintenance. Mr. Burgin is equipped with the technical skills necessary to complete large, complex environmental restoration projects. Mr. Burgin also served as the environmental point of contact on the project delivery team for military construction projects. Additionally, with his background in federal government work, Mr. Burgin understands the lifecycle of funds and the urgency to obligate them prior to their expiration.

PROJECT HIGHLIGHTS

- Loxley Corn Branch Stream Restoration – Loxley, AL
- Mobile Bay National Estuary Program, Marlow Stream Restoration – Mobile, AL
- Bay Springs Dredging Permit Modification – Tishomingo County, MS
- Forest Heights Public Outreach Meetings – Gulfport, MS (USACE, Mobile District)
- Tyndall Air Force Base Zone 1 Rebuild Construction Support
- Tyndall Air Force Base Installation Restoration Program Sites Support
- Lead and Asbestos Containing Materials Surveys – Pensacola, FL
- Luke Rivers Road Bridge Permit – McIntosh, AL

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cburgin@thompsonengineering.com

thompson
ENGINEERING

PROJECT EXPERIENCE

Loxley Corn Branch Stream Restoration, Loxley, AL – Responsible for obtaining USACE Nationwide Permit 27. Tasks include completing and submitting Pre-Construction Notification as well as coordinating with the USACE to obtain an issued permit.

Mobile Bay National Estuary Program, Marlow Stream Restoration, Mobile, AL – Completed warranty inspection to determine plant maturation.

Mobile Bay National Estuary Program, Fowl River Restoration, Mobile, AL - Served in a quality control role by reviewing plans and specifications prior to being issued for bid.

Bay Springs Dredging Permit Modification, Tishomingo County, Mississippi – Responsible for submitting permit modification request and obtaining dredge permit modification from the USACE.

Forest Heights Public Outreach Meetings, Gulfport, Mississippi (USACE, Mobile District) – Thompson's project manager on the ResilienT team to provide support to the USACE to facilitate and hold two public meetings for the residents of Gulfport, MS to inform them of the levee improvement project that is to be constructed.

Tyndall Air Force Base Zone 1 Rebuild Construction Support, (Hensel Phelps and AIS) Ongoing - Project manager. Coordinated weekly construction stormwater quality control (QC) inspections, hazardous waste determination, performed stormwater QC inspections, completed inspection reports, and compiled them to submit as monthly invoice supporting documentation. Also coordinated with fellow engineers and co-workers to design the Site 5 soil stockpile area in accordance with applicable specifications and regulatory requirements, communicated with clients and contractors to confirm all design requirements were met, and completed and submitted FDEP ERP application that encompassed all aspects of the project from wetland impacts to stormwater controls.

Tyndall Air Force Base Installation Restoration Program Sites Support, (USACE Mobile District) Ongoing – As a subcontractor, serve as project manager, technical lead, and field supervisor for the investigation of three sites at Tyndall Air Force Base. Completed front end, project management documents, and reviewed additional management documents required by the Performance Work Statement. Reviewed work plans for upcoming field work and will serve as the field supervisor for sampling activities. Additional duties include QA/QC for investigative reports; general consultant to the prime AE firm; coordinate between the USACE, Installation, prime AE firm, and all other subcontractors to schedule and complete fieldwork; represent Thompson and the prime AE firm by attending partnering meetings, monthly status calls, and any additional impromptu meetings.

Lead and Asbestos Containing Materials Surveys, Pensacola, FL – Project Manager. Coordinated between the client and subcontractor to schedule field activities and deliverables due dates as well as QA/QC all project deliverables.

Luke Rivers Road Bridge Permit, McIntosh, AL, Ongoing - Responsible for obtaining USACE Nationwide Permit 14. Tasks include completing and submitting Pre-Construction Notification as well as coordinating with the USACE to obtain an issued permit.

Wolf Bay Bridge permit, Orange Beach, AL, Ongoing – Worked with the project team in a technical support role to obtain USCG and USACE permits for new bridge construction.

Baughman Rd Incised Pit Certification, Silverhill, AL, Ongoing – Project manager and QCP. Conduct site visits to certify that the site is being operated as an incised pit, according to the issued permit. Complete and submit certification letter to the ADEM. Consult with client to solve miscellaneous permitting tasks.

Harcros Chemical Best Management Practices Plan, Muscle Shoals, AL – Completed Best Management Practices Plan for the Harcros Chemicals Facility located in Muscle Shoals, AL.

Mobile Civic Center Hazardous Materials Survey, Mobile, AL – Project Manager. Directed field activities, QA/QC for field activities and project deliverables, and coordinated with all stakeholders on scheduling.

Alabama State Port Authority Dredge Support, Mobile, AL, Ongoing – Serve on the project team to provide support to the Alabama State Port Authority (ASPA) Dredge Program. Maintain quality communications with the ASPA and complete construction specifications in a timely manner to issue for bid.

Fort Rucker Performance Based Contract (PBC), Fort Rucker, AL – Served as the technical manager for the Fort Rucker PBC for 3 years. The Fort Rucker PBC provided services needed for compliance with Fort Rucker's waste permit with the ADEM. Many of the sites covered in the permit are former landfills that were closed in previous years. As technical manager, Mr. Burgin completed reviews of groundwater monitoring reports, remedial investigations, monitoring well installation and abandonment work plans, and site inspection reports. Mr. Burgin also provided field oversight for monitoring well installation and abandonment, groundwater sampling, soil sampling, and landfill cap inspections.

Florida Central Optimized Remediation Contract (ORC), Tampa FL and Avon Park, FL – Mr. Burgin served as the contracting officer representative (COR) and technical manager on the Florida Central ORC. As COR and technical manager, Mr. Burgin completed reviews on remedial investigation work plans, groundwater monitoring reports, monitoring well abandonment work plans, and site inspection reports.

Fort McClellan Support Task Order, Fort McClellan, AL – Mr. Burgin served as the technical manager on a task order that provided MNA sampling, Five Year Review, and land use control support to Fort McClellan. As technical manager, Mr. Burgin completed reviews on groundwater monitoring reports, a Land Use Control Implementation Plan, a Land Use Control Implementation Report, and a Five-year Review. Mr. Burgin also assisted with site inspections as part of the Five-Year Review process.

Anniston Army Depot Enhanced Groundwater Interceptor System (eGWIS) Optimization Design, Anniston, AL – Mr. Burgin served as the COR and environmental engineer on the eGWIS

STEPHEN M. O'HEARN, PG, LEED AP

PRINCIPAL

ASSIGNMENT
Principal/Sr. Consultant

FIRM
Thompson Engineering, Inc.

YEARS OF EXPERIENCE

With This Firm:	30
Total:	30

EDUCATION
BS/Geology, University of South Alabama, 1993

ACTIVE REGISTRATIONS
Professional Geologist:
Alabama #0841
Arkansas #1876
Florida #2348
Mississippi #0028
Tennessee #4984

LEED Accredited Professional

EXPERIENCE AND QUALIFICATIONS

Mr. O'Hearn is Thompson's Environmental Manager. He manages environmental engineers, geologists, biologists, scientists, GIS specialist, and planners assigned to the Environmental Services Group. He has also performed as a Project Manager and/or environmental technical lead on various types of projects.

His technical experience includes:

- National Environmental Policy Act (NEPA) studies
- Soil and groundwater contamination
- Phase I and Phase II Environmental Site Assessments
- Underground Storage Tank (UST) assessments and closures
- Subsurface explorations (push-probe and conventional drilling techniques)
- Monitor well installation, development, and monitoring
- Environmental sampling
- Indoor air quality
- Brownfields investigations
- QA/QC protocol
- Corrective action plans
- Risk-based corrective action evaluations

PROJECT EXPERIENCE

Coastal / Stream Restoration

Mobile Bay National Estuary Program (MBNEP), Deer River Shoreline Stabilization and Marsh Creation, Mobile County, AL, Ongoing – Principal for the creation of an additional 30-acres of marsh to restore the island and to enhance/create aquatic, wetland, and upland habitats. The project also involved dredging of Deer River with thin-layer placement to enhance marsh resiliency, installation of breakwaters to stabilize the shoreline, and the evaluation of borrow material for fill. The project involved subsurface investigations, permitting, alternatives evaluation (living shoreline, marsh configuration, etc.), engineering design, and construction inspection.

Alabama Dept. of Conservation and Natural Resources (ADCNR), Marsh Island Restoration, Portersville Bay, Mississippi Sound, Ongoing – Project Manager for the restoration of salt marsh and provide shoreline protection at Marsh Island in the Mississippi Sound. The Island had been experiencing 5-10 ft. of shoreline loss per year. The project included the placement of 3,500-ft. of OysterBreakTM structures to stabilize the shoreline of the existing 20-acres and the creation of an additional 50-acres of marsh. The project also included permitting, hydrologic modeling, tidal creeks, borrow source investigation and placement of dredged material for fill, and planting native marsh vegetation.

Mobile Bay National Estuary Program (MBNEP), Mon Louis Island Shoreline Stabilization, Mobile County, AL, Ongoing – Sr. Project Manager for the creation of an additional 4-acres of marsh to restore the island and to enhance/create aquatic, wetland, and upland habitats. The project also involved dredging the Fowl River Federal Navigation Channel, installation of a rubble mound breakwater to stabilize the shoreline, and the evaluation of borrow material for fill. The project involved subsurface investigations, permitting, alternatives evaluation (living shoreline, marsh configuration, etc.), engineering design, and construction inspection.

Mobile Bay National Estuary Program, Regenerative Step Pool Storm Conveyance (SPSC), Baldwin County, AL, 2014 – Project Manager for a SPSC system that was designed and constructed to repair a deeply eroded steam channel and to dissipate energy of higher flow events. The network consisted of rock riffles, boulders, and 25 plunge pools to stabilize the 1,000-ft. slope. The project also included restoration of degraded wetlands severely impacted by sedimentation including sediment removal and wetland plantings. This type of project is a first in Alabama and received awards from the EPA and the International Green Apple Award.

City of Fairhope, Fly Creek Restoration Evaluation, Fairhope, AL, 2014 – Project Manager for the Fly Creek restoration evaluation to identify measures to restore natural resources in the coastal stream and its associated watershed. The watershed that feeds Fly Creek is 5,018-acres. The areas of restoration focused on degraded streams and wetlands, stormwater management, land use practices, preservation of natural areas and open space, and the creation of riparian buffer.

City of Gulf Shores, Master Plan for Public Beach and Little Lagoon, Gulf Shores, AL, 2014 – Project Manager for the development of a Master Plan for the City's vision of a "Small Town, Big Beach" that would make Gulf Shores a world-class beach destination. The project involved stakeholder interview and analyses, a design charette, development of three alternatives, and conceptual design including low impact development (LID) practices. The budget was developed using a phased approach with a rough order of magnitude cost totaling $29-million.

Kinder Morgan, Gulf LNG Marsh Creation, Pascagoula, MS, 2016 – Project Manager for the creation of a 50-acre tidal salt marsh area in the Mississippi Sound. The marsh designinvolved establishing elevations for the breakwater and marsh, intertidal creeks/channels, and mudflats. The project included subsurface exploration, topographic and hydrographic surveying, various design configurations, coastal modeling, evaluation of suitability of fill materials, settlement predictions, permitting assistance, and shoreline stabilization (breakwater) design.

Mobile Bay National Estuary Program, Weeks Bay Watershed Management Planning, Baldwin County, AL, Ongoing – QA/QC Manager for the development of a Comprehensive Watershed Management Plan to restore or conserve the Weeks Bay Watershed and improve water and habitat quality. The Watershed encompasses 130,000-acres and includes the Fish River and Magnolia River drainage basins. Key factors of the plan include watershed characterization, wetlands assessment, delineation of watershed management units, sea level rise and climate change assessment, conceptual engineering, and public outreach.

The Nature Conservancy, Coastal Process Analysis for the Pelican Point Living Shoreline, Baldwin County, AL, Ongoing – Project Manager for the evaluation of the shoreline due to the construction of the Pelican Point Living Shoreline project. Recommendations included a path forward involving beach nourishment, long-term shoreline monitoring, and modeling. During the project, data gathering and evaluation included local and regional sediment budgets; wind, wave, current, and tidal information; borings; topographic, bathymetric, and pre/post construction surveys (TNC/DISL); and shoreline change analysis based on historical aerial photographs. The summary report included data findings, gaps, and assessment of viability and summarized seasonal variability with regards to sediment movement along the shoreline, erosion/depositional trends, and general shoreline response at the living shoreline project.

Alabama State Port Authority (ASPA), Choctaw Point Terminal, Design of Mitigation Areas, Mobile, AL – Environmental Manager for the detailed design, preparation of construction documents, and construction oversight for the wetlands mitigation project. The scope involved the restoration and creation of tidal marsh in three areas, totaling over 57 acres, to replace wetlands and water bottoms that were lost during the development of the terminal. The mitigation sites required significant soil excavation and removal to establish elevations and hydrologic regimes appropriate for the marsh plant community. The topography, soils, and local tidal hydrology were evaluated to ensure creation of a productive marsh to support fish, macroinvertebrate, and wildlife communities.

Ecological Investigation

Alabama Power, Wetland and Ecological Services, Statewide, AL, Ongoing – Project Manager for the delineation of wetlands and locating threatened and endangered species. The project has included over 574 miles of powerline maintenance in existing easements as well as new alignments throughout the State. In total, more than 1,300 wetlands have been delineated and more than 1,600 endangered species have been identified.

Eglin Air Force Base, Wetlands Delineation and Permitting, Florida – Environmental manager for the wetland delineations and permitting on five replacement bridges on Range Road 211 and for a new Sniper KD Range. Thompson Engineering performed Design/Build services for replacement of failed one-lane bridges in the northern area and construction of a new sniper firing range on Eglin AFB near Crestview. Jurisdictional wetlands were delineated and marked in the field at the five bridge locations and a wetland survey report prepared. Mr. Eubanks coordinated with the U.S. Army Corps of Engineers, Jacksonville District and the Florida Department of Environmental Protection regarding compliance with the required wetland permits for replacement of these bridges and the sniper range.

City of Fairhope, Development of LID Regulations and Incentives, Fairhope, AL, 2015 – Project Manager for the development of Low Impact Design (LID) Allowances Plan to provide a set of standards for the use of LID techniques in the

City (15+ sq. miles) and the planning jurisdiction (73+ sq. miles). The plan addressed design considerations for wet basins, rain gardens, permeable pavement systems, sand filters, grass swales, grass buffers, wetland channels or wetlands, step pool stormwater conveyance structures, in-line stormwater storage, site design for wetlands and water body conservations, restoration of habitat or wetlands and water bodies, greenways, restoring channel morphology and natural function, bio-retention, and level spreaders.

Dredging / Dredge Material Evaluation

Plains Marketing, Maintenance Dredging, Mobile, AL, 2016 – Project Manager for routine dredging maintenance that involves contract dredging, sediment characterization, dredge plans and specifications, permitting, dredge disposal coordination, hydrographic survey, certification of removed volume, and construction inspection. The area encompasses three acres and is in the vicinity of the Plains bulk loading dock along the Mobile River. Dredging is performed to a depth of -44 MLLW and dredge materials are disposed of in a Dredge Material Management Area (DMMA). As part of the scope, material must be removed from the DMMA for off-site disposal.

City of Pass Christian Harbor Expansion, Pass Christian, MS – Environmental Scientist for a 20-acre harbor basin. The project involved development of an environmental permit application and dredging as well as design and construction of berths and breakwater protection. Ms. Montgomery developed a sampling analysis plan for chemical and bioaccumulation analyses of dredge materials, oversaw vibracore sampling in the Mississippi Sound, and developed the characterization report using analytical and bioaccumulation results.

NEPA (EIS, EA, CE)

Alabama Department of Transportation, NEPA Documentation (CE), I-10 Texas Street – Environmental Manager - Due to high number of traffic incidents at the west tunnel entrance/exit at Interstate 10 at the Mobile River, ALDOT selected Thompson Engineering to provide turn-key services for all aspects of the design and preparation of National Environmental Policy Act (NEPA) documentation which included tasks such as: public involvement, conceptual design, environmental impact analysis, social/economic analysis, and alternative analysis.

Florida Department of Transportation, Permitting/Categorical Exclusion, Escambia County, FL, 2009 – Thompson's responsibilities include: preliminary project research; permitting; the establishment of wetland jurisdictional lines; the preparation of aerial maps showing the jurisdictional boundaries of wetlands and surface waters; coordination with State environmental agencies (ADEM and FDEP), U.S. Army Corps of Engineers, and acquiring verification of the jurisdictional lines; identification of and type of impacts of wetlands within the project limits; field reviews; and written assessments. In addition, the project required a FHWA NEPA document (categorical exclusion) to be performed.

Calhoun County Highway Department, Environmental Assessment, Calhoun County, AL, 2004 – Project manager for the NEPA portion of 8 FEMA funded evacuation routes. Thompson Engineering was selected to provide turn-key environmental, engineering design, survey, and construction management of this ten million dollar project. Mr. O'Hearn and his team provided the preparation of eight environmental documents which included replacement of seven bridges and upgrades to an approximate 12 mile road section.

Baldwin County Highway Department, Environmental Assessment, Baldwin County, AL – Project Manager for the development of a FHWA NEPA document for a 12-mile section of roadway for a Hurricane Evacuation Route along County Road 83. Thompson Engineering provided public involvement; regulatory coordination; wetlands assessment; threatened and endangered species survey; and cultural resources survey.

Alabama Department of Transportation, Environmental Assessment, Baldwin County, AL – Project manager for the development of a FHWA NEPA document for a 1-mile section of roadway and new I-10 Interchange for a Hurricane Evacuation Route along County Road 83. Thompson Engineering was selected to provide turn-key environmental, engineering design, and surveying services.

Florida Department of Transportation, Environmental Assessment, 3rd District – QA/QC manager for the development of ten environmental evaluations located throughout the 3rd District. Thompson Engineering was selected to provide turn-key environmental and engineering analysis.

Mississippi Army National Guard, Environmental Assessment, Camp Shelby, MS, 2005 – The Mississippi Army National Guard (MSARNG) required an Environmental Assessment to address the impacts that would potentially result from the construction and operation of a new Wastewater Treatment Facility and the closure of the existing Wastewater Treatment Plant. The purpose of this EA is to identify and discuss the anticipated environmental and socioeconomic impacts and to determine whether the proposed action has the potential to create significant impacts on the environment which would warrant a more detailed study of the possible impacts, mitigation, alternative courses of action, and preparation of an Environmental Impact Statement (EIS) to address the action.

Troup County, Environmental Assessment, LaGrange, Troup County, GA, 2005 – Project Manager for development of a NEPA document to evaluate two primary actions: (1) conduct a limited public involvement effort to solicit the opinions of the public on proposed Celebration Center; and (2) prepare an EA and "Finding of No Significant Impact" (FONSI) to address the environmental effects attributable to the Celebration Center and related development activities within the Pyne Road Park.

U.S. Department of Veterans Affairs and Tennessee State Veterans Homes Board, Environmental Assessment, Cleveland, Tennessee – QA/QC Manager for the development of a National Environmental Policy Act (NEPA) EA for a new 108 bed 98,000 sq. ft. living facility. The EA was prepared to comply with Department of Veterans Affairs requirements as part of a grant application. Thompson Engineering provided a Phase I ESA and EA that included; regulatory coordination; wetlands assessment; threatened & endangered species survey; cultural resources survey; and facility design.

University of South Alabama, Specialized Laboratory Environmental Assessment (EA), Mobile, AL, 2010 – Project Manager for the development of a National Environmental Policy Act (NEPA) EA for a new 25,800 sq. ft. facility that will contain BSL-2, BSL-3, and ABSL labs. The EA was prepared to comply with National Institutes of Health (NIH) requirements as part of a grant application. Thompson Engineering provided a Phase I ESA and EA that included; regulatory coordination; wetlands assessment; T&E and cultural resources survey; and safety and security evaluation.

Regulatory Compliance and Permitting

Alabama State Port Authority, EPA Stormwater Compliance, Mobile, AL, 2010 – Project Manager for ensuring compliance with the Port's NPDES Stormwater Permits. Thompson Engineering reviewed existing documents and provided civil engineering, environmental consulting, and surveys to locate inlets, drainage, and outfalls; verified boundaries/operational limits and tenant locations; determined drain paths, possible pollution sources and impacts; permitting; BMP and SPCC plans revisions; and facility diagram updates.

Alabama Department of Transportation, Alabama Department of Environmental Management's Consent Agreement (CA), Mobile, AL – Project Manager for the U.S. Highway 98 Relocation project for environmental compliance requirements from multiple governmental agencies on the $21 million 8-mile long grade/drain/and bridge.

CB&I Fabrication Facility, Site Development, New Hope, Marion County, TN, 2010 – Project Manager for the environmental portion of the site development team. Thompson Engineering provided environmental consulting services that included preparation of all permitting documents; such as, the TDEC Aquatic Resource Alteration Permit (ARAP), the TDEC storm water construction permit (NOI) and Storm water Pollution Prevention Plan (SWPPP), the joint TVA/USACE Form 26A, and the TDEC air permit. All services are provided under an accelerated time schedule with close coordination with the regulatory agencies having oversight of the water quality impacts, wetlands, threatened and endangered species, and historical and cultural resources.

Asbestos, Lead Based Paint, Hazardous Materials

Retirement Systems of Alabama (RSA), Van Antwerp Building Renovations, Mobile, AL – Project Manager / Environmental Consultant for the performance of the Hazardous Materials Survey and Abatement during the renovation of the 11-story, 58,300 sq. ft., historic Van Antwerp Building that was constructed in 1908 in downtown Mobile. The project also includes adding 11-stories totaling over 16,000 sq. ft. on the west side of the existing building. Environmental services included a pre-renovation hazardous materials survey, abatement plans and specifications, and asbestos abatement oversight during demolition activities. Thompson is also responsible for the structural engineering design for the demolition, renovation, and addition as well as the building envelope inspections for the windows, roofing system, and facade.

Moss Construction Services, Roger Williams Housing Development, Hazardous Materials Survey, Civil & Hazmat Demolition Plan, Air Monitoring, Mobile, AL, Ongoing – Sr. Project Manager for the performance of the Hazardous Materials Survey prior to and during the demolition of the buildings and roads. The survey identified asbestos-containing materials, lead-based paint, and other hazardous and regulated materials. Thompson Engineering provided abatement plans, civil engineering demolition plans, abatement air monitoring and inspection services, quality monitoring, and NPDES permitting services.

Retirement Systems of Alabama, GM Building Hazardous Materials Survey, Mobile, AL, Ongoing – Project Manager for the performance of the Hazardous Materials Survey prior to and during the total renovation of a 34-story, high-rise office building. The survey identified asbestos-containing materials, lead-based paint, and other hazardous and regulated materials. Thompson Engineering provided abatement plans, structural engineering services, inspection of the building envelope, water tightness testing, contract administration, abatement air monitoring and inspection services.

Retirement Systems of Alabama, GM Building Asbestos Abatement Consulting, Mobile, AL, Ongoing – QA/QC Manager for providing asbestos and lead-based paint consulting services for the renovation of a 34-story high-rise office building in downtown Mobile. The building was constructed in 1965 and structural steel was coated with asbestos containing fireproofing. Thompson Engineering prepared detailed abatement plans and specifications for the abatement of lead-based paint and asbestos and conducting air monitoring during removal.

Soil and Groundwater Assessments / Remediation

Alabama Department of Transportation, I-10 River Bridge Preliminary Investigation, Mobile County, AL, Ongoing – Sr. Project Manager/QA/QC Manager for performing a hazardous materials preliminary investigation for the proposed I-10 Mobile River Bridge at ten properties located within the proposed bridge and/or right-of-way project limits. The project involved performing borings, soil and groundwater sampling, temporary well installation, chemical testing, and reporting. In addition, Ms. Montgomery has worked on the following projects for ALDOT performing soil and groundwater assessments and remediation.

- U.S. Highway 72 Interchange Project, Madison Co., AL
- SR-35 Widening Project, Jackson Co., AL
- SR-181 Widening Project, Baldwin Co., AL
- CR-83 Widening Project, Baldwin Co., AL
- SR-13 Interchange Project, Washington Co., AL

Carter Oil Company, ADEM UST Soil and Groundwater Remediation, Sheffield, AL, Ongoing – Sr. Project Manager for multiple UST soil and groundwater remediation projects at a petroleum bulk storage and fueling facility. Responsibilities since 2010 have included coordination of monitor well installations and free product recovery activities, coordinating soil and groundwater sampling, analysis of data for remediation recommendations, writing Preliminary, Secondary, and Groundwater Monitoring Reports including GIS and CAD mapping, completing an ARBCA and CAPs, air and underground injection control permitting, coordinating the installation of an ozone sparging system, completing the ozone system CAI Report, reviewing bi-weekly operations and maintenance inspections of ozone sparging system, writing quarterly ozone CAE Reports including GIS and CAD drafting, etc. Currently coordinating chemical injection activities.

Nick's Conoco, ADEM UST Soil and Groundwater Remediation, Prichard, AL, Ongoing – Sr. Project Manager for multiple UST soil and groundwater remediation projects at an active retail gas station. Responsibilities since 2007 have included supervision of monitor well installations and free product recovery activities, performing/coordinating soil and groundwater sampling, analysis of data for remediation recommendations, writing Preliminary, Secondary, and Groundwater Monitoring Reports including GIS and CAD mapping, completing Alabama Risk Based Corrective Action Assessment (ARBCA) and CAPs, NPDES and air permitting, coordinating the installation of a dual phase extraction system, and completing the dual phase system CAI Report. Currently coordinating the bi-weekly operations and maintenance inspections of the dual phase system and the quarterly groundwater sampling events and writing quarterly dual phase CAE Reports including GIS and CAD drafting, etc.

Continental Motors, CMIP and Corrective Measures Implementation, Mobile, AL, Ongoing – QA/QC Manager for multiple projects at the site involving the presence of cyanide in soil and groundwater. The project involved an initial subsurface investigation, neutral sump release investigation report, development of a Corrective Measures Implementation Plan (CMIP), UIC Class V Well Permit application, soil and groundwater sampling / monitoring, Vertical Badger System Injection install, in-situ chemical injection, future well abandonment, and reporting.

Rouse Properties, Shoppes of Bel Air Renovations, Mobile, AL, Ongoing – QA/QC Manager for soil excavation and removal, groundwater sampling and monitoring, pre-demolition hazardous materials surveys (limited asbestos and lead-based paint), demolition plans and specifications, and reporting for the former standalone single story Sears Automotive Center. Pre-renovation hazardous materials surveys were also performed for retail spaces in the main mall that previously housed Sears, Champs, and Lady Foot Locker. Air monitoring was performed during remediation.

Celanese, Groundwater Assessment, Bucks, AL, Ongoing – Project Manager for a subsurface investigation characterizing the hydrogeology and contaminate flow beneath a chemical plant in Alabama. The study includes soil and groundwater sampling utilizing Geoprobe technology. Quarterly and semi-annual groundwater monitoring, chemical analysis, and evaluation are required.

Alabama Department of Transportation, Soil and Groundwater Assessment, Chambers County, AL, Ongoing – Conducted preliminary and secondary investigations during roadway construction on County Road 208. Delineated soil and groundwater contamination using conventional and direct-push methods. Based on the findings, a Risk Assessment (ARBCA) and Corrective Action Plan (CAP) will be developed. The CAP will include remediation by natural attenuation, enhanced natural remediation by oxygen release compound (ORC), and conventional pump-and-treat (groundwater recovery wells and air stripping treatment).

Kerr-McGee, Groundwater Remediation, Theodore, AL, Ongoing – Provide annual groundwater analysis of a groundwater recovery operation using five, 24-inch wells at the chemical plant in Alabama and approximately 2,000 ft. of "French" drain. Analysis includes groundwater flow direction, gradient, cone of depression analysis, operational analysis, and 2-D modeling.

Eddie's Chevron, Groundwater Monitoring, Government Street, Mobile, AL, Ongoing – Performs ADEM required quarterly groundwater monitoring activities and oversees MEME events. Responsible for coordinating quarterly groundwater sampling events, CAD design, report writing. Also has performed an Alabama risk based corrective action evaluation.

Alabama State Port Authority, Environmental Consulting, Pinto Island, Mobile County, AL, 2010 – Project Manager for a permitting, site investigations, remediation, and construction inspection of a 115 million dollar steel slab transfer facility located on Mobile River. Project includes USACE permit application and ADEM water quality certification. Subsurface activities include soil and groundwater sampling, laboratory analysis, soil remediation, and risk-assessment. Construction activities included over-site of NPDES permit compliance.

Alabama State Port Authority, Little Sand Island Subsurface Investigation, Mobile, AL, 2009 – Project Manager for a subsurface investigation of the island to evaluate Recognized Environmental Conditions (RECs) based on a Phase I ESA. The Coast Guard and Fire Dept. used the Island for fire fighting training on petroleum fires and ship fires and it also serves as a dredged material disposal facility. Thompson Engineering was responsible for the Phase I ESA, monitor well installation, soil and groundwater investigations, and analytical analysis.

Alabama State Port Authority, Frascati Yard Subsurface Investigation, Mobile, AL, 2009 – Project Manager for a subsurface investigation of a former railroad repair facility to evaluate recognized environmental conditions associated with the property based on the Phase I ESA. Thompson Engineering was responsible for the Phase I ESA, soil investigation, groundwater investigation, analytical sampling, Geoprobe, and temporary well installation.

Mitsubishi, Groundwater Remediation, Theodore, AL, 2008 – Provided emergency response consulting during a shut-down at a local industrial facility. The release included nitric acid and hydrofluoric acid from a trench at the sump area of a "clean" room. Services provided included soil and groundwater delineation, design and installation of a groundwater recovery system, and ADEM coordination. Due to the critical time frame, all investigative, design, and installation services were completed in a six-day period.

Alabama State Port Authority, Soil and Groundwater Remediation, Mobile, AL, 2005 – Project manager for asbestos and lead-based paint surveys of the buildings, storage tanks, and pipelines utilized by various companies located at Choctaw Point. Project manager for an assessment at Choctaw Point using Geoprobe drilling techniques to delineate the horizontal and vertical extent of two groundwater plumes. In addition, remediation efforts included soil excavation, groundwater extraction and disposal, and introduction of an aerobic oxygen stimulant.

Alabama Department of Transportation, Soil Assessment, Jackson County, AL, 2005 – Conducted a preliminary investigation along State Highway 35 during a road widening project. The investigation included soil sampling using a Geoprobe direct push unit, soil collection, soil analysis, and evaluation.

Bebo's Car Wash, Soil and Groundwater Assessment, Mobile, AL, 2005 – Developed work plans and conducted petroleum contamination assessments to delineate the nature and extent of petroleum contamination from underground storage tanks, including review of groundwater and soil chemical data, slug tests, grain-size analysis, construction of potentiometric maps, characterization of groundwater flow, risk assessment, corrective action plan, soil excavation and disposal.

US Army Corp of Engineers and US EPA, Brownfield Assessment, Moultrie, GA, 2003 – Project manager for a brownfields investigation of a former meat-packing plant located in Moultrie Georgia. Funding was provided under U.S. EPA's Targeted Brownfields Assessment program. The investigation centered on the former engine room and boiler house. Services provided included Data Quality Objectives (DQO), Quality Assurance Project Plan (QAPP), public meetings, U.S. EPA coordination, subsurface investigation, and reporting.

Alabama Department of Transportation, Soil and Groundwater Assessment, Crenshaw County, AL, 1997 – Performed preliminary and secondary investigations during roadway construction on Highway 331. Delineated soil and groundwater contamination using conventional and direct-push methods. Used an on-site gas chromatograph for field screening and confirmed results using laboratory analysis. Based on the findings, developed a conceptual Corrective Action Plan (CAP) for groundwater contamination. The CAP included remediation by natural attenuation, enhanced natural remediation by oxygen release compound (ORC), and conventional pump-and-treat (groundwater recovery wells and air stripping treatment).

Kerr-McGee, Groundwater Remediation, Hamilton, MS, 1996 – Supervised the installation of an approximate 500 ft. horizontal groundwater well used for the on-site remediation of groundwater at a chemical plant site.

Casino Development, Soil and Groundwater Assessment, Lemay, MO, 1996 – Directed a fast-track Phase II subsurface investigation at a 30 acre former chemical manufacturing facility in St. Louis, Missouri. The property is reposed as the site of a >$50 million waterfront development. The investigation included soil and groundwater sampling and analyses, monitor well construction, sampling of residual solid wastes for toxicity characteristics, data interpretation, and coordination with the state regulatory agency.

Miscellaneous Phase I ESAs and Phase II Subsurface Investigations – Conducted numerous Phase I ESAs and Phase II Subsurface Investigations for real estate transactions throughout Alabama, Florida, and Mississippi. Services included site history, interviews, aerial photograph review, soil stratigraphy, groundwater flow characterization, regulatory record review, aquifer identification, soil and groundwater sampling, analysis, and evaluation.

Storage Tank Management

Casino Developer, UST Closure Assessment, Biloxi, MS, 1996 – Performed a fast-track UST closure assessment for a developer in Mississippi. During construction of a utility trench, three USTs were discovered. Responded within 24 hours to perform the assessment and immediately began excavation of the tanks (one 2100-gallon tank and two 10,000-gallon tanks). Findings and conclusions presented in the final report resulted in a "No Further Action" status from the Mississippi Department of Environmental Quality.
Landfills / Impoundments

Advanced Disposal Services, Inc., Landfill Development, Washington County, AL, 2007 – Project manager for development of a new Municipal Solid Waste Landfill facility. The project includes all siting criteria, such as: wetlands, threaten and endangered species, noise analysis, cultural resources, geological interpretation, soil analysis, Phase I ESA, groundwater sampling, and surveying.

Other

British Petroleum, Dock Demolition and Repair, Mobile, AL, 2006 – Project manager for the demolition and design of a bulk petroleum facility dock (located on the Mobile River) that was severely damaged by a runaway oil rig during Hurricane Katrina. The project included demolition, civil design, landfill disposal of debris materials, site layout, safety issues, and product containment.

PUBLICATIONS/PAPERS PRESENTED

- Haywick, D.W., M. Eschette, and S.M. O'Hearn, 1995. Industry Participation in the Teaching of a University Course in Environmental Geology. Geological Society of America, New Orleans, Louisiana.
- Isphording W.G., S.M. O'Hearn, and M.E. Bundy, 1993. Limestone Weathering and the Chemical Evolution of Residual Soils in a Tropical Karst Terrain. Geological Society of America, Boston, Massachusetts.
- Bundy, M.E., W.G. Isphording, S.M. O'Hearn, and J.E. Kusion, 1992. The Formation of Residual Pedogenic Clays by Limestone Weathering. Geological Society of American, Cincinnati, Ohio.

ORGANIZATIONS

- Geological Society of America (GSA)
- Alabama Geological Society (AGS)
- Southwest Alabama Geology Society (SWAGS)
- Manufacture Alabama
- Partners for Environmental Progress (PEP)
- The Nature Conservancy
- Mobile Baykeeper

SELECTED PROFESSIONAL TRAINING COURSES

- Supervisory Training – Accident Prevention and Loss Control, 2009
- Leadership Coastal Alabama Graduate, 2004
- NEPA Section 4(f) Workshop, 2004
- NEPA, Project Development, and Transportation Decision Making, 2004
- Annual participation in the ADEM UST Assessment and Remediation conferences
- Implementing ARBCA Process, 2002
- Auburn Engineering "Geodesy for Engineers and Surveyors" 1999.
- Implementing ARBCA Process: An in-depth, hands-on Training Program, 1998.
- Auburn Engineering "Global Positioning Systems for Engineers and Surveyors", 1998.
- National Groundwater Association Short Course: "PC Applications in Risk Assessment, Remediation Modeling and GIS", 1998.
- The Princeton Course "Groundwater Pollution and Hydrology", 1997.
- Introduction to ArcView, 1997.

- Risk-based Corrective Action (RBCA) and Training for Consultants, 1996.
- Geographic Information Systems (GIS) and the Geosciences, 1995
- Hazard Assessment and Response Management, 1994 (OSHA "40-hr Training") and annual updates.

COMMUNITY SERVICE

- Rotary International
- American Cancer Society – Chili Cook-off
- Alabama Coastal Foundation

CHRISTOPHER J. GILLENTINE, PG

SENIOR CONSULTANT - ENVIRONMENTAL

YEARS OF EXPERIENCE

Thompson: 12 years
Total: 17 years

EDUCATION

BS, Geology, The University of Alabama, 1994

REGISTRATIONS

Professional Geologist:
TN #4786

ADDITIONAL SKILLS

Environmental Permitting
NPDES
CCR
Compliance Consulting
Subsurface Investigations

Mr. Gillentine has over 29 years of experience in the environmental consulting and environmental field having served as Co-Owner of a consulting firm, Branch Manager, Project Manager, Project Scientist and Environmental Geologist on numerous diverse projects.

PROJECT HIGHLIGHTS

- Tennessee Valley Authority (TVA) – Chattanooga, TN
- Tennessee Dept. of Transportation, EPSC Coordinator
- Tennessee Valley Authority, Civil Construction Division, System Wide
- CB&I Fabrication Facility, Environmental Permitting, New Hope – Marion County, TN
- American Midstream, LLC – Muscle Shoals, AL
- Lauderdale County Solid Waste Department, Landfill Expansion – Florence, AL
- APAC-MS, Proposed Sand and Gravel Operation, Environmental Surveys – Marion County, AL
- Proposed Walgreen's Location, Environmental Site Assessment – Opelika, AL
- Underwood Landfill, NPDES Permit Renewal – Florence, AL

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thompson ENGINEERING

PROJECT EXPERIENCE

Tennessee Valley Authority (TVA), Chattanooga, TN – Assistant program manager for the Combustible Coal Residual (CCR) monitoring program consisting of scheduling, sampling and reporting for all coal-fired facilities located throughout the Tennessee Valley System.

Tennessee Dept. of Transportation, EPSC Coordinator, TN – Managed internal QA/QC of Erosion Prevention Sediment Control (EPSC) inspections for new and existing road construction projects located in Clay, Washington, Sullivan, Union and Knox counties. Direct consultation with TDOT personnel and with TDEC personnel to ensure NPDES permit standards are met on projects under our contracts.

Tennessee Valley Authority, Civil Construction Division, System Wide – Managed geotechnical projects consisting of pressure relief drilling and monolithic joint investigations in spillway, stilling basin and lock structures at facilities operated by the United States Army Corp of Engineers located throughout the southeast.

CB&I Fabrication Facility, Environmental Permitting, New Hope, Marion County, TN – Technical lead for the environmental permitting portion of the project. Thompson Engineering provided environmental consulting services that include preparation of all permitting documents such as the TDEC Aquatic Resource Alteration Permit (ARAP), the TDEC storm water construction permit (NOI) and Storm water Pollution Prevention Plan (SWPPP), the joint TVA/USACE Form 26A, and the TDEC air permit. All services are provided under an accelerated time schedule with close coordination with the regulatory agencies having oversight over the water quality impacts, wetlands, threatened and endangered species, and historical and cultural resources.

American Midstream, LLC, Muscle Shoals, AL, Ongoing – Performing ADEM NPDES permitting for discharges associated with new and existing pipeline construction. Also, performing permitting with the TVA and Army Corp of Engineers for disturbances located within Navigable Waterways within their jurisdiction.

Lauderdale County Solid Waste Department, Landfill Expansion, Florence, AL – Client and project manager of 70-acre expansion of permitted Industrial/Construction Debris Landfill. Performing all environmental surveys required for ADEM permitting and project management of environmental and engineering services for expansion of the landfill. Directly interpreting client concerns and needs.

APAC-MS, Proposed Sand and Gravel Operation, Environmental Surveys, Marion County, AL – Performed various environmental services required for ADEM and MDEQ permitting for the installation of a 300-acre sand and gravel mining operation. Provided project management services for environmental and engineering services required for the installation of plant site and site water usage.

Proposed Walgreen's Location, Environmental Site Assessment, Opelika, AL – Performed a Phase II subsurface assessment on a service station facility in which free product was determined present. Performed the ADEM UST Closure Assessment for facility, and provided oversight and sampling for the remediation of groundwater, contaminated soils, and removal of free product. Monitoring activities are continuing under an ADEM approved CAP.

Underwood Landfill, NPDES Permit Renewal, Florence, AL – Performed NPDES Individual Permit Renewal for existing landfill facility along with accompanying sampling and necessary form filing.

Hamilton County, East Ridge Elementary School, East Ridge, TN – Performed a Phase I Environmental Site Assessment, which identified a "recognized environmental condition" that was further investigated during the Phase II Subsurface Investigation.

Carter Oil Company, UST Soil and Groundwater Remediation, Sheffield, AL. – Project Geologist for UST soil and groundwater monitoring and remediation projects at a petroleum bulk storage and fueling facility. Responsibilities have included coordination of monitor well design and installation and free product recovery activities, soil and groundwater sampling, Preliminary and groundwater monitoring reports.

MARY BRANDON HUETTEMANN, MS

STAFF SCIENTIST

YEARS OF EXPERIENCE

Thompson: 2 years
Total: 2 years

EDUCATION

BS/Geology, University of South Alabama, 2019

MS/Geology, University of Alabama, 2022

Mrs. Huettemann is a Staff Scientist working out of Thompson Engineering's Mobile, Alabama, office. While attending The University of South Alabama, Mrs. Huettemann interned for Allen Engineering and Science located in Mobile, AL. She is experienced in storm water inspections, wetland delineations, Phase I and Phase II ESAs, and soil and groundwater sampling methodology. Mrs. Huettemann is a Qualified Credentialed Inspector, as recognized by the Alabama Department of Environmental Management (ADEM).

University of South Alabama: Research Assistant – 1 years. Mrs. Huettemann is experienced in conducting research that entails the sampling and analysis of groundwater. She has experience measuring water table changes and relating submarine groundwater discharge (sgd) atmospheric forcing around Coastal Alabama.

University of Alabama: Masters Fellowship – 2 years. Mrs. Huettemann is experienced in conducting research that entails the sampling and analysis of groundwater. She has experience collecting water samples around Coastal Alabama and analyzing for nitrate, phosphates, and sulphate.

University of Alabama: Laboratory Instructor - 1 semester. Duties included teaching students about Oceanography and conducting projects using lessons taught throughout the semester. Mrs. Huettemann assessed the students' performance through standard testing and grading procedures.

PROJECT HIGHLIGHTS

- Numerous Wetland Delineations, Mobile and Baldwin Counties, AL
- Bayou View Solar Energy Project, WRAP Forms, Washington County, AL
- Phase I ESAs and Phase II Subsurface Investigations, Mobile and Baldwin Counties, AL
- FHWA ER Sally Sites, Baldwin County, AL
- Lee County Hurricane Ian Response for Debris Management Sites, Florida
- Stop N Shop #9, Groundwater Monitoring, Magnolia Springs, AL
- Virginia Street, Groundwater Monitoring, Mobile, AL
- Former Amoco S/S 192, Well Abandonment, Mobile, AL
- QCI Stormwater Inspections, Mobile and Baldwin Counties, AL

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PROJECT EXPERIENCE

Numerous Wetland Delineations - 2022 – Staff Scientist for numerous Wetland Delineations involving mapping out the wetland for different project criteria.

Bayou View Solar Energy Project, WRAP Forms, Washington County, AL - 2022 – Assisting in Wetland Rapid Assessment Procedures (WRAP) forms. This involved performing wetland quality evaluations at 28 proposed road crossed within delineated weltand areas at the approximate 4,000-acre Bayou View Solar Energy Project.

Phase I ESAs and Phase II Subsurface Investigations – Conducted numerous Phase I ESAs and one Phase II Subsurface Investigations for real estate transactions throughout Mobile, Alabama. Services included site history, interviews, aerial photograph review, interviews with relevant government agencies and parties, soil stratigraphy, groundwater flow characterization, regulatory record review, aquifer identification, soil and groundwater sampling, analysis, and evaluation.

FHWA ER Sally Sites, Baldwin County, AL, 2022 – Environmental documentation for drainage site repairs. Included site visits and preparation of required documentation for environmental clearances at each site.

Lee County Hurricane Ian Response for Debris Management Sites, Florida, Ongoing – Assisting in writing soil analysis reports for citizen drop-off and debris monitoring sites around Lee County, FL.

Stop N Shop #9, Groundwater Monitoring, Magnolia Springs, AL, 2022 – Performance of ADEM required quarterly groundwater monitoring activities.

Virginia Street, Groundwater Monitoring, Mobile, AL, 2022 – Performance of ADEM required quarterly groundwater monitoring activities.

Former Amoco S/S 192, Well Abandonment, Mobile, AL, 2022 – Assisted in well abandonment activities and report.

QCI Stormwater Inspections – Conducted numerous QCI Stormwater inspections for multiple sites.

PUBLICATIONS/PAPERS PRESENTED

Beebe, D. A., Huettemann, M. B., Webb, B. M., & Jackson, W. T. Jr. (2022). Atmospheric groundwater forcing of a subterranean estuary: A seasonal seawater recirculation process. Geophysical Research Letters, 49, e2021GL096154. https://doi.org/10.1029/2021GL096154.

ED KRYGER

SENIOR ENVIRONMENTAL SPECIALIST

YEARS OF EXPERIENCE

Thompson: 24 years
Total: 27 years

EDUCATION

Professional Training

CERTIFICATIONS

Asbestos Management Planner (AL)

AHERA Inspector's Course (AL & MS)

Asbestos Contractor/Supervisor Course (AL & MS)

Asbestos Air Monitor

NIOSH 582, Sampling and

Evaluating Airborne

Asbestos Dust Course (AL & MS)

Lead Inspector (AL & MS)

Lead Risk Assessor (AL & MS)

Hazard Assessment and Response Management Course (OSHA 29CFR 1910.120 "40-HR. Training") and annual update

ADEM Qualified Credentialed Inspector

PROFESSIONAL TRAINING

AHERA Inspector's Course

Asbestos Contract Supervisor

AHERA Management Planner

Lead Based Paint Inspector

Lead Based Paint Risk Assessor

NIOSH 582, Sampling and Evaluating Airborne Asbestos Dust

OSHA 29 CFR 1910.20 Hazardous Waste Operations and Emergency Response Course

Mr. Kryger has over 26 years of experience in the environmental/investigative engineering field as an Environmental Specialist and Project Manager for a wide variety of environmental testing, including: Environmental Site Assessments, Storm Water monitoring, Underground Storage Tanks removal and testing, Lead testing, Asbestos air monitoring, Industrial Hygiene and Mold testing, Soil Erosion Control measures for ALDOT, Soil and Groundwater testing, Soil classifications, structural investigations, and construction materials testing.

Mr. Kryger is experienced in independent record keeping and preparation of reports for inspection and testing, interpretation of plans and specifications, and observation of construction activities to check adherence to construction specifications. His expertise includes hazardous waste sampling and protocols (water, soils/sediment, and air), hazardous waste site safety (including levels of protection and decontamination procedures for personnel and equipment), construction of wastewater/groundwater treatment facilities (including system instrumentation), hazardous waste material handling and transportation.

Mr. Kryger’s responsibilities have included environmental field services involving NPDES permitting and monitoring, hydrogeological and subsurface contamination investigations, groundwater well installation and monitoring, underground storage tank closure assessments, site contamination assessments, and soil and groundwater remediation projects. Project duties include stormwater sampling and monitoring, lead paint inspections, research for Phase I ESAs, including site reconnaissance, field investigation performing soil and groundwater sampling at contaminated sites. Mr. Kryger has over 13 years of experience conducting AHERA asbestos containing materials surveys and lead base paint surveys in schools, commercial, industrial and residential structures. Mr. Kryger is also certified and licensed to perform asbestos air sampling and analysis.

PROJECT HIGHLIGHTS

- Mississippi Department of Transportation, Asbestos Consulting Services, Statewide, MS
- Hero Demolition, SS Britania Hazardous Materials Survey, Theodore, AL
- Mobile County Public School System, AHERA Asbestos Management Plan Re-Inspections, Mobile County, AL
- Mobile County Public School System, Asbestos Abatement, Mobile County, AL
- Rouse Properties, Inc., Asbestos-Containing Materials Survey, Mobile, AL
- Mississippi Department of Transportation, Tallahatchie River Asbestos, Panola County, MS
- Mobile County Public School System, Various Lead Based Paint Surveys, Mobile County, AL
- Retirement Systems of Alabama, RSA Van Antwerp Building and GM Building Environmental Consulting, Mobile, AL
- Alabama Department of Conservation and Natural Resources, Marsh Island Restoration, Portersville Bay, MS

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thompson ENGINEERING

PROJECT EXPERIENCE

Mississippi Department of Transportation, Asbestos Consulting Services, Statewide, MS – Asbestos Monitor for an on-call master contract to provide asbestos inspection, reporting, asbestos abatement plans and specifications, and air monitoring at a variety of locations throughout Mississippi.

Hero Demolition, SS Britania Hazardous Materials Survey, Theodore, AL – Asbestos Monitor/Environmental Specialist for a pre-demolition hazardous materials (HazMat) survey on a flotel (floating hotel). This 802 bed vessel was used to house, feed and support oilfield workers in the North Sea and of the coast of Mexico. Hero Demolition purchased this vessel to dismantle and sell for scrap. Asbestos and lead-based paint surveys were conducted to determine what safety precautions would be needed by the workers demolishing the vessel.

Mobile County Public School System, AHERA Asbestos Management Plan Re-Inspections, Mobile County, AL – Served as Management Planner for 3-year re-inspections of multiple schools for the Mobile County Public School System. The project involved physical visits to more than 70 schools (elementary thru high school) to assess the condition of the asbestos containing materials that remain present. The project also involved the re-inspection of more than 180 portable buildings on school property. Based on the re-inspections, Asbestos Management Plans were updated in accordance with AHERA requirements.

Mobile County Public School System, Asbestos Abatement, Mobile County, AL – Served as inspector for 3-year re-inspections of multiple schools for the Mobile County Public School System. The project involved physical visits to more than 70 schools (elementary thru high school) to assess the condition of the asbestos containing materials that remain present. The project also involved the re-inspection of more than 180 portable buildings on school property. Based on the re-inspections, Asbestos Management Plans were updated in accordance with AHERA requirements.

Rouse Properties, Inc., Asbestos-Containing Materials Survey (H&M), Mobile, AL – Served as inspector for the pre-renovation asbestos surveys at a local mall for major renovations. The space had previously contained four stores that are being combined for the new H&M store. Thirty-two bulk samples of suspect asbestos-containing material (ACM) were collected. The survey included the collection and analysis of floor tiles, floor tile mastics, drywall/spackling, duct mastic, ceiling panels and fireproofing.

Rouse Properties, Inc., Asbestos-Containing Materials Survey (Old Sears), Mobile, AL – Served as inspector for the pre-demolition asbestos surveys at a major shopping mall in Mobile, AL that previously contained a Sears's department store. Based on survey results, Thompson prepared detailed abatement plans and specifications for removal and disposal of 48,479 sq. ft. of asbestos-containing floor tile and mastic. Air monitoring and surveillance was conducted during removal activities. The project also required groundwater/soil sampling, removal of subsurface soils that contained hydraulic oil, and monitoring well installation and sampling.

Mississippi Department of Transportation, Tallahatchie River Asbestos, Panola County, MS – Performed asbestos surveys at multiple facilities/parcels along SR 6 over the Tallahatchie River that were due to be demolished by MDOT. The project involved asbestos-containing materials (ACM) in textured ceilings, floor tile, and sheetrock joint compound. Air monitoring and surveillance was performed during the removal and disposal of ACM in accordance with NESHAP and the Mississippi Department of Environmental Quality regulations. Asbestos abatement specifications were developed that included ACM locations, material type, quantities, and safety precautions during removal such as air monitoring, surveillance, respiratory protection, etc.

Mobile County Public School System, Various Lead Based Paint Surveys, Mobile County, AL – Performed lead based paint surveys for multiple educational facilities throughout Mobile County. Painted surfaces that were to be impacted by demolition or renovation activities were tested to determine if they were coated with lead-based paint. Over 600 painted surfaces were tested using an X-Ray Fluorescence (XRF) lead paint analyzer. Facilities tested include:

- Nan Gray Davis Elementary School
- Dixon Elementary School
- Lott Middle School
- Mae Eanes Middle School
- Murphy High School

Retirement Systems of Alabama, RSA Van Antwerp Building Environmental Consulting, Mobile, AL – Provided asbestos and lead-based paint consulting services for the renovation of a historic 11-story high-rise office building in downtown Mobile. The building was constructed in 1908 and miscellaneous asbestos containing materials and lead-based paint were located throughout the building. Detailed abatement plans and specifications were prepared for the abatement of lead-based paint and asbestos. Air monitoring and surveillance was performed during removal activities.

Retirement Systems of Alabama, GM Building Environmental Consulting, Mobile, AL – Project Manager for providing asbestos and lead-based paint consulting. Abatement monitor for asbestos and lead-based paint abatement activities during the total renovation of a 34-story, high-rise office building. The building was constructed in 1965 and structural steel was coated with asbestos containing fireproofing. Detailed abatement plans and specifications were prepared for the abatement of lead-based paint and asbestos. Air monitoring and surveillance was performed during removal activities.

Alabama Department of Conservation and Natural Resources, Marsh Island Restoration, Portersville Bay, MS – Environmental Specialist for the restoration and shoreline stabilization of Marsh Island. The project was part of the Phase I NRDA early restoration process assigned in the State using funds received from the BP Deepwater Horizon Oil Spill incident. The overall objective of the project is to create island stability and longevity. This included the creation of 50 acres of marsh habitat along the northern shoreline, approximately 5,000 ft. of tidal creeks, and approximately 3,000 ft. of permeable breakwater along the southern shoreline. The project involves the design and construction oversight for a permeable segmented breakwater for shoreline protection, placement of sediment for marsh creation, and the planting of native marsh vegetation. Engineering design includes a breakwater structure using armored stone that will take into consideration crest height, storm stage, wave height, and the type of foundation for the structure; modeling; permitting; dredge/fill placement and marsh elevations; tidal creeks including location, size, depth, and configuration to establish tidal gradients within the creeks; and marsh planting which will determine the proper species mix and planting strategy for plugs, plug size, spacing, and development of a zoning map.

Mobile Bay National Estuary Program, Mon Louis Island Restoration, Mobile, County, AL – Environmental Specialist for the restoration of Mon Louis Island. The National Fish and Wildlife Foundation (NFWF) provided a grant to the Mobile Bay National Estuary Program (MBNEP) for restoration the northern end of Mon Louis Island. Thompson Engineering was selected to provide engineering and design to stabilize the shoreline along the bay side of the island and create/enhance aquatic, wetland, and upland habitats to the extent possible. The intent of the project is not to offer protection from catastrophic weather events, but to stabilize the shoreline from chronic, routine impacts. Design components include wave attenuation and shoreline stabilization structures, associated provision of hardened substrate for attachment of oysters and other estuarine benthic species, planting of appropriate native wetland and upland vegetation, beneficial use of dredged materials, and beach optimization.

Alabama State Port Authority (ASPA), Frascati Yard Subsurface Investigation, Mobile, AL – Environmental Specialist for a subsurface investigation of a former railroad repair facility to evaluate recognized environmental conditions associated with the property based on the Phase I ESA. The field activities included collection of soil and groundwater samples. Thompson Engineering was responsible for the Phase I ESA, soil investigation, groundwater investigation, analytical sampling, geoprobe, and temporary well installation.

Alabama State Port Authority (ASPA), Little Sand Island Subsurface Investigation, Mobile, AL – Environmental Specialist for a subsurface investigation of the Island to evaluate Recognized Environmental Conditions (RECs) based on a Phase I ESA. The Coast Guard and Fire Dept. used the Island for fire fighting training on petroleum fires and ship fires and it also serves as a dredged material disposal facility. Thompson Engineering was responsible for the Phase I ESA, monitor well installation, soil and groundwater investigations, and analytical analysis.

Alabama Department of Transportation (ALDOT) Road Construction Projects - Erosion and sediment control specialist for 15 ALDOT road construction projects. Duties include providing on-site inspection for NPDES Permit compliance and recommendation of appropriate implementation of Best Management Practices (BMPs) for stormwater pollution prevention.

Transco, Alabama - Field Inspector for a 250-mile long fiber optic cable installation project extending from LeGrange, Georgia to Shiloh, Mississippi. Services include NPDES Permit review and certification, and stormwater Pollution Prevention Plan (SWP3) revision and certification. Also provided full-time, on-site inspection of Best Management Practices (BMPs) utilized for compliance with applicable regulations for this ongoing project.

Scott Paper Company, Alabama and Mississippi - Performed stormwater sampling and monitoring for five sites in Alabama and Mississippi, site preparation for automated stormwater sampler, data monitoring of rainfall and flow, data and sample retrieval of stormwater event.

Hoechst Celanese Corporation, Bucks, AL- Performed quarterly groundwater monitoring, groundwater elevation monitoring, saturated well volume calculations for evacuation, groundwater sampling with field analysis for temperature, pH, and conductivity.

Mobile Infirmary Medical Center, Mobile, AL - Project Technician for a "Free"-phase recovery project involving a petroleum product and recovered water recovery system at the Mobile Infirmary Medical Center.

Teledyne Continental Motors, Mobile, AL - Project Manager for UST Closure Assessment - duties included documentation of closure process, soil and groundwater sampling, and closure report preparation.

PREVIOUS EMPLOYMENT EXPERIENCE

United Consulting, Mobile, AL – Project Manager and Environmental Specialist. Project experience included geotechnical soil testing, Phase I ESA, monitor well installation, soil and groundwater investigations, and analytical analysis.

Envirochem, Mobile, AL – Field Department Supervisor. Project experience included water sampling, monitor well installation, soil and groundwater investigations, and analytical analysis.

APPENDIX F

QUALITY ASSURANCE/QUALITY CONTROL PLAN

UNDERGROUND STORAGE TANK
QUALITY ASSURANCE/QUALITY CONTROL PLAN

FORMER VIRGINIA SHELL
559 VIRGINIA STREET
MOBILE, MOBILE COUNTY, ALABAMA
ADEM FACILITY I. D. NO.: 25118-097-014263
UST INCIDENT NO.: UST 20-10-05
ADEM FILE CODE: UST201005/PLAN09902

DECEMBER 2024

Prepared for:

Mr. Lawson Brown, P.E.
Alabama Department of Transportation
3700 Fairground Road
Montgomery, AL, 36110

PROJECT NO.: 23-1101-0102

Alabama | Florida | Georgia | Louisiana | Mississippi | North Carolina | Tennessee | Texas

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thompsonengineering.com | 251.666.2443

TABLE OF CONTENTS

DISTRIBUTION LIST

Stephen O'Hearn, Thompson Engineering
Chris Wiley, Thompson Engineering
Christopher Gillentine, Thompson Engineering

SECTION 1.0 TITLE AND APPROVAL PAGE

ALDOT Quality Assurance/Quality Control Plan
Document Title

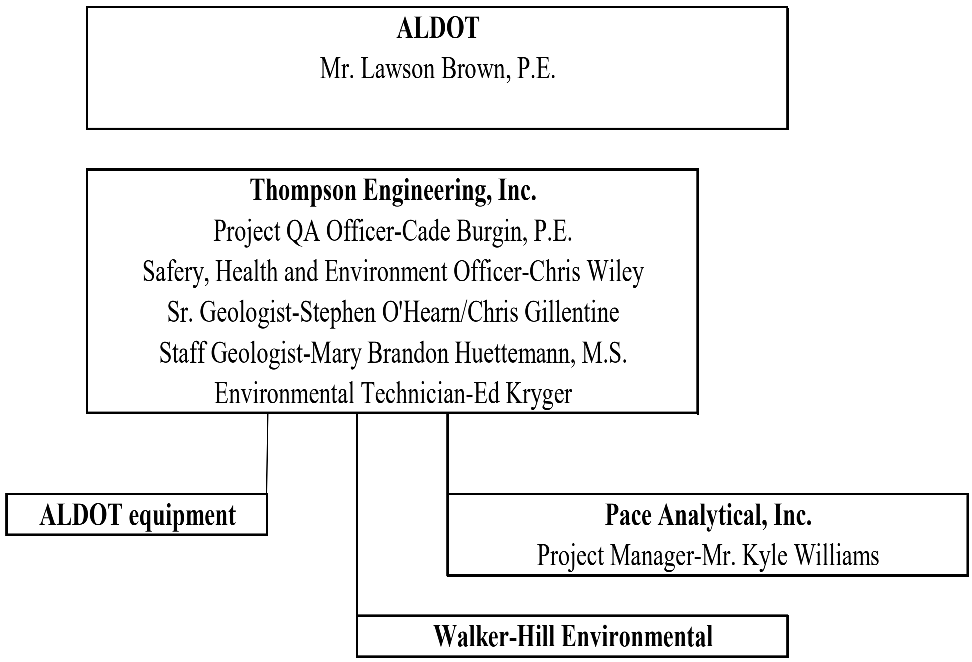
Cade Burgin, Thompson Engineering, Inc.
Prepared by: (Preparer's Name and Organizational Affiliation)

2970 Cottage Hill Road, Suite 190, Mobile, Alabama, 36606 (251) 666-2443
Address and Telephone Number

____
Signature

Cade Burgin, P.E. 40475 December 2024
Printed Name/Date

SECTION 2.0 PROJECT ORGANIZATION AND RESPONSIBILITY



QUALITY ASSURANCE OFFICER AND SERIOR ENGINEER - Mr. Cade Burgin, P.E., Environmental Manager at Thompson Engineering will be responsible for managing, directing and coordinating all aspects of this project. Mr. Burgin has over 7 years of experience managing and/ordinating a multitude of geologic, environmental, and contamination assessment projects. His experience includes subsurface exploration using push-probe and conventional drilling techniques; monitor well installation, development, and monitoring; environmental sampling; quality assurance/quality control (QA/QC) protocol; corrective action plans; and risk-based corrective action evaluations. Mr. Burgin provides project management and technical support for numerous Phase I and Phase II Environmental Site Assessments (ESAs) in connection with real estate transactions, and underground storage tank (UST) closures and assessments. He also plans, supervises, and executes soil and groundwater contamination projects, indoor air quality and brownfields investigations. His duties have included initial project scoping, coordinating and performing field activities, assimilating field results, preparing reports and managing project schedules and costs.

Safety, Health and Environment Officer - Mr. Chris Wiley, Corporate Health and Safety Officer with Thompson Engineering, will assist the project team in the audit/assessment phase of this project as a resource available to evaluate potential issues identified in the field. Mr. Wiley manages Thompson's corporate safety program, develops safety and environmental management systems, and conducts safety and environmental audits for clients. He has a proven ability for balancing safety and environmental considerations with cost-effective approaches consistent with government regulations and quality objectives.

Senior Geologist - Mr. Stephen O'Hearn, P.G., Principal Consultant at Thompson Engineering will be responsible for overseeing all aspects of this project. Mr. O'Hearn has 31 years' experience performing and coordinating geologic, environmental, and contamination assessment projects. His experience includes experience includes subsurface exploration using push-probe and conventional drilling techniques; monitor well installation, development, and monitoring; environmental sampling; QA/QC protocol; corrective action plans; and risk-based corrective action evaluations. He has performed and supervised groundwater monitoring (post active remediation and natural attenuation). He has prepared cost estimates, assisted with remedial strategy evaluations and remedial design, and performed data interpretation.

Senior Geologist - Mr. Chris Gillentine, P.G., Senior Consultant at Thompson Engineering will be responsible for directing and coordinating all aspects of this project. Mr. Gillentine has 28 years' experience performing and coordinating geologic, environmental, and contamination assessment projects. His experience includes experience includes subsurface exploration using push-probe and conventional drilling techniques; monitor well installation, development, and monitoring; environmental sampling; QA/QC protocol; corrective action plans; and risk-based corrective action evaluations. He has performed and supervised groundwater monitoring (post active remediation and natural attenuation). He has prepared cost estimates, assisted with remedial strategy evaluations and remedial design, and performed data interpretation.

Staff Geologist - Ms. Mary Brandon Huettemann, M.S., Project Scientist at Thompson Engineering will be responsible for performing field services of this project. Ms. Huettemann has 4 years' experience performing and coordinating geologic, environmental, and contamination assessment projects. Her experience includes experience includes subsurface exploration using push-probe and conventional drilling techniques; monitor well installation, development, and monitoring; environmental sampling; and QA/QC protocol. She has performed groundwater monitoring (post active remediation and natural attenuation).

Pace Analytical, Inc.- Ms. Heather Dennison is an office project manager and provides field guidance and analytical support to the varied environmental investigations and monitoring programs required by today's diverse environmental market. She is responsible for assessing clients' goals and quality objectives and communicating these goals to the laboratory. As part of this process, Ms. Dennison provides technical support for preparation of project specific quality assurance (QA) plans and sampling and analyses proposals, day-to-day monitoring of projects in progress, validation, review of data and approval of the final laboratory report. She also provides responses to post-project inquiries from the clients or regulatory agencies. Ms. Dennison's project management experience includes groundwater, wastewater, and drinking water monitoring programs, site assessment investigations, waste characterization, Superfund remedial investigations, dredge and fill projects, water quality studies and regional characterization of streams and rivers and estuarine waters for management of contamination loading.

Soil and Groundwater Remediation System Manufacturer - H2O Engineering, Inc. of San Luis Obispo, CA is a full-service resource for soil and groundwater remediation through in-situ chemical oxidation (ISCO) and bioremediation equipment, specializing in the application of ozone. They design, manufacture and install complete ozone generation and delivery systems, featuring a proprietary control technology, Intelo-zone®. This leadingedge logic theory maximizes system uptime thus optimizing remediation results, saving time and money. H2O Engineering supports its customers with experienced sales, technical, and service staff.

Drilling Subcontractor - Walker-Hill Environmental, Inc. (WHE) is a privately held remediation and environmental drilling service firm with offices in Foxworth, Mississippi and Walker, Louisiana. Since the 1990's, WHE has been providing quality remediation construction and drilling services to private sector clients, as well as local, state, and federal governmental agencies. WHE provides a wide range of remediation services for sites impacted with contaminated soil and/or groundwater. WHE's staff of project managers, field supervisors, and technicians have extensive experience in the remediation and environmental services arena. WHE's remediation construction management team is experienced in directing site operations, enforcing site specific health and safety requirements, and QA/QC.

WHE personnel have worked extensively in remediating (in-situ and ex-situ) impacted soil and groundwater at Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites. WHE has successfully performed in-situ treatment of impacted soils using biotreatment technology, as well as in-situ and ex-situ groundwater remediation using single and dual phase extraction systems. WHE offers complete installation, operation, and maintenance services to these extraction systems.

WHE has successfully remediated numerous sites impacted with various organic, inorganic, and metal constituents. WHE's remediation capabilities include solidification/stabilization, land treatment (biological), clay capping, in-situ and ex-situ single and dual phase extraction systems, etc.

Additional ancillary personnel for the contractors as well as the listed subcontractors may be required to complete the proposed scope of work.

SECTION 3.0 PROBLEM DEFINITION

The site is currently inactive and had four USTs, a 10,000-gallon diesel tank, and three 10,000-gallon gasoline tanks. The USTs were removed on October 24, 2019. The USTs were located on the western portion of the property (Figure 2, Appendix A). The piping associated with the USTs was removed on October 24, 2019. The UST pit and pipe trench was backfilled on October 25, 2019. The site has no record or documentation of release prior to the October 24, 2019, UST Closure. Upon completion of the UST removal, the structures on the site were demolished and removed. The concrete foundation for the store and all concrete surfaces excluding those above the UST pit and the pipe trench, remain in place. A UST Release Report was submitted to ADEM on November 27, 2019. In January 2020, Thompson Engineering performed on-site preliminary investigation (PI) activities and submitted a PI report in March 2020. Based on the results obtained from the PI, Thompson Engineering performed SI activities and submitted a SI report in December 2020.

During the December 2020 investigation, it was determined that the lateral and horizontal extent of the petroleum contamination was not confirmed. Thompson Engineering recommended an Off-Site SI be performed. In November 2021, Thompson Engineering submitted the Off-Site SI.

A groundwater monitoring report was submitted in September 2022. Several constituents exceeded their EPA screening levels. A groundwater monitoring well location plan is provided as Figure 4. The most recent groundwater potentiometric surface plan is provided as Figure 5. The groundwater analytical results are summarized in Figure 6 for June 27, 2024, sampling event. Groundwater isoconcentration maps are provided as Figures 7, 8, 9, and 10.

Two MEME events were conducted at the site on January 17, 2024 (Event 1) and February 28, 2024 (Event 2). Prior to Event 1, Separate-phase hydrocarbons (SPH) were detected in MW-1 (0.01 feet). Event 1 was conducted for eight hours at two extraction points, MW-1 and MW-7. SPH was not detected during post-extraction gauging. During Event 1, a calculated total of 279 pounds of vapor-phase petroleum hydrocarbons (approximately 46 equivalent gallons of gasoline) were removed. The hydrocarbon removal rate ranged from 30 to 39 pounds per hour during Event 1. A dual internal combustion engine (DICE) unit was utilized throughout the event to treat effluent vapor generated during extraction. Pretreatment vapor concentrations ranged from 34,000 to 42,000 parts per million by volume (PPM V) during this EFR® event. The vapor flow rate ranged from 75 to 79 actual cubic feet per minute (ACFM). A calculated total of 0.13 pounds of hydrocarbons was released into the atmosphere, a destruction efficiency of 99.95%.

Prior to and upon completion of Event 2, SPH was not detected in any of the gauged monitor wells. This event was conducted for eight hours at the same two extraction points, MW-1 and MW-7. During Event 2, a calculated total of 195 pounds of vapor-phase petroleum hydrocarbons (approximately 32 equivalent gallons of gasoline) were removed. This recovery total is less than the total attained during Event 1. The hydrocarbon removal rate ranged from 17 to 37 pounds per hour during Event 2, which is lower than those attained during Event 1. Pretreatment vapor concentrations ranged from 18,000 to 40,000 PPM V during Event 2, as compared to concentrations of 34,000 to 42,000 PPMV detected during Event 1. The vapor flow rate ranged from 77 to 80 ACFM, as compared to flow rates of 75 to 79 ACFM measured during Event 1. A calculated total of 0.14 pounds of hydrocarbons was released into the atmosphere, a destruction efficiency of 99.93%.

Based on continued elevated constituents at the site, on April 7, 2023 ALDOT requested Thompson Engineering to provide a cost proposals for ARBCA TierI/II evaluations and for ozone sparging remediation using their mobile ozone sparge unit.

Section 4.0 Project Description

Based upon the estimated costs, knowledge of the site conditions and current ALDOT funding, the most effective option at this time is considered to be mobile ozone sparging over a one-year period in combination with natural attenuation.

Once the CAP is approved, an ADEM Class V Underground Injection Control (UIC) Notice of Intent (NOI) will be prepared and submitted using ADEM's online eNOI system. The anticipated time frame to obtain an UIC permit is approximately 45 days. Once the UIC permit is issued, twelve (12) ozone sparge points strategically placed on the property will be installed. Installation, utility hookup, and system startup is anticipated to be approximately six (6) weeks.

ALDOT currently has funding for twelve monthly 8-hour ozone sparging events to be performed utilizing their mobile ozone unit. Effectiveness monitoring will be performed on a semi-annually basis during the twelve months of ozone sparging events. Analyses during the semi-annual groundwater monitoring events will include contaminant and natural attenuation parameters.

If monitoring results indicate that Groundwater Resource Protection Target Levels are not achievable within the given time frame, additional ozone sparging events would be conducted and the RNA period will be extended. The further remediation action method taken will be dependent upon monitoring results and ALDOT funding at the time.

Performance of the field sampling will be documented in field notebooks maintained by the Staff Geologist. The Staff Geologist will report to the Senior Engineer/Project QA officer any problems with the field sampling if failure to meet method quality control criteria are encountered. The Senior Engineer will be responsible for any corrective action deemed necessary during the field sampling.

Monitoring reports will include a discussion of corrective action taken and the effect of any QC failure on project objectives. All problems encountered, decisions, and corrective actions taken will be recorded in the Staff Geologist's field notebook. Once field work has been completed and laboratory sample analyses results have been validated, the semi-annual corrective action system effectiveness monitoring report will be prepared. Copies of field investigation records and reports will be retained by Thompson Engineering for 5 years. Copies of the laboratory records will be retained by Pace Analytical in accordance with their SOP procedures.

The final Corrective Action report that will be provided for this project will include:

- Detailed description of all sampling activities.
- Conclusion and Interpretation of sampling event and analytical results.
- Tables documenting monitoring well details.
- Figures illustrating groundwater elevation and contaminant plume and boundaries.
- Original laboratory reports and associated chain-of-custody forms.
- Tabular summary of current and historical groundwater concentrations.

SECTION 5.0 ENVIRONMENTAL SAMPLES

Based on historical information, volatile organic hydrocarbon constituents have been detected in the first zone of saturation at the site. No free phase hydrocarbons have been recently detected at the site.

Groundwater sampling will be performed using dedicated tubing via peristaltic pump as listed in Appendix C.4.1.c of the Alabama Environmental Investigation and Remediation Guidance Manual (AEIRG). Samples will be placed in pre-cleaned volatile organic compound 40 milliliter vials. Sample containers will be supplied by Pace Environmental-Mobile.

The collected groundwater samples will be analyzed for volatile organic compounds (BTEX+MTBE, EPA Method 8260) and semi-volatile organic compounds (SVOC, EPA Method 8270). Secondary lines of evidence will be specific to aerobic and anaerobic biodegradation and will include the parameters, nitrates, sulfate, and ferrous iron by EPA Methods 353.2, 375.4 and 6010 respectively. The groundwater samples will be analyzed on a normal turnaround basis.

SECTION 6.0 SAMPLING REQUIREMENTS

All procedures for sample collection, preservation, and handling, chain of custody, field equipment operation, decontamination and preventive maintenance will be in general conformance with applicable guidance in USEPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, November 2001 (EISOPQAM). Thompson Engineering will supply the groundwater sampling equipment. Sample containers will be provided by Pace Analytical-Mobile.

Required groundwater sampling equipment:

- Water sampling logs detailing well data
- Peristaltic pump
- Oil/Water Interface Probe
- pH meter
- Pre-cleaned and labeled sample containers from the analytical laboratory
- Thermometer in degrees Celsius
- Dissolved Oxygen meter
- Specific Conductance Meter
- Turbidity Meter
- Dedicated sample tubing

As soon as a sample is collected, the location and all relative sampling information (including the site-specific sample identification number) will be entered into the field notebook maintained by the Staff Geologist. The sample information will also be immediately entered into the chain of custody form to ensure proper sample tracking (Appendix A). Chain of custody procedures will be maintained throughout the sampling, analysis and data validation procedures and will be reviewed by the Staff Geologist before sample shipment to the laboratory, and by the Project QA officer upon receipt of data from both the field operations and from the laboratory. The Senior Engineer is responsible to ensure that the QA/QC and field sampling methodology are followed during the execution of field activities. The Senior Engineer will be responsible for any corrective action deemed necessary during the field sampling. Any deviations and the corrective action associated with it will be noted in the field notebook by the Staff Geologist and reported immediately to the Project QA officer.

SECTION 7.0 FIELD AND LABORATORY QUALITY CONTROL

All sampling equipment will be inspected by the Staff Geologist prior to the groundwater sampling event to ensure Quality Control. Field equipment will be calibrated at the beginning of each field sampling day. The Thompson Engineering Environmental Sampling Technician will perform the calibration of the field equipment and groundwater sampling.

Intra-laboratory QA/QC operations used by the Pace Analytical laboratory are documented in their Laboratory Quality Manual. These manual outlines laboratory equipment calibration and preventative maintenance procedures. The manual also references the corrective action taken by Pace Analytical personnel if acceptance criteria are not met and details the documentation of corrective action recorded if such an occurrence takes place.

A Site-Specific Health and Safety Plan is included in Appendix B. The Health and Safety Plan provides the names of personnel responsible for health and safety during site activities, level of protection, emergency contacts and directions to the local emergency care facility.

SECTION 8.0 DATA MANAGEMENT AND DOCUMENTATION

Proper data documentation and management are critical to the success of the investigation. During the sampling phase of this project the field notebooks and monitor well sampling logs will be maintained by the Staff Geologist. This documentation will include sampling locations and field sampling notes. The Staff Geologist will review all field notebooks at the beginning of each workday to ensure that proper documentation of project tasks are being recorded. The Staff Geologist will report to the Senior Engineer/Project QA officer any problems encountered during these reviews or through direct observation. This report will also include a discussion of corrective action taken and the effect of any QC failure on project objectives. All problems encountered, decisions and corrective actions taken will be recorded in the Staff Geologist's field notebook.

Results of laboratory analyses by the off-site laboratory will be delivered to the Project Manager after the laboratory completes the required analyses. The laboratory will provide data in both hardcopy and electronic formats. Laboratory and field data will be maintained by the Project Manager during the life of the project at the Thompson Engineering offices. Files will be available for review by project personnel. Once the final report has been completed, data will be maintained by the Thompson Engineering Project Manager at the company's offices.

Once field work has been completed and laboratory sample analysis results have been delivered, the project final report will be written. Any problems encountered with either the field sampling or laboratory data will be detailed in the data validation section of the final report. This section will also discuss corrective actions and impacts on project objects of any QC problems encountered.

SECTION 9.0 ASSESSMENT AND RESPONSE ACTIONS

Due to the limited duration of this project, no laboratory performance audits are planned. Pace Analytical operates under a Laboratory Quality Manual detailing all laboratory QA/QC procedures. Also, Pace Analytical undergoes routine evaluations and audits. Any corrective actions required during laboratory analysis of project samples will be noted by the laboratory in the QA summary provided with the laboratory data report. Any corrective action required during field sampling operations will be executed by the authority of the Senior Engineer and its impact on project objectives will also be noted in the QA/QC summary section of the final report.

SECTION 10.0 DATA USABILITY

The laboratory will perform all sample analyses in compliance with EPA guidance and will be responsible for reviewing all data according to their internal QA/QC procedures. Data review will be completed prior to the delivery of the data package to Thompson Engineering. Any problems will be resolved, and all data will be reviewed before being reported. Following satisfactory completion of all QA/QC checks by the laboratory and the project QA/QC officer, the data will be available for external reporting.

Thompson Engineering will perform a data review of all the samples when released. Data review will be performed upon receipt of the data package from the laboratory and prior to release of results as discussed in the QA/QC Plan. Specific review procedures will be used for analytical methods as well as standard operating procedures. This review will include chain-of-custody documents, laboratory QA/QC summaries, and conformance of QA/QC sample results. The Method Detection Level (MDL) will be one (1) microgram per liter (ug/L) or one part per billion equivalent for purgeable aromatics. Any limitations in the data, such as a detection level exceeding the requested MDL, will be noted in the final report. The final project results will be compared with the SSTLs to evaluate the possible extent of contamination that exceeds the established standard.

APPENDIX A

SAMPLE CHAIN OF CUSTODY FORM

Pace® Location Requested (City/State):

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Scan QR Code for instructions

Company Name:	Contact/Report To:
Street Address:	Phone #:
	E-Mail:
	Cc E-Mail:
Customer Project #:	Invoice to:
Project Name:	Invoice E-mail:
Site Collection Info/Facility ID (as applicable):	Purchase Order # (if applicable):
	Quote #:
Time Zone Collected: [ ] AK [ ] PT [ ] MT [ ] CT [ ] ET	County / State origin of sample(s):

Data Deliverables:

[ ] Level II [ ] Level III [ ] Level IV

[ ] EQUIS

[ ] Other____________________

Regulatory Program (DW, RCRA, etc.) as applicable: Reportable [ ] Yes [ ] No

Rush (Pre-approval required):

[ ] Same Day [ ] 1 Day [ ] 2 Day [ ] 3 Day Other _______________

Date Results Requested:

DW PWSID # or WW Permit # as applicable:

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis:

Specify Container Size **

Identify Container Preservative Type***

Analysis Requested

**Container Size: (1) 1L, (2) 500mL, (3) 250mL, (4) 125mL, (5) 100mL, (6) 40mL vial, (7) EnCore, (8) TerraCore, (9) 90mL, (10) Other

*** Preservative Types: (1) None, (2) HNO3, (3) H2SO4, (4) HCl, (5) NaOH, (6) Zn Acetate, (7) NaHSO4, (8) Sod. Thiosulfate, (9) Ascorbic Acid, (10) MeOH, (11) Other

Lab Use Only

Proj. Mgr:
AcctNum / Client ID:
Table #:
Profile / Template:
Prelog / Bottle Ord. ID:

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SS), Oil (OL), Wipe (WP), Tissue (TS), Bioassay (B), Vapor (V), Surface Water (SW), Sediment (SED), Sludge (SL), Caulk (CK), Leachate (LL), Biosolid (BS), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Composite Start		Collected or Composite End		# Cont.	Residual Chlorine												Sample Comment	Preservation non-conformance identified for sample.
			Date	Time	Date	Time		Result	Units												

Additional Instructions from Pace® :

Collected By:
Printed Name
Signature

Customer Remarks / Special Conditions / Possible Hazards:

# Coolers:	Thermometer ID:	Correction Factor (°C):	Obs. Temp. (°C):	Corrected Temp. (°C):	[ ] On Ice

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Tracking Number:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Delivered by: [ ] In- Person [ ] Courier
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	[ ] FedEX [ ] UPS [ ] Other
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	**Page: of**

***Pace Location Requested**: City and State of Pace Laboratory testing is to be performed at.

***Company Name**: Client's company name
***Street Address**: Client's mailing address
***City, State, Zip**: Client's city, state and zip code for mailing
***Contact/ Report to**: Person to receive results
Customer Project # and Project Name: Client's reference to the project or work involved with these samples.
Site Collection Info/ Facility ID: Client's location of project
Time Zone: Check time zone of sample to ensure proper hold times are met.
Purchase Order #: Client specific number to be listed on project invoice for client billing purposes.
Invoice To: Client contact the project invoice needs to be emailed to.
Invoice Email: Email address that project invoice will need to be emailed to
***Phone #**: Client's contact phone number
E-mail: Client's e-mail for correspondence and final report
Regulatory Program: List the program that is guiding the work to ensure proper regulations are followed: DW, RCRA, etc.
Data Deliverable: Please select or enter required deliverables.
***County/State Origin of Samples**: Enter the county to ensure proper handling of regulated soils. State required to ensure proper reporting.
Field Filtered: Indicate if samples have been filtered in the field. If samples are required to be field filtered and filtering is not indicated, a qualifier will be added to all associated data.

***Customer Sample ID**: The unique sample ID you want to appear on the analytical report
***Collected Date**: Date sample was collected. For composite samples, please fill in both beginning and end date.
***Collected Time**: Time sample was collected. For composite samples, please fill in both beginning and end time.
***Comp/Grab**: Please denote "GRAB" if the sample was collected at one time from one specific location. Please denote "COMP" if the sample is a composite of samples collected at one or more times or locations and combined to make one sample.
***Matrix**: Select from list provided list. If prepopulated chain is provided for you matrix codes may vary.

Rush request: If faster than standard turnaround time results are needed. Circle one of the rush options and note the day the results are requested by. All rush requests require preapproval by the laboratory. Surcharges will apply for non- standard turnaround times. Results will be due by the end of business on the date due based on standard turnaround time unless other arrangements have been made with your Project Manager.

Summarized Sample Acceptance Policy Requirements:

- Proper, full and completed chain-of-custody documentation
- Readable unique sample container identification written in indelible ink
- Appropriate sample container
- Sufficient sample volume to perform requested tests
- Received within required holding time
- Received within temperature preservation requirements
- Sample containers received in good condition (not leaking or broken)
- Any custody seal intact
- Properly preserved
- No headspace in volatile water samples
- **Note:** When sample specific Quality Control is required (e.g. MS/MSD) please ensure necessary sample containers and sample volume is provided.

A data qualifier and/or case narrative will be added to the final test report when the above sample acceptance requirements are not met.

Location Specific Sample Acceptance Policy available from your Project Manager

may vary.
***Number and Type of Containers**: Total number of containers per container type submitted for the samples
***Container Size:** Specify container size from list.
***Container Preservation Type**: Specify sample preservation from provided list. ***Analysis Requested**: Write the analysis name (or an abbreviation), the name of a group of tests, or the method number you would like us to perform. Examples are BOD, TCLP Metals, PCBs, Method 624, etc. Place a check mark in the small boxes that correspond to the sample(s) on which you want these tests performed.

Sample Comment: List any notes or important information about the individual sample here. Please identify in the sample comment if a sample should be used for MS/MSD.

Customer Remarks/Special Conditions/Possible Hazards: List special instructions about the sample here. If the sample is known or suspected to be hazardous indicate that here and attach SDS if possible. This space can also be used for listing additional analyses, or to request an extra copy of the report to be sent to an alternate person/address, etc.
***Collected By**: Printed name of sample collector
***Collected By Signature**: Signature of sample collector

***Relinquished By/Received By:** This form **must be signed** each time the sample(s) changes hands. Custody seals are available upon request if needed.

***Required field**: Failure to fill in a required field may result in a sample(s) being put on hold until information can be obtained. This may result in a delay in receiving results.

APPENDIX B

SITE SPECIFIC HEALTH AND SAFETY PLAN

THOMPSON ENGINEERING, INC.
Health & Safety Plan

Site Name: Former Virginia Shell Site Contact: Mr. Lawson Brown

Site Address: 559 Virginia Street, Mobile, Mobile County, Alabama

Contact Phone Number: 251-666-2443

Purpose of Site Visit: To conduct corrective actions for a petroleum-contaminated site.

Proposed Dates of Work: Upon approval of Corrective Action Plan

Directions to Site: Exit I-10 west (Exit No. 25B) onto Virginia Street, site on left side.

Site Investigation Team:

Personnel	***Safety Category***	***Responsibilities***
Cade Burgin	Safety Officer	Senior Engineer
Chris Wiley	Corp. H S & E	Corporate Oversight
Mary Brandon Huettemann		Staff Geologist
Ed Kryger		Field Technician

Plan Preparation:

Prepared by: Mr. Cade Burgin Project Safety Officer

Site Status: Active:______ Inactive: X Unknown: ________

Emergency Information:
Local Resources:

Ambulance (Name): Newman's Ambulance Phone: 251-471-1541
Hospital (Name): USA Health Phone: 251-415-1000
Police (Local or State): Mobile Police Department Phone: 251-208-1700 or 911
Fire Department: Mobile Fire-Rescue Department Phone: 251-208-7351 or 911

Recommended Level of Protection: Modified Level D

Modified Level D protection requires a hard hat (if overhead work is being performed), hearing protection (during extraction, cutting, and excavation activities), protective eye wear, and at a minimum steel-toed boots. Long pants and long sleeve shirt must also be worn to limit skin exposure.

Modifications:
Respiratory: None Anticipated
Field Dress: As specified

Monitoring Procedures / Equipment*:

____ HNU	____ OVA
____Radiation Survey Meter	______Explosimeters
__X__Oxygen Meter	___X__Other, Specify: GW Test Meters

*All instruments are calibrated in accordance with the U.S. Environmental Protection Agency, Environmental Services Division Environmental Compliance Branch Standard Operating Procedures and Quality Control Assurance Manual, November 2001, or by the Manufacturer's Specifications.

Method of Air Surveillance: __N/A__________________________________

Additional Site-Specific Information / Stipulations:__N/A________________

Site Decontamination Procedures: Intrusive equipment will be decontaminated by washing with Alconox and or Liquinox soap followed by a deionized water rinse and pesticide grade alcohol rinse.

Confined Space Entry (check one):_____yes **X** no

If yes, define procedures to be used: ______N/A

Underground Utilities

All extraction locations are situated on private property. Alabama One Call utility locate services cannot be provided for private property therefore the following procedure will be used. If future excavation activities are required, the same procedures apply.

Under Ground Utilities
Personnel performing subsurface boring activities will use a hand auger to clear utilities to a depth of 5 ft. bgs before using motorized drilling equipment. Personnel involved in the cutting concrete will wear eye protection in addition to normal safety gear appropriate for the required level of protection. The Site Safety Officer will ensure that all personnel remove watches, rings and other jewelry, as well as securing loose fitting or dangling articles of clothing while in the vicinity of the cutting operations.

Above Ground Utilities:
All above ground utilities must be located prior to commencing excavation activities. A map will be prepared showing the locations of all power lines, telephone lines, video cables, guy wires, and other objects which could pose a hazard to personnel operating excavation and loading equipment. The site safety officer will ensure that all operations are kept well clear of such hazards.

Safety Meetings:
A safety toolbox meeting with all personnel will be conducted by the Site Safety Officer prior to each day's work.

Office Resources

ALDOT – Mr. Lawson Brown Phone: 334-850-1931

Emergency Contacts

National Response Center Phone: 800/424-8802
(For Environmental Emergency Only)

Directions to Hospital

Exit site and turn left on Virginia Street, turn right on Ann Street, turn left on Saint Stephens Road, turn left on Pleasant Avenue, turn right on Stanton Road, turn left onto University Hospital Drive, follow signs to emergency department.

Safety and Health Risk Analysis

Waste Types/ Chemicals:___________N/A____

Hazard Evaluation:

Known or Suspected Hazardous/Toxic Materials (If applicable include: PEL/IDLH and / or TLV-TWA/TLV- STEL, LEL, flammability, odor, reactivity, stability, and corrosivity).

Potential Hazards: None Identified

Overall Hazard:	_____________	Serious	______**X**______	Moderate
	_____________	Low	______________	Unknown