

**MODIFIED CORRECTIVE ACTION PLAN  
(COST PROPOSAL NO. 23)**

**CIRCLE K STORES, INC.  
CIRCLE K STORE NO. 2721559  
(FORMER PANTRY NO. 1559)  
10 NORTH UNIVERSITY BOULEVARD  
MOBILE, ALABAMA**

**FACILITY I.D. NO. 22176-097-006446  
UST INCIDENT NO. UST13-04-02**

**PPM PROJECT NO. 262724.MCAP**

**SEPTEMBER 3, 2019**



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(COST PROPOSAL NO. 23)**

**FOR**

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10 NORTH UNIVERSITY BOULEVARD  
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**FACILITY I.D. NO. 22176-097-006446  
UST INCIDENT NO. UST13-04-02**

**PREPARED FOR:**

**CIRCLE K STORES, INC.  
1100 SITUS COURT, SUITE 100  
RALEIGH, NORTH CAROLINA 27606**

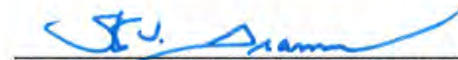
**PPM PROJECT NO. 262724.MCAP**

**SEPTEMBER 3, 2019**

**PREPARED BY:**

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\_\_\_\_\_  
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## CERTIFICATION PAGE

*I certify under penalty of law that this Modified Corrective Action Plan (CAP) for the Circle K Store 2721559 (former Pantry No, 1559) located at 10 North University Boulevard in Mobile, Alabama, and the 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 knowingly submitting false information.*

  
Steve T. Grammas, P.G.  
AL No. 011  
ALABAMA LICENSED PROFESSIONAL GEOLOGIST

9/3/19  
Date

## UST RELEASE FACT SHEET

**GENERAL INFORMATION:**

SITE NAME: Circle K Store No. 2721559 (Former Pantry No. 1559)

ADDRESS: 10 North University Boulevard, Mobile, AL

FACILITY I.D. NO.: 22176-097-006446

UST INCIDENT NO.: UST13-04-02

**RESULTS OF EXPOSURE ASSESSMENT:**

How many private drinking water wells are located within 1,000 ft. of site?	0
How many public water supply wells are located within 1 mile of the site?	0
Have any drinking water supply wells been impacted by contamination from this release?	0
Is there an imminent threat of contamination to any drinking water wells?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Have vapors or contaminated groundwater posed a threat to the public?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Are any underground utilities impacted or imminently threatened by the release?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Have surface waters been impacted by the release?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Is there an imminent threat of contamination to surface waters?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
What is the type of surrounding population?	Commercial & University, & Residential

**CONTAMINATION DESCRIPTION:**

Type of contamination at site:  Gasoline,  Diesel,  Waste Oil  
 Kerosene,  Other \_\_\_\_\_

Free product present in wells?  Yes  No Maximum thickness measured: 0.75 feet (2/26/15)

Maximum BTEX concentrations measured in soil: 4.868 ppm in SB-3/S-2 (8'-12') on 6/26/13

Maximum BTEX or PAH concentrations measured in groundwater: Total BTEX 130 mg/L (MW-1) May 26, 2015

**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: Circle K Store No. 2721559 (Former Pantry No. 1559)  
 SITE ADDRESS: 10 North University Boulevard  
Mobile, AL  
 FACILITY I.D. NO.: 22176-097-006446  
 UST INCIDENT NO.: UST13-04-02

OWNER NAME: Circle K Stores, Inc.  
 OWNER ADDRESS: 1100 Situs Court, Suite 100  
Raleigh, NC 27606

NAME & ADDRESS OF PERSON  
 COMPLETING THIS FORM: Rodney M. Kilgore, P.G.  
PPM Consultants, Inc.  
30704 Sgt. E.I. "Boots" Thomas Dr.  
Spanish Fort, Alabama 36527

<i>CLASSIFICATION</i>	<i>DESCRIPTION</i>	<i>YES</i>	<i>NO</i>
<b>CLASS A</b>	<b>IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR</b>		
A.1	Vapor concentrations at or approaching explosive levels that could cause health effects, are present in a residence or building.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A.2	Vapor concentrations at or approaching explosive levels are present in subsurface utility system(s), but no buildings or residences are impacted.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>CLASS B</b>	<b>IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR</b>		
B.1	An active public water supply well, public water supply line, or public surface water intake is impacted or immediately threatened.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B.2	An active domestic water supply well, domestic water supply line or domestic surface water intake is impacted or immediately threatened.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B.3	The release is located within a designated Wellhead Protection Area I.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>CLASS C</b>	<b>IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR</b>		
C.1	Ambient vapor/particulate concentrations exceed concentrations of concern from an acute exposure, or safety viewpoint.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<i>CLASSIFICATION</i>	<i>DESCRIPTION</i>	<i>YES</i>	<i>NO</i>
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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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D.2	A non-potable water supply well is impacted or immediately threatened.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F.2	Groundwater is impacted and a domestic well is located within 1,000 feet of the site.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F.3	Contaminated soils and/or groundwater are located within designated Wellhead Protection Areas (Areas II or III).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CLASS 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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**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:	G.1
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ADEM GROUNDWATER BRANCH  
SITE CLASSIFICATION CHECKLIST  
(5/8/95)

## 1.0 INTRODUCTION

PPM Consultants, Inc. (PPM) was retained by Circle K Stores, Inc. to prepare a Modified Corrective Action Plan (MCAP) for the Circle K Store No. 2721559 facility (former Pantry No. 1559) located at 10 North University Boulevard, Mobile, Alabama. The preparation of the MCAP (under Cost Proposal No. 23) was approved by the Alabama Department of Environmental Management (ADEM) in a letter dated June 7, 2019.

The purpose of this MCAP is to provide an alternative method for remediation of impacted soil and/or groundwater caused by a release of petroleum hydrocarbons from the former underground storage tank (UST) system. This MCAP provides a summary of environmental activities conducted to date at the facility and a detailed description of the proposed methods of site cleanup.

## 2.0 BACKGROUND

### 2.1 SITE DESCRIPTION

The Circle K Store No. 2721559 is geographically located in the northwest quarter of the northwest quarter of Section 22, Township 4 South, Range 2 West on the Springhill, Alabama 7.5 Minute Quadrangle at approximate Latitude 30° 41' 25" North and Longitude 88° 10' 23" West. The site rests at an approximate elevation of 137 feet above mean sea level (AMSL), based on nearby elevation contours from the United States Geological Survey (USGS) topographic map (**Figure 1, Site Location Map, Appendix A**).

The site is currently an active gas station/convenience store. The site property is improved with an approximate 3,000 square foot store building. A 2,000 square foot metal canopy is attached to the west side of the store building.

The underground storage tank (UST) pit is located adjacent to the south side of the store building and holds a 10,000-gallon regular unleaded UST, a 10,000-gallon mid-grade unleaded UST, and an 8,000-gallon premium unleaded UST. The USTs supply gasoline to two double sided fuel dispensers located beneath the canopy on the west side of the store building.

The USTs and associated product lines are of single wall steel construction and are believed to have been installed in 1971. The tanks are cathodically protected and in compliance.

Underground utilities at the site include water, sewer, natural gas, and telephone and/or fiber optic lines that traverse along University Boulevard. Water and natural gas enters the site property from the west. Electricity and telephone service is provided by overhead lines. Site improvements and all known utilities are shown in **Figure 2, Site Map, Appendix A**.

The site is located in a combination commercial/residential area of Mobile, Alabama. Residential properties border the site to the north and northeast and a stream (Twelve Mile Creek) followed by a strip mall borders the site to the east. Restaurants border the site to the south and southeast and University Boulevard followed by the University of South Alabama campus border the site to the west and northwest.

## **2.2 SITE HISTORY**

The site is believed to have operated as a gas station under various names (Delta Mart No. 822, USA Shell No. 122, and Pantry No. 1559) since 1971 when the UST system was installed. Circle K Stores, Inc. began leasing the site from the current owners in 2015 and renamed the site Circle K Store No. 2721559.

A Preliminary Investigation was conducted in the fall of 1993 to investigate a previous incident (UST92-11-21) at the site. Four soil borings were drilled and converted to permanent groundwater monitor wells. Soil samples were analyzed for Total Petroleum Hydrocarbons (TPH). Only one soil sample, [MW-4 at a depth of 10-12 feet below ground surface (BGS)] contained TPH concentrations above 100 milligrams per liter (mg/L). Monitoring well MW-4 was found to have 2 inches of free phase gasoline product. The remaining three wells were sampled and analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX). None of the three samples were found to contain BTEX concentrations over the detection limit of 0.001 mg/L.

A groundwater monitoring event was conducted at the site in July 1996 and the analytical results indicated that all BTEX concentrations were below detection limits (BDL) in wells MW-1, MW-2, and MW-3. Monitoring well MW-4 was not sampled due to the presence of free phase gasoline product (0.02 feet).

A Secondary Investigation and Free Product Removal Workplan was submitted by PPM to ADEM on June 24, 1997. The workplan was approved by ADEM on March 12, 1998. On April 2, 1998, PPM mobilized to the site to perform the Secondary Investigation activities, however, upon arrival it was discovered that the land immediately east of the tank pit had been washed away by flood waters from Twelve Mile Creek earlier in 1998. Since the area between the source and the presumed discharge point no longer existed, the Secondary Investigation was not performed and a Risk Assessment was recommended.

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The Tier I Risk Assessment was submitted to ADEM in April 2001 with the following conclusions:

- Representative on-site concentrations for subsurface soil do not exceed the Tier 1 Risk Based Screening Levels (RBSL) for any BTEX constituent or methyl tertiary butyl ether (MTBE) for any complete pathway.
- For the more conservative “without decay” model, compliance well concentrations protective of groundwater were not exceeded by BTEX or MTBE in the creek or in MW-3.
- Maximum representative concentrations for groundwater at the site did not exceed Tier 1 Target Levels for BTEX or MTBE.

PPM recommended that the site be issued a No Further Action (NFA), which was issued on March 1, 2002.

On April 3, 2013, Petroleum Service and Calibration was onsite to conduct a routine test on the UST system. A leak in the premium unleaded product line was discovered near the submersible turbine pump (STP) sump. The premium tank was immediately shut down until repairs could be made and a tightness test conducted and passed.

A UST Release Report was submitted to ADEM on April 3, 2013. On May 23, 2013, a Notice of Requirement (NOR) was issued by ADEM to conduct investigative and corrective actions.

**Preliminary Investigation (Incident No. UST 13-04-02)**

In June and July 2013, PPM conducted a Preliminary Investigation at the site. Soil borings SB-1 through SB-4 were advanced around the perimeter of the UST pit for the purpose of installing monitoring wells MW-1 through MW-4.

- Benzene concentrations in soils collected from borings SB-1, SB-3 and SB-4 exceeded the ADEM initial screening levels (ISL) for Commercial Soil, while the Method Detection Limit (MDL) for MTBE also exceeded the ADEM ISL in soil samples collected from SB-1, SB-3, and SB-4.
- Concentrations of groundwater BTEX exceeded their respective ADEM ISLs in samples collected from MW-1 and MW-2. The MDL for MTBE also exceeded the ADEM ISL in MW-1 and MW-2.

- Concentrations of groundwater benzene, toluene, and ethylbenzene exceeded their respective ADEM ISLs in the sample collected from MW-4. The MDL for MTBE also exceeded the ADEM ISL in MW-4.
- Groundwater benzene concentrations exceeded the ADEM ISL in the sample collected from MW-3.
- Groundwater flow was toward the east-northeast.

### **Secondary Investigation (Incident No. UST 13-04-02)**

In November 2013, PPM conducted a Secondary Investigation at the site. Soil borings SB-5 through SB-12 were advanced for the purpose of installing seven Type II monitoring wells MW-5 through MW-11 to depths ranging from 18 feet BGS to 20 feet BGS and one Type III deep monitoring well DW-1 to a depth of 45 feet BGS.

- Benzene in soil sample SB-12/S-1 [0.0094 milligrams per kilogram (mg/kg)] and SB-12/S-2 (0.056 mg/kg) was the only constituents of concern (COC) with concentrations exceeding the ADEM ISL. Boring SB-12 was advanced at the southwest corner of the UST pit
- During the groundwater sampling event 0.45 feet of free product was discovered in monitoring well MW-2.
- Concentrations of groundwater BTEX exceeded their respective ADEM ISLs in samples collected from MW-1, MW-3 and MW-4. The MDL for MTBE also exceeded the ADEM ISL in MW-1 and MW-4.
- Concentrations of groundwater benzene, toluene, ethylbenzene and naphthalene exceeded their respective ADEM ISLs in the sample collected from MW-1 and MW-4. The MDL for MTBE also exceeded the ADEM ISL in MW-1 and MW-4.
- Groundwater benzene concentrations exceeded the ADEM ISL in the sample collected from MW-3.
- Groundwater flow was toward the east-southeast.

### **Free Product Recovery (FPR) and Groundwater Monitoring (GWM) (first quarter)**

During the first FPR/GWM quarter, three 8-hour MEME events were conducted on June 26, July 24 and August 21, 2014. Free product was present in MW-2 at thicknesses of 1.54 feet, 0.80 feet, and 1.10 feet, respectively during the three FPR events. To date, FPR efforts have removed a cumulative total of approximately 147.01 pounds (23.82 equivalent gallons) of hydrocarbons.

Groundwater monitoring was conducted on August 27, 2014. Free product was present in MW-2 at a thickness of 0.63 feet. Benzene concentrations exceeded the ADEM ISL at MW-1, MW-3, and MW-4. Toluene and ethylbenzene concentrations exceeded their respective ADEM ISLs in groundwater samples MW-1 and MW-4. Total xylenes and naphthalene concentrations exceeded their respective ADEM ISLs in groundwater sample MW-1.

**Free Product Recovery and Groundwater Monitoring (second quarter)**

During the second FPR/GWM quarter, three 8-hour MEME events were conducted on September 17, October 16, and November 12, 2014. Free product was present in MW-2 at thicknesses of 0.88 feet both on September 17 and November 12, 2014. Free product could not be measured in MW-2 on October 16 because a car was parked over the well. Monitoring well MW-2 was used as the extraction point except on October 16, when MW-1 was used. To date, approximately 337.50 pounds (55.68 equivalent gallons) of hydrocarbons have been removed by the six FPR events.

Groundwater monitoring was conducted on November 24, 2014. Free product was present in monitoring wells MW-2 (0.63 feet). Benzene concentrations exceeded the ADEM ISL at MW-1, MW-3, and MW-4. Toluene exceeded the ADEM ISL in groundwater samples MW-1 and MW-4. Ethylbenzene and naphthalene exceeded their respective ADEM ISLs in groundwater sample MW-1.

**Risk Assessment**

An Alabama Risk Based Corrective Action (ARBCA) Evaluation to establish alternative clean-up levels for the site were performed by PPM. The ARBCA Report was submitted, by PPM, to ADEM on March 5, 2015. The ARBCA Report consists of the calculation of Tier II Site-Specific Correction Action Levels (SSCAL) for the site, which are listed in the table below. The SSCALs were approved by ADEM in a letter dated March 15, 2015.

APPROVED SSCALS				
CHEMICALS OF CONCERN	SOURCE WELL (MW-3)	COMPLIANCE WELL (MW-1)	COMPLIANCE WELL (MW-2/EW-2)	COMPLIANCE WELL (MW-4)
Benzene (mg/L)	0.539	0.539	0.539	0.539
Toluene (mg/L)	108	108	108	108
Ethylbenzene (mg/L)	75.4	75.4	75.4	75.4
Xylenes (mg/L)	175	175	175	175
MTBE (mg/L)	2.15	2.15	2.15	2.15
Naphthalene (mg/L)	2.15	2.15	2.15	2.15

CHEMICALS OF CONCERN	COMPLIANCE WELL (MW-6)	COMPLIANCE WELL (MW-7)	COMPLIANCE WELL (MW-8)	COMPLIANCE WELL (DW-1)
Benzene (mg/L)	0.345	0.195	0.227	0.539
Toluene (mg/L)	69	39	45.5	108
Ethyl-benzene (mg/L)	48.3	27.3	31.8	75.4
Xylenes (mg/L)	175	175	175	175
MTBE (mg/L)	1.38	0.78	0.91	2.15
Naphthalene (mg/L)	1.38	0.78	0.91	2.15
CHEMICALS OF CONCERN	COMPLIANCE WELL (EW-1)	ON-SITE TIER II TARGET LEVELS		
Benzene (mg/L)	0.539	309		
Toluene (mg/L)	108	526		
Ethyl-benzene (mg/L)	75.4	169		
Xylenes (mg/L)	175	175		
MTBE (mg/L)	2.15	48,000		
Naphthalene (mg/L)	2.15	31		

**Corrective Action Plan**

In May 2015, a Corrective Action Plan (CAP) Evaluation was done to determine the most comprehensive and cost efficient remediation method to reduce dissolved phase COC concentrations in soil and groundwater to below SSCAL. The CAP determined that continued MEME events were the best course of action. ADEM approved the CAP on May 26, 2015.

**Corrective Action-Extraction Well Installation/MEME/Remediation By Natural Attenuation (RNA)**

Field activities for the Extraction Well Installation began on October 28, 2015. Following the extraction well installation, 8-hour MEME events were conducted at the site on November 4, 2015, December 2, 2015, January 13, 2016, and February 3, 2016. Groundwater sampling was conducted on February 23, 2016 for the first tri-annual RNA event.

During the four MEME events a total of 1,321 pounds (214 equivalent gallons) of hydrocarbons were removed. During the RNA event, conducted on February 23, 2016, free product was encountered in monitoring wells MW-1 (0.07 feet) and MW-2 (0.62 feet), which are located to the east and southeast of the UST pit. Benzene concentrations in groundwater exceeded their respective SSCALs in MW-4 and extraction well EW-1.

During the second tri-annual RNA event, four 8-hour MEME events were conducted at the site on March 2, 2016, April 6, 2016, May 6, 2016, and June 1, 2016 and the groundwater sampling was conducted on June 27, 2016. During these MEME events a total of 485.41 pounds (78.65 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on June 27, 2016, free product was encountered in monitoring well MW-2 (0.40 feet) and is located southeast of the UST pit. Benzene concentrations in groundwater exceeded their respective SSCALs in monitoring wells MW-1, MW-4 and extraction well EW-1.

During the third tri-annual RNA event, four 8-hour MEME events were conducted at the site on July 6, 2016, August 3, 2016, September 8, 2016, and October 5, 2016 and the groundwater sampling was conducted on October 24, 2016. During these MEME events a total of 203.96 pounds (33.06 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on October 24, 2016, free product was encountered in monitoring well MW-2 (0.18 feet) and is located southeast of the UST pit. Benzene concentrations in groundwater exceeded their respective SSCALs in monitoring well MW-1 and extraction well EW-1.

During the fourth tri-annual RNA event, four 8-hour MEME events were conducted at the site on November 2, 2016, December 1, 2016, January 4, 2017, and February 8, 2017 and the groundwater sampling was conducted on February 24, 2017. During these MEME events a total of 117.80 pounds (19.09 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on February 24, 2017, free product was encountered in monitoring well MW-2 (0.05 feet) and is located southeast of the UST pit. Benzene concentrations in groundwater exceeded their respective SSCALs in monitoring well MW-1 and extraction well EW-1.

Based on the results of the fourth tri-annual RNA event, ADEM requested that monitoring well MW-2 be converted to a 4-inch extraction well (EW-2).

During the fifth tri-annual RNA event, four 8-hour MEME events were conducted at the site on March 8, 2017, April 5, 2017, May 3, 2017, and June 7, 2017 and the groundwater sampling was conducted on June 27, 2017. During these MEME events a total of 915.15 pounds (148.29 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on June 27, 2017, free product was encountered in monitoring well MW-2 (0.35 feet) and is located southeast of the UST pit. Benzene concentrations in groundwater exceeded their respective SSCALs in monitoring wells MW-1, MW-4 and extraction well EW-1.



### **Extraction Well Installation**

On August 18, 2017, Walker Hill Environmental, Inc., under the supervision of a PPM geologist, abandoned by over drilling existing monitoring well MW-2 and installed a 4-inch diameter extraction well (EW-2) in its place.

### **Corrective Action-MEME/RNA**

During the sixth tri-annual RNA event, four 8-hour MEME events were conducted at the site on July 5, 2017, August 2, 2017, September 7, 2017, and October 11, 2017 and the groundwater sampling was conducted on October 23, 2017. During these MEME events a total of 583.35 pounds (94.52 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on October 23, 2017, free product was encountered in monitoring well EW-2 (0.05 feet), formerly MW-2, and is located southeast of the UST pit. Benzene concentrations in groundwater exceeded their respective SSCALs in monitoring wells MW-1 and extraction wells EW-1 and EW-2.

During the seventh tri-annual RNA event, four 8-hour MEME events were conducted at the site on January 10, 2018, January 31, 2018, February 15, 2018, and February 28, 2018 and the groundwater sampling was conducted on February 20, 2018. During these MEME events a total of 459.92 pounds (74.52 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on February 20, 2018, approximately 0.02 feet of free product and 0.31 feet of free product was encountered in monitoring well MW-4 and extraction well EW-2, respectively. Both wells were bailed and sampled. Benzene concentrations in groundwater exceeded their respective SSCALs in monitoring wells MW-1 and extraction wells EW-1 and EW-2.

During the eighth tri-annual RNA event, four 8-hour MEME events were conducted at the site on March 22, 2018, April 24, 2018, May 23, 2018, and June 27, 2018 and the groundwater sampling was conducted on June 21, 2018. During these MEME events a total of 122.32 pounds (19.82 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on June 21, 2018, free product was not encountered in any of the monitoring or extraction wells. Benzene concentrations in groundwater exceeded their respective SSCALs in monitoring wells MW-1 and extraction wells EW-1 and EW-2.

During the ninth tri-annual RNA event, four 24-hour MEME events were conducted at the site on July 25, August 21, September 27, and October 24, 2018 and the groundwater sampling was conducted on October 29, 2018. During these MEME events a total of 175.5

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pounds (28.44 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on October 29, 2018, free product was not encountered in any of the monitoring or extraction wells. Benzene concentrations in groundwater exceeded their respective SSCALs in extraction wells EW-1 and EW-2.

During the tenth tri-annual RNA event, four 24-hour MEME events were conducted at the site on November 28, 2018, December 20, 2018, January 24, 2019, and February 19, 2019 and the groundwater sampling was conducted on February 26, 2019. During these MEME events a total of 110.19 pounds (17.85 equivalent gallons) of hydrocarbons were removed. During the RNA event conducted on February 26, 2019, free product was not encountered in any of the monitoring or extraction wells. Benzene concentrations in groundwater exceeded their respective SSCALs in extraction wells EW-1 and EW-2.

During the tenth tri-annual RNA event, four 24-hour MEME events were conducted (March 26, April 25, May 8, and June 5, 2019). Free product was not encountered prior to any of the events. A total of 377.13 pounds (61.23 equivalent gallons) of hydrocarbons were removed during the four events.

## **2.3 SITE CONDITIONS**

### **2.3.1 Site Lithology**

In general, lithologies at the site consisted of vari-colored Clayey Sand (SC) and Sand (SP) to total depth, with intermittent lenses of gray Sandy Clay (CL) less than 1-foot thick, with the exception of boring SB-2, where sandy clay was encountered at 7 feet BGS to total depth (20 feet BGS).

### **2.3.2 Groundwater**

During the most recent groundwater sampling event on June 21, 2019, the depths to groundwater in the Type II monitoring wells ranged from 7.48 feet BTOC in MW-11 to 13.64 BTOC in MW-6. Groundwater elevations at the site ranged from 118.46 feet AMSL at MW-7 to 129.82 feet AMSL at MW-11. Groundwater flow direction at the site was southeast with a hydraulic gradient of 0.055 between monitoring wells MW-11 and MW-7. Groundwater elevations and flow direction during the June 2019 sampling event are shown in **Figure 3, Groundwater Elevation Map (June 21, 2019)**. A summary of groundwater elevation surveys conducted at the site is provided in **Table 1, Summary of Groundwater Elevation Survey Data, Appendix B**.

### 2.3.3 COCs in Groundwater

During the June 21, 2019 sampling event, benzene concentrations exceeded SSCALs in groundwater samples collected from extraction wells EW-1 (0.67 mg/L) and EW-2 (3.30 mg/L). Benzene concentrations in groundwater during the June 2019 sampling event are shown in **Figure 4, Benzene Concentrations in Groundwater (June 21, 2019), Appendix A**. Toluene, ethylbenzene, total xylenes, MTBE and naphthalene did not exceed respective SSCALs in any of the samples collected. MTBE concentrations in groundwater during the June 2019 sampling event are shown in **Figure 5, MTBE Concentrations in Groundwater (June 21, 2019)** and naphthalene concentrations are shown in **Figure 6, Naphthalene Concentrations in Groundwater (June 21, 2019)**. Groundwater analytical results are summarized in **Table 2, Summary of Groundwater Analytical Data, Appendix B**.

## 3.0 REMEDIAL OBJECTIVES

This MCAP has been prepared to achieve the following objectives:

- Reduce the concentrations of COCs in the groundwater to below SSCALs; and
- Accomplish site objectives in a safe, timely, and cost-effective manner.

## 4.0 PROPOSED MODIFIED CORRECTIVE ACTION

### 4.1 CORRECTIVE ACTION OVERVIEW

The technologies considered in this MCAP were evaluated based on their potential effectiveness alone and in combination with other technologies. Other considerations included cost, ease of implementation and operation, and estimated clean-up times. Through the screening process, implementation of chemical oxidation, potentially combined with enhanced bioremediation, was selected as the most viable approach for obtaining site objectives. This approach should be effective in reducing COC concentrations on site and thus mitigating the potential for further off-site impact.

The first phase of corrective action should consist of ozone sparge techniques to provide COC mass reduction. The second phase of corrective action will continue RNA. This second phase is intended to address dissolved COC concentrations that may be at or near the SSCALs but do not warrant further ozone sparge efforts.

The most current groundwater monitoring event can serve as a baseline event to provide site conditions just prior to initiating ozone sparge at the site. Subsequent groundwater monitoring events can be used to assess the overall effectiveness of the remedial approach and to aid in selecting the future course of actions at the site. The following provides a description of the proposed corrective actions and associated effectiveness monitoring.

## **4.2 CHEMICAL OXIDATION**

In-situ chemical oxidation can be used to reduce contaminant mass present in the subsurface by altering the contaminant's chemical structure into either readily degradable substances or less harmful, inert substances. PPM recommends that ozone sparge be used at on-site locations to decrease COC concentrations in soil and groundwater to below SSCALs.

### **4.2.1 Overview of Ozone Sparge**

Ozone ( $O_3$ ) is an allotrope of oxygen, consisting of three oxygen atoms that are less stable than diatomic oxygen ( $O_2$ ). Ozone is more soluble than oxygen in water and is commonly used in municipal water treatment applications for disinfectant purposes. However, the use of ozone for soil and groundwater remediation projects has increased over the last several years as alternative remedial methods have been pursued and the technology has subsequently evolved.

In general, ozone based processes for site remediation are similar to other chemical oxidation techniques in which the oxidant of choice is injected into the desired treatment area. However, the use of ozone is different from most oxidation processes as the ozone can be injected as a gas or liquid (as ozonated water). This approach provides the opportunity to deliver more continuous oxidation as opposed to batch applications typically associated with other techniques.

An ozone generator uses electrical current to convert  $O_2$  (readily available in atmospheric air) to  $O_3$ . A compressor is then used to sparge the ozone into the subsurface using one or more sparge points. Although ozone gas is typically sparged into the water table for groundwater remediation, it can be sparged into the vadose zone for soil treatment. Once delivered to the subsurface, the ozone facilitates deconstruction of COC molecules and other oxidizable substances. As an added benefit, the reaction results in the release of oxygen that is beneficial in producing conditions that are conducive to aerobic degradation of select contaminants.

## 4.2.2 Design Considerations

PPM has selected a remedial approach that should achieve site objectives in a cost effective and timely manner. The area chosen for treatment comprise monitoring and extraction wells from which groundwater samples have exhibited concentrations of COCs exceeding SSCALs. Historically, shallow groundwater on the east and south sides of the UST pit in the areas of monitoring well MW-1 and extraction wells EW-1 and EW-2 have exhibited COC concentrations exceeding SSCALs. For this reason, it was decided that this area should be treated.

One of the most important aspects of any chemical oxidation program is providing adequate contact with the substance to be oxidized. Typically, most applications deliver the oxidant throughout the area of impact in an effort to provide a greater amount of destruction. Sparge points are strategically placed across the area of impact to provide overlap of the oxidant injections.

Based on the limited extent of the area requiring remediation and the existing COC concentrations at wells in that area, an ozone sparge system was selected that should be capable of producing a sufficient mass of ozone per day such that site objectives could be achieved within a reasonable time frame.

PPM proposes to use the most current groundwater analytical data as a baseline prior to startup of the remediation system. Quarterly groundwater sampling events will be conducted after system start up. Groundwater sampling methodology and recommended sampling frequency are discussed further in **Sections 4.8** and **4.8.1**. Based on the results of these events, the decision will be made to continue with ozone sparge or proceed with a RNA approach.

A copy of the equipment manufacturer's quotes and specifications are attached in **Appendix C, Equipment Manufacturers Quotation/Specifications**. The quote for installation services is included in **Appendix D, Subcontractor Specifications and Quotation**.

## 4.2.3 Ozone Unit

Based on availability, PPM recommends that an H2O Model No. MOSU20-52 ozone unit be used at the site. The unit is capable of producing up to 2.75 pounds per day (ppd) of ozone for remedial efforts. The ozone delivery pump can sparge ozone at a rate of 0.4 cubic feet per minute (cfm) at 20 pounds per square inch (psi) for up to 20 ozone sparge points simultaneously. Maximum delivery capacity is rated at approximately 3.8 cfm at 20 psi.

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The unit has a field programmable controller with an interface panel viewer. Independent time duration control for each sparge point is available ranging from 1 to 99 minutes per location. A programmable cycle lag time is used to control the time duration between each sparge cycle.

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. More detailed information regarding the unit is provided in **Appendix C**.

#### **4.2.4 Electrical Components**

External and internal electrical equipment will meet or exceed local, state, and federal code pertaining to design and installation requirements. The unit utilizes single-phase, 240-volt power.

#### **4.2.5 Fail-safe Components**

The unit is provided with a fail-safe automatic shutdown device to stop ozone production/sparging in the event that an ozone leak is detected within the unit. The built in ambient ozone sensor can be set for system shutdown if ozone is detected at concentrations from 0.1 parts per million (ppm) to 1.0 ppm. In addition, a built in high limit pressure switch and pressure relief valve is provided to protect against equipment damage.

Although it is anticipated that ozone sparged into the subsurface will be depleted during the oxidation process, it is possible that some residual ozone may remain after the oxidant demand has been met. If this should occur, ozone escape is not anticipated to be an issue for outdoor inhalation or indoor inhalation within surface structures, primarily due to dilution effects with ambient air. Furthermore, no basements or crawl spaces are located within close proximity of the proposed treatment area.

#### **4.2.6 Monitoring Components**

Individual and total sparge time accumulators will monitor the duration of ozone sparge. A pressure gauge will be located at the unit such that the discharge pressure can be monitored visually and by the data logger. Pressure gauges will be installed at the well heads for each sparge point that will enable site personnel to evaluate if an acceptable pressure distribution is present across the treatment area.

### **4.3 SPARGE POINTS**

PPM recommends that ozone be applied to the subsurface by means of four sparge points strategically placed on the property. Each sparge point will be installed during system installation activities. Ozone sparge at these locations should achieve an overall decrease of COC concentrations within the vicinity of each sparge point. An ozone sparge pilot test study was not conducted. However, based on experience on sites with similar lithologies, a conservative estimation of 20 feet was chosen as the design radius of influence. The placement of the proposed sparge points is provided in **Figure 7, Proposed Ozone System Layout, Appendix A**.

Existing monitoring wells will be used to monitor site response and to serve as locations for measuring pressure gradients once the system is operational. Should the radius of influence from these sparge points be deemed insufficient to contact the majority of COC impact over time, additional sparge points may be added as needed.

For costing purposes, it is assumed that the four proposed sparge points will each be constructed to a depth of approximately 20 feet BGS. The intent of these completion depths is to sparge ozone into the upper extent of the saturated zone. Actual depths may vary slightly during system installation depending on site conditions encountered.

### **4.4 REMEDIATION BY NATURAL ATTENUATION**

Natural attenuation is a term applied to the natural processes that help reduce contaminant concentrations and, in some cases, reduce the potential for contaminant migration. There are multiple components that comprise natural attenuation including: biodegradation; sorption; dispersion and dilution; and volatilization. Biodegradation is often considered the most important component of RNA as it results in chemical changes to the contaminant often rendering it less harmful to the environment.

RNA is typically not considered for sites with elevated contaminant concentrations or free product, as it typically does not achieve site objectives within a reasonable time frame. However, RNA is often selected for sites with low to moderate impact that show indications that it may be effective. In addition, RNA may be used in conjunction with other remedial methods that address contaminant source control.

#### 4.4.1 Overview of RNA Approach

If dissolved COC concentrations appear to be stable and are at or just below SSCALs, an RNA monitoring program may be implemented at the site. It is anticipated that ozone sparge will not only reduce the overall contaminant mass, but will also create conditions conducive to increased microbial activity. If so, an RNA monitoring program may be necessary to ensure that active remediation is no longer warranted at the site.

There are multiple secondary approaches for monitoring RNA effectiveness including estimating a first order rate of attenuation and measuring select water quality parameters. PPM will use both methods to evaluate the overall effectiveness of RNA. However, the stable and/or decreasing trends of dissolved COC concentrations will be the primary gauge of RNA effectiveness.

A first order rate of attenuation constant will be estimated for select wells in general accordance with the U.S. EPA publication entitled “Calculation and Use of First-Order Rate Constants for Monitored Natural Attenuation Studies” (November 2002). The following formula will be used to estimate the approximate time frame required to achieve SSCALs through use of natural attenuation:

$$t = \frac{- \ln \left( \frac{C_{goal}}{C_{start}} \right)}{K_{point}}$$

Where:

- $t$  = time, yrs
- $C_{goal}$  = desired COC concentration, ppm
- $C_{start}$  = initial COC concentration, ppm
- $k_{point}$  = time rate constant

The initial  $C_{start}$  concentration will be the COC concentrations observed shortly after the ozone sparge has been discontinued at the site.

Select water quality parameters [pH, temperature, specific conductance, oxidation reduction potential (ORP), and dissolved oxygen etc.] will also be monitored during the RNA groundwater monitoring events. In addition, select wells may be sampled for nitrate, manganese, iron, and sulfate to further assess the aerobic condition of the aquifer.



## **4.5 ANTICIPATED SITE RESPONSE**

The following provides information regarding the anticipated site response to treatment based on actual and assumed site conditions.

### **4.5.1 Oxidation of COC**

Ozone sparged into the subsurface should rapidly react with oxidizable substances that it contacts with, essentially deconstructing the molecules in a short time period. An important factor in this process is providing an adequate mass of ozone based on the oxidant demand. Multiple sparge points are proposed to provide sufficient contact in the treatment area.

### **4.5.2 Remediation by Natural Attenuation**

The final phase of effectiveness monitoring will be initiated once active remediation efforts have ceased at the site. Anticipated site response to RNA 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 approximately ten months of implementing corrective action activities outlined in this CAP.

## **4.6 PERMITS**

Prior to installation of the ozone system, an underground injection control (UIC) permit application and applicable fee will be submitted via the Electronic Notice of Intent (ENOI) system on ADEMs website. Cost Proposal No. 24 will be submitted under separate cover to expedite approval to submit the UIC permit application.

## **4.7 INSTALLATION**

### **4.7.1 General**

The ozone unit is proposed to be within a fence enclosure generally south of the dumpster location in the southwest corner of the site. The primary reasons for selecting this area are surface area usage, locations of utilities, security, and pedestrian and vehicular traffic. The proposed location of the unit is shown in **Figure 7, Appendix A**.

Installation dates will be based on the approval date of this MCAP by ADEM, the approval of the UIC permit, equipment availability, and subcontractor scheduling. Initial installation activities will consist of the following:

- Installation of four borings using hollow stem augers (HSA)
- Construction of four ozone sparge points (SP-1 through SP-4)
- Installation of protective piping and ozone delivery tubing from sparge points to the ozone system location
- Mobilization of the ozone unit to the site
- Installation of required electrical power supply equipment and lines
- Preliminary testing of the ozone system.

#### **4.7.2 Ground Penetrating Radar**

Based on the proximity of the plume of dissolved hydrocarbons to the UST pit, PPM intends to take additional precautionary measures to avoid penetrating any onsite underground utilities, pipes, wiring, tanks, etc. during the system installation. PPM proposes to utilize ground penetrating radar (GPR) prior to boring/installation of sparge points to survey and determine the locations of underground utilities, pipes, conduits, tanks, etc., associated with the site.

#### **4.7.3 Soil Borings**

The first 4 feet of each boring will be advanced with hand-held equipment to check for the presence of unmarked utilities. The hand-held equipment will be cleaned prior to use at each boring location by means of a phosphate free soap rinse, an isopropyl alcohol rinse, and a rinse of distilled water. Rinse fluids will not be contained but will be allowed to fall to the land surface in an area that provides drainage away from the respective boring location.

The borings for the proposed sparge points will be advanced with HSA equipment using a minimum of 2.25 inside diameter (I.D.) rods. Borings will be advanced to depths of approximately 20 feet BGS. Down-hole equipment will be cleaned prior to use at each location with a high-pressure steam rinse. Soil cuttings generated during boring advancement will be stored in roll off container then transported to a certified lined landfill.

#### **4.7.4 Ozone Sparge Point Installation**

Ozone sparge points will be constructed of 1-inch I.D. Schedule (SCH) 80 polyvinyl chloride (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 (O.D.) 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 2 feet above the top of the oxidation point. A bentonite seal approximately 1 to 2 feet 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 foot BGS. The bentonite seal and grout are intended to reduce the potential for ozone escaping up the boring and to the land surface.

The proposed sparge points will be set within a 12-inch diameter steel 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 covers 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 well head connection that will facilitate ozone delivery and measurement of sparge pressures. Quotes for the installation of the system are provided in **Appendix E**.

#### **4.7.5 Electrical Hookup**

A certified electrical subcontractor will provide the connection from the service provider to the system. Electrical work will be performed in accordance with applicable federal, state, and local codes.

#### **4.7.6 Sparge Point Configuration**

Four sparge points will be utilized for soil and groundwater remediation efforts. Each location has been strategically placed such that remedial objectives can be obtained within a reasonable time period.

The areas selected for treatment at the site are focused in and around the source of COC impact and in the downgradient portion of impact. Placement of sparge points is intended to reduce existing COC impact in these areas and reduce the potential for further COC migration.

Sparge point specifications will consist of the following:

- Installation of a 12-inch diameter x 12-inch deep manhole cover at each proposed sparge point
- Installation of a well head connection including a SCH 80 flush threaded cap, a type 316 stainless steel tee, a compression fitting, and a pressure gauge
- Connection of the delivery tubing to the well head via the compression fitting
- Installation of 1-inch I.D., SCH 40 PVC piping (chase pipe for tubing) from the manhole to the ozone system.

Typical construction details of sparge points are presented in **Figure 8, Typical Ozone Sparge Point Construction Details, Appendix A.**

#### **4.7.7 Protective Piping**

Ozone resistant tubing (1/2-inch O.D. by 3/8-inch I.D.) will be used to convey the ozone from the system to each sparge point. The tubing for each sparge point will be placed inside 1-inch I.D. SCH 40 PVC for protection. The piping will be installed to a depth of approximately 12 inches BGS. Efforts will be made to ensure that the piping does not interfere with existing underground utilities.

### **4.8 BASELINE GROUNDWATER MONITORING**

PPM will utilize the most recent groundwater sampling event to establish baseline conditions prior to initiating corrective actions. The following provides a detailed description of the fieldwork methodology and quarterly groundwater sampling events proposed in this CAP.

#### **4.8.1 Fieldwork Methodology**

A groundwater elevation survey will be performed prior to sampling the wells. Depth to groundwater measurements will be accomplished at each well location to be sampled with an oil/water interface probe capable of measuring the water depth to within +/- 0.01 feet.

The interface probe will be cleaned prior to use at each well location by means of a phosphate free soap rinse, an isopropyl rinse, and a rinse of distilled water. Rinse fluids will be discharged to the land surface in areas that do not drain back to the respective well locations.

Each selected well will then be sampled in general accordance with PPM's internal Quality Assurance/Quality Control (QA/QC) plan. Prior to sampling, each well will be purged of approximately three well-casing volumes (or to near dryness) utilizing single use, disposable PVC bailers and nylon rope. Purge water from the monitoring wells will be placed in a 55-gallon drum then transported to PPM's office in Spanish Fort, Alabama. The contents of the drum will then be disposed of by Erwin Remediation, Inc.

Each sample for COC analysis will be transferred from the bailer into 40-milliliter (ml) glass vials containing HCl as a preservative. Each container will be filled with the sample, promptly capped, and appropriately labeled to indicate the sample origin. A duplicate sample from one well will be collected for QA/QC protocol. Containers will then be placed in an iced cooler for preservation during shipment to the laboratory.

PPM personnel will wear disposable nitrile gloves during well purge and sample collection activities in an effort to reduce the potential for cross-contamination and as part of personal protective equipment (PPE) for the project. Gloves will be changed and discarded between each sample acquisition.

Select water quality parameters (pH, temperature, specific conductance, ORP, and dissolved oxygen) will be measured during sample collection. Measurements will be performed for each well sampled and will be representative of the water collected from the well. Instrument readings will be documented in the project field book.

Upon completion of sampling activities, sample coolers will be transported or shipped under standard chain-of-custody protocol to an independent testing laboratory for analyses. A copy of PPM's **Technical Sampling and QA/QC Plan** is provided in **Appendix E**.

## **5.0 OZONE SYSTEM STARTUP/INITIAL OPTIMIZATION**

PPM personnel will be on site during system startup and initial operation. System components will be monitored to ensure that the system is operating properly prior to their departure from the site. During the first day of operation, air will gradually be applied to the various sparge points. Connections, piping, and well heads will be checked for the presence of leaks and modifications/repairs will be made upon discovery. Data will be collected to

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evaluate the initial pressure gradient generated throughout the sparge areas and fluctuations in groundwater elevations (if any). The initial startup period is anticipated to be completed in approximately two days. Once it appears the system is operating as intended, ozone will then be sparged into the subsurface.

This information will be collected and recorded, on a daily basis during the first two days of the optimization study and twice during the following four weeks. These measurements will be used to perform modifications and adjustments to the system as needed to enhance the remedial efforts.

## **5.1 SYSTEM OPERATIONS AND MAINTENANCE**

Following completion of the optimization study, PPM will periodically visit the site to conduct O&M and monitoring activities. These activities will be conducted by a PPM engineer, geologist, or technician experienced in subsurface investigations and remediation. PPM anticipates visiting the site approximately two times per month during normal system operation. Additional visits may be required based on site-specific conditions encountered. O&M and monitoring activities to be conducted during these routine visits are discussed in the following sections.

Normal operations will include O&M of the system and continuing optimization of system performance as needed. Scheduled visits will be made to maintain the system components and ensure the system is operating as intended. Minor system components will be regularly inspected and replaced or repaired as required. If a shutdown of the system occurs, PPM will attempt to provide personnel to restart/repair the system within 72 hours of receiving notification of shutdown.

Typical O&M activities will include the following:

- Visual inspection of system components and their condition (including pipe connections for potential leaks)
- Monitoring of pressure levels at the unit and each sparge point
- Monitoring of sparge times
- Inspection of ambient ozone monitor to ensure proper working condition.

### **5.1.1 Effectiveness Monitoring**

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

### **5.1.2 Ozone Sparge System Monitoring**

System monitoring will include routine measurement of parameters discussed in **Section 5.1** and will coincide with O&M activities. Additional parameters to be measured, recorded, or calculated during the routine activities are as follows:

- Date of each site visit
- Measuring groundwater elevations in select monitoring wells (minimum of once per month)
- Total system runtime and explanations of unscheduled shutdowns
- O&M activities and system condition
- Progress of the remedial system toward achieving site cleanup objectives.

An example of a monitoring form to be used is included in **Appendix F, Ozone Unit Monitoring Forms**.

### **5.1.3 Groundwater Sampling**

PPM recommends groundwater samples be collected from all monitoring wells on a quarterly basis thereafter while the system is in operation. Groundwater samples will be analyzed for COCs per EPA Method 8260. Analytical data obtained during these events will be evaluated to ascertain if modifications to the ozone sparge program are warranted. This may include adjusting the ozone sparge cycle time or modifying the number of sparge points used.

The system will be shut down approximately 24 to 48 hours in advance of each scheduled monitoring event. Sampling activities will be conducted in accordance with the methodology outlined in **Section 4.8.1**.

## 6.0 REPORTING

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

1. System Delivery  
A system delivery letter will be submitted to ADEM within ten days of system delivery to the site.
2. Start-up Notification  
This letter report will provide start-up notification within 15 days of system start-up.
3. Report of Corrective Action Implementation  
This report will be submitted within 60 days of system startup. This report will include as-built drawings of the system and analytical results of the baseline sampling event.
4. Reporting of Corrective Action Effectiveness  
PPM proposes to submit quarterly progress reports, which summarize field activities and progress of the system toward reducing COC concentrations to below SSCALs. These reports will include an evaluation of the system effectiveness, and recommendations concerning any additional modifications or change in remedial approaches that may be necessary. ADEM Corrective Action System Effectiveness Monitoring Report (CASEMR) forms will be included with each report.
5. Request for Cessation of Corrective Action (Closure Evaluation)  
This report will include data that shows that remediation goals or asymptotic levels have been achieved. A separate cost proposal will be submitted for this work.
6. Site Closure Report  
This report will describe in detail the closure of the site and removal of all remediation equipment. A separate cost proposal will be submitted for this work.

## 7.0 CLOSURE EVALUATION

The data collected during site monitoring activities will be evaluated on a quarterly basis or more frequently if needed. Criteria for considering termination of remedial activities will include reduction of COC concentrations to at or below SSCALs or a determination that asymptotic levels have been reached.



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.

## **8.0 SITE HEALTH AND SAFETY**

A site-specific Health and Safety Plan (HASP) for proposed corrective action activities at the facility is included in **Appendix G, Site Health and Safety Plan**. The HASP was specifically designed to address the proposed corrective actions and monitoring activities at the site. Project personnel will be familiar with the HASP prior to performing any work at the site. The HASP will be kept on site throughout the duration of the project.

## **9.0 PROJECT SCHEDULE**

PPM will notify ADEM five days in advance of any planned drilling, trenching, system installation, or startup activities to allow department personnel the opportunity to visit the site during work activities if possible. If rescheduling is necessary, PPM will notify ADEM by telephone of the new date and reason for rescheduling.

### **9.1 ESTIMATED SCHEDULE FOR SYSTEM INSTALLATION**

PPM estimates that site preparation/system installation activities will require approximately two weeks to complete pending site and weather conditions encountered. System offloading and connection activities will likely require two days to complete pending adequate response time from local utility personnel.

System start-up activities will require approximately two days for adequate system monitoring prior to departing from the site. A site visit will be conducted approximately one week following start-up activities to further optimize system operation. Based on this anticipated schedule, PPM estimates that system installation, start up, and initial optimization efforts can be completed within 35 days of initiating site activities.

## **9.2 ESTIMATED CLEANUP TIME**

Although the length of time required to obtain cleanup objectives cannot be accurately predicted, it is anticipated that the ozone system will be operated for approximately 12 months. This time frame is based on several factors including, but not limited to: estimated mass of COC in soil and groundwater; estimated mass of oxidizable substances in the subsurface (non COC material); estimated radii of influence for sparge points; estimated ozone delivery rate from the system; and estimated system runtime. It is noted that this is a theoretical estimate only and the actual cleanup time can be expected to vary from that predicted.

A more accurate prediction of cleanup time will be provided once the system has been in operation long enough to establish trends for dissolved COC concentrations during system operation.

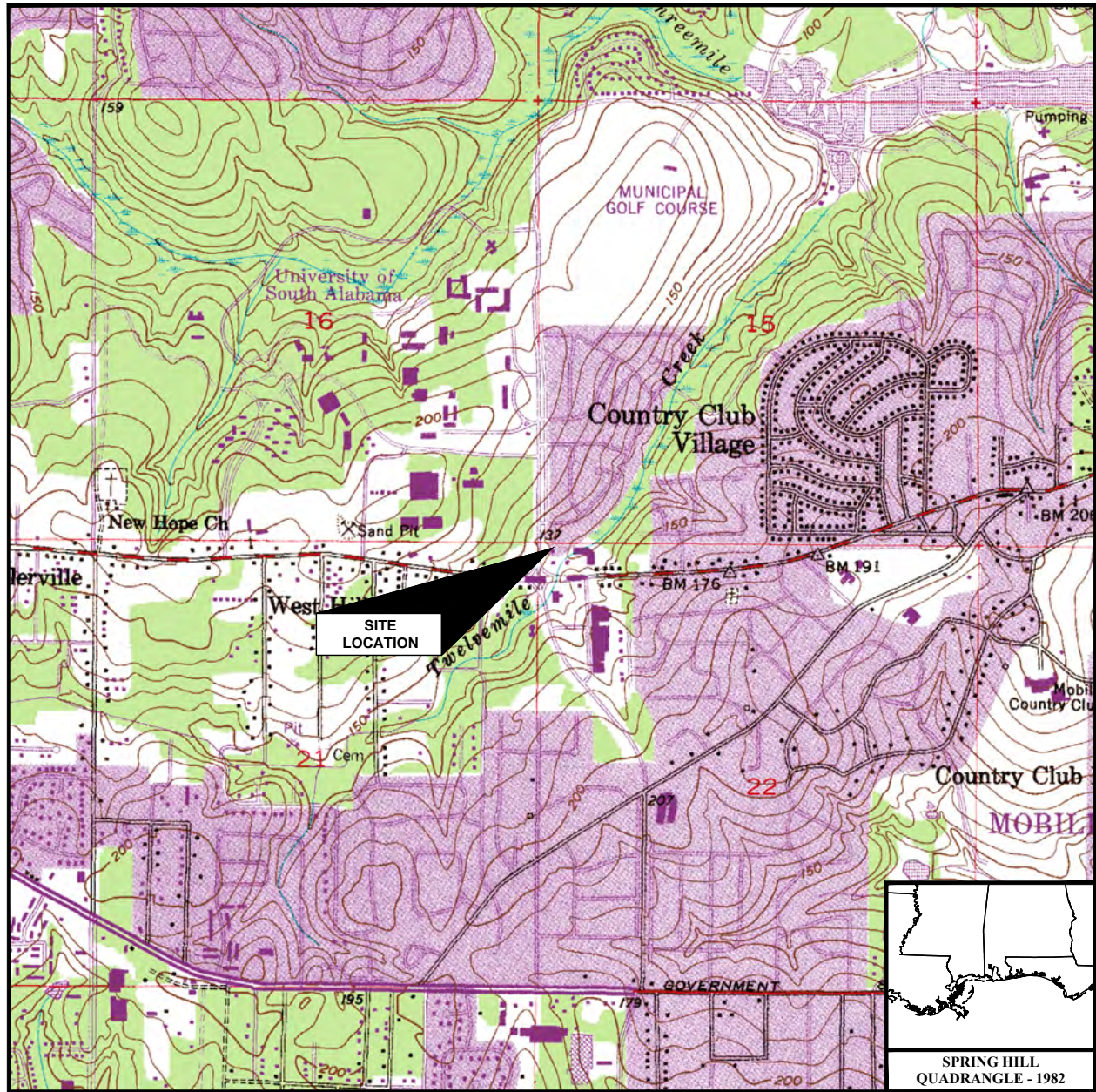
## **10.0 COST ESTIMATE**

Cost proposals for completion of the activities associated with implementation of the CAP are included as follows:

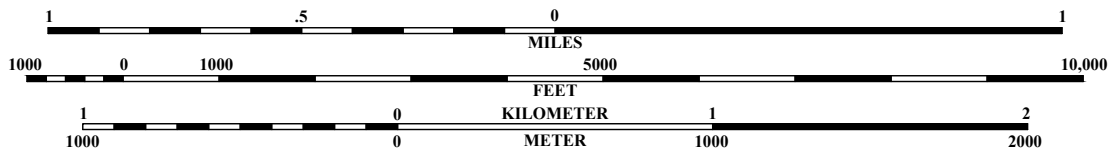
- **Appendix H – Cost Proposal No. 25 – Equipment Purchase**
- **Appendix I – Cost Proposal No. 26 – Ozone System Installation and Startup**
- **Appendix J – Cost Proposal No. 27– First Quarter O&M**
- **Appendix K – Cost Proposal No. 28 – Second Quarter O&M**
- **Appendix L – Cost Proposal No. 29 – Third Quarter O&M**


## **APPENDICES**

## **APPENDIX A – FIGURES**



SCALE: 1 : 24,000

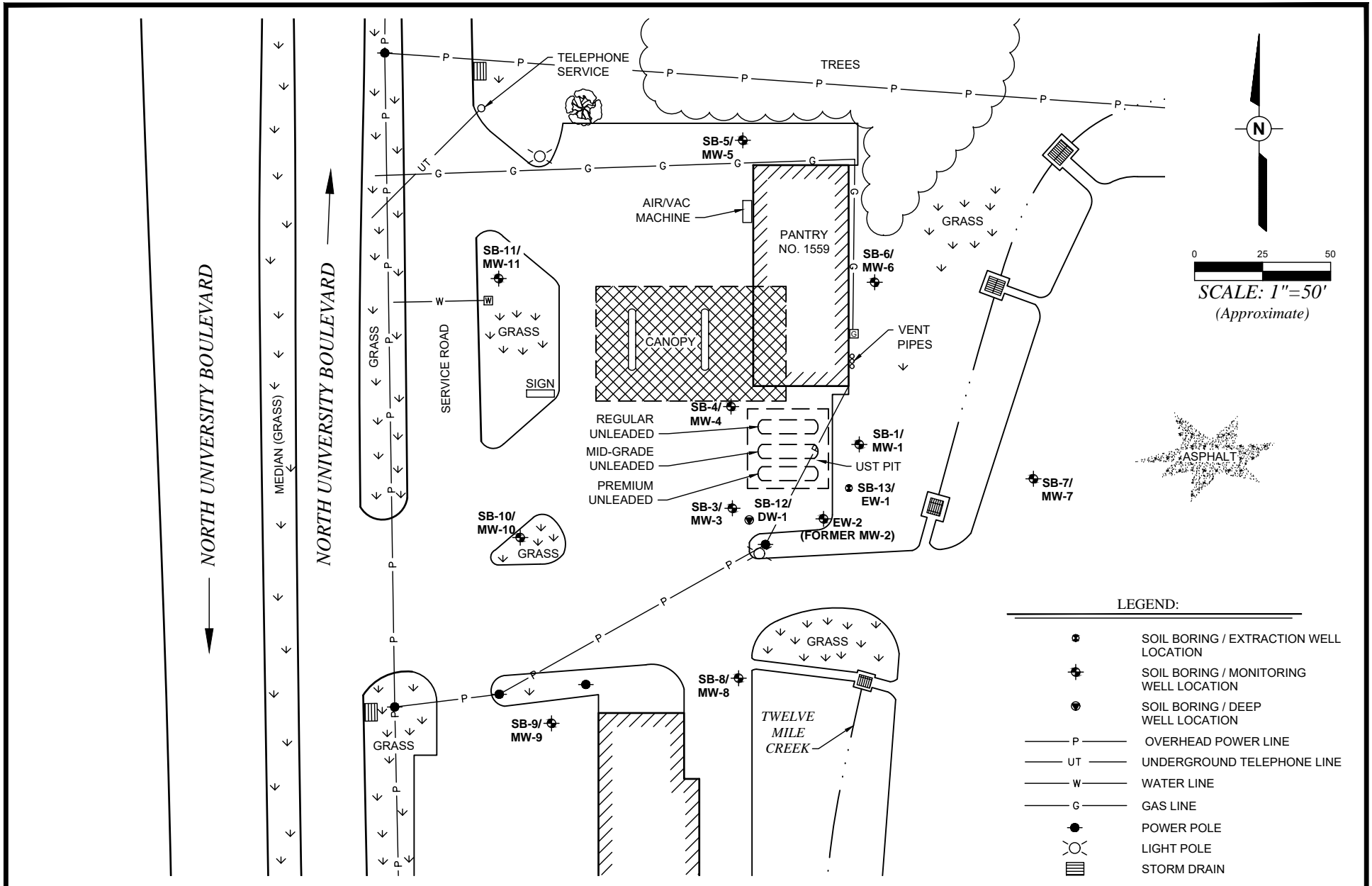


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PROJECT NUMBER: <b>262724</b>	PHASE: <b>MCAP</b>

**CIRCLE K STORES, INC.**  
**CIRCLE K STORE NO. 2721559**  
 10 NORTH UNIVERSITY BOULEVARD  
 MOBILE, ALABAMA

**SITE LOCATION MAP**

FIGURE NUMBER  
**1**



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**CIRCLE K STORES, INC.**  
**CIRCLE K STORE NO. 2721559**  
10 NORTH UNIVERSITY BOULEVARD  
MOBILE, ALABAMA

SITE MAP

FIGURE NUMBER

2

DRAWN BY:

JCP

DRAWN DATE:

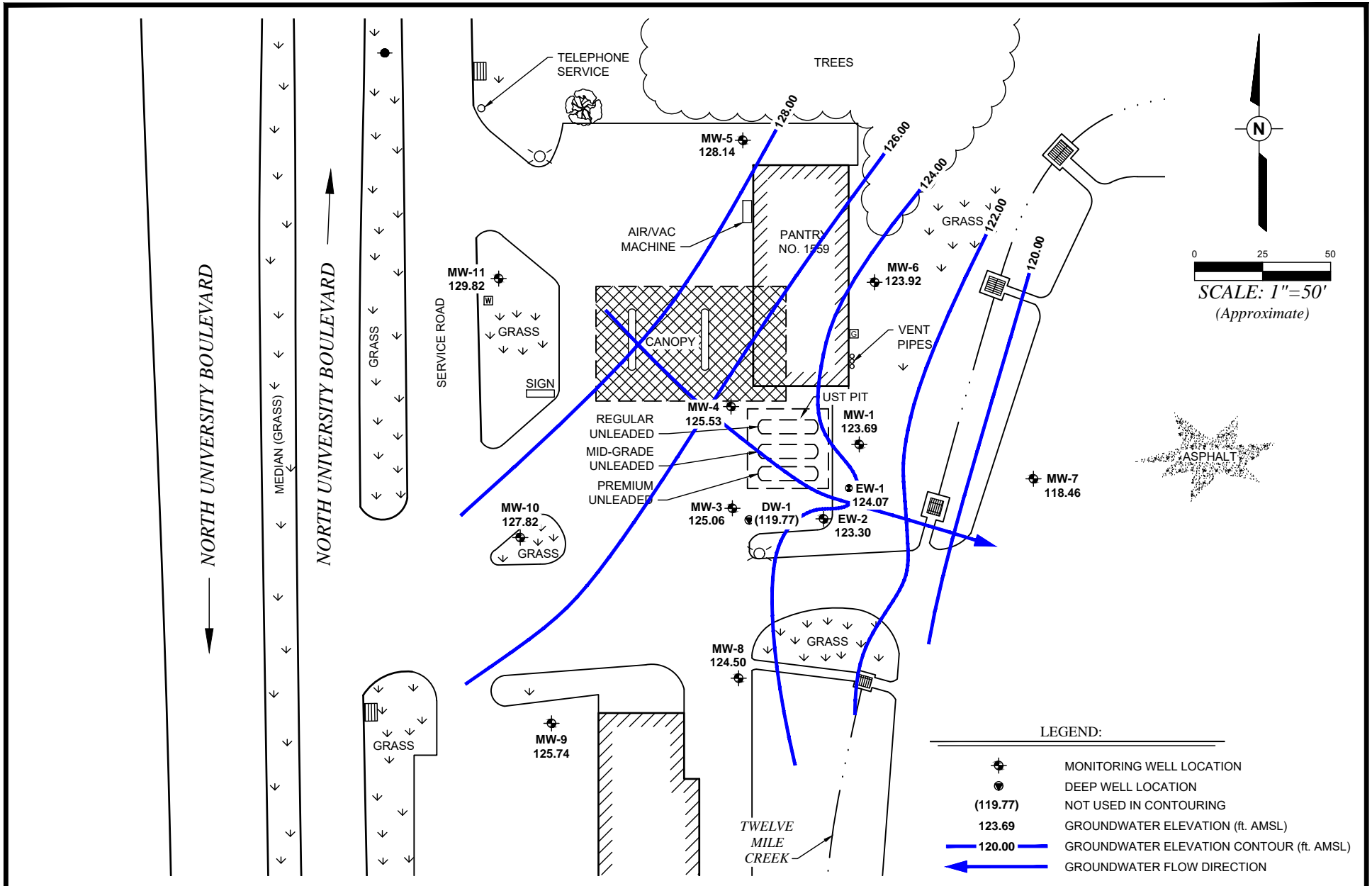
08/27/19

PROJECT NUMBER:

262724

PHASE:

MCAP



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JCP

DRAWN DATE:

08/27/19

PROJECT NUMBER:

262724

PHASE:

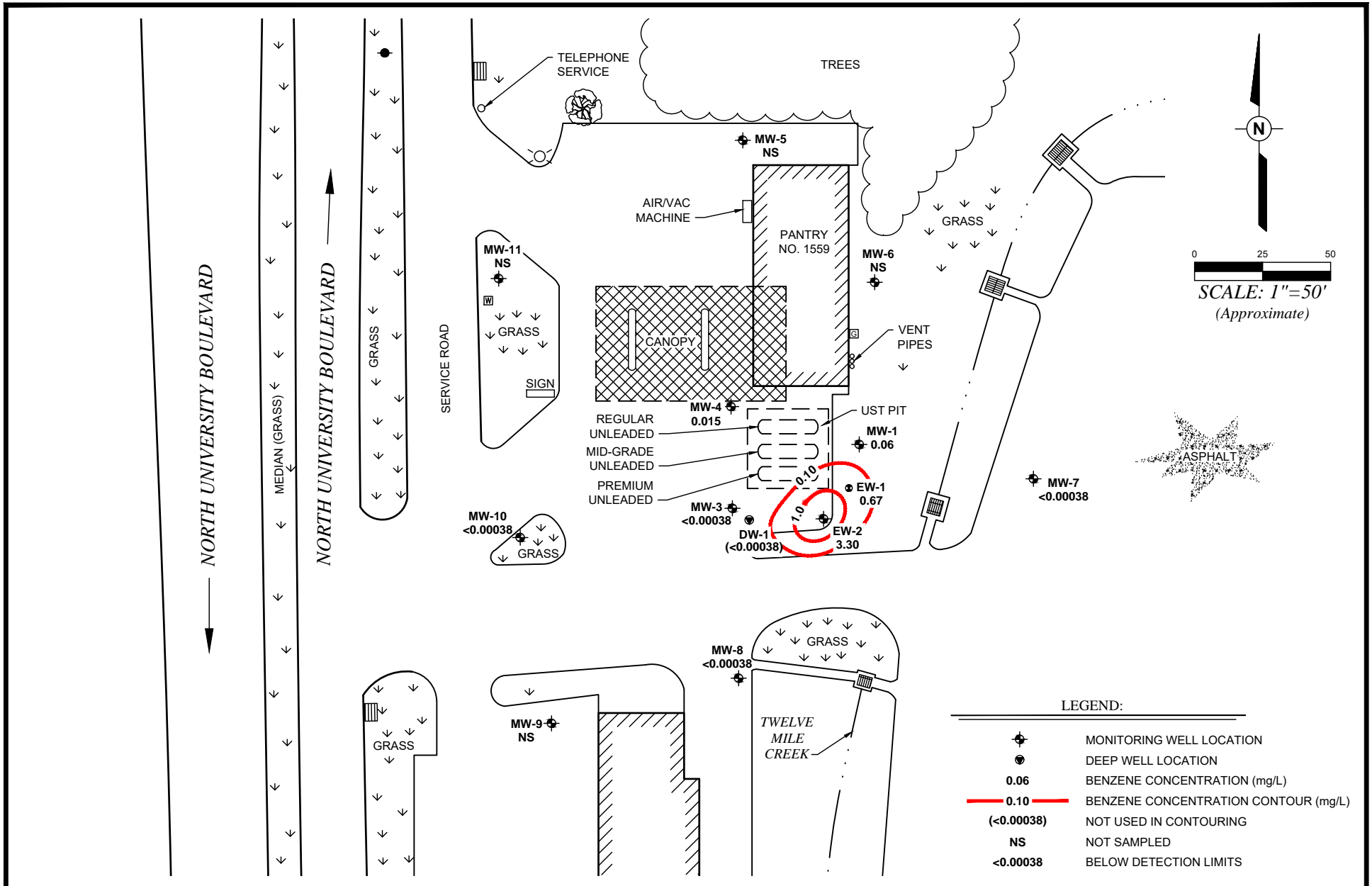
MCAP

**CIRCLE K STORES, INC.**  
**CIRCLE K STORE NO. 2721559**  
10 NORTH UNIVERSITY BOULEVARD  
MOBILE, ALABAMA

**GROUNDWATER ELEVATION MAP**  
(JUNE 21, 2019)

FIGURE  
NUMBER

3



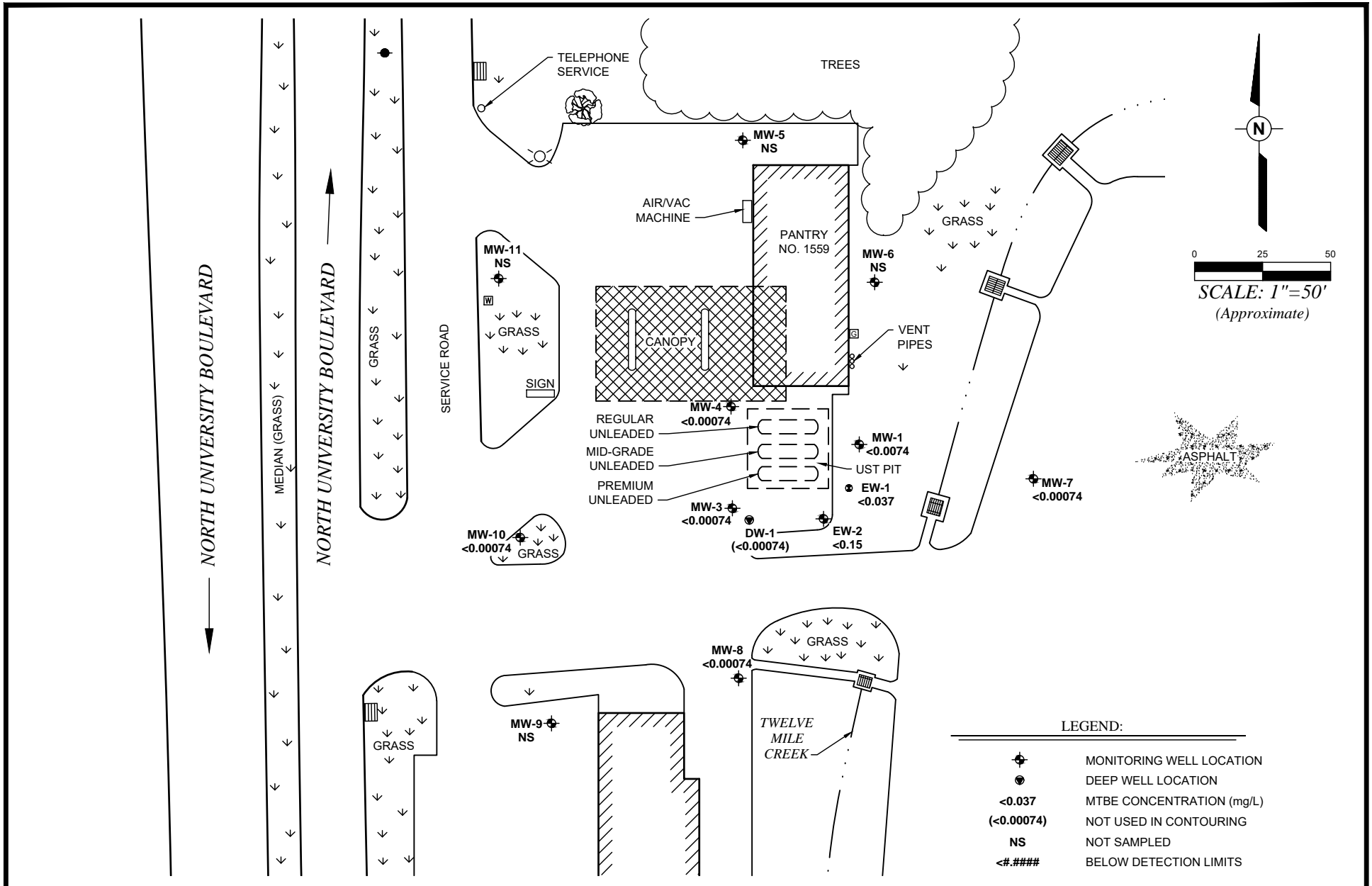
<b>PPM</b> PPM CONSULTANTS, INC. www.ppmco.com	
DRAWN BY: JCP	DRAWN DATE: 08/27/19
PROJECT NUMBER: 262724	PHASE: MCAP

**CIRCLE K STORES, INC.**  
**CIRCLE K STORE NO. 2721559**  
 10 NORTH UNIVERSITY BOULEVARD  
 MOBILE, ALABAMA

**BENZENE CONCENTRATIONS  
 IN GROUNDWATER  
 (JUNE 21, 2019)**

FIGURE  
 NUMBER  
**4**



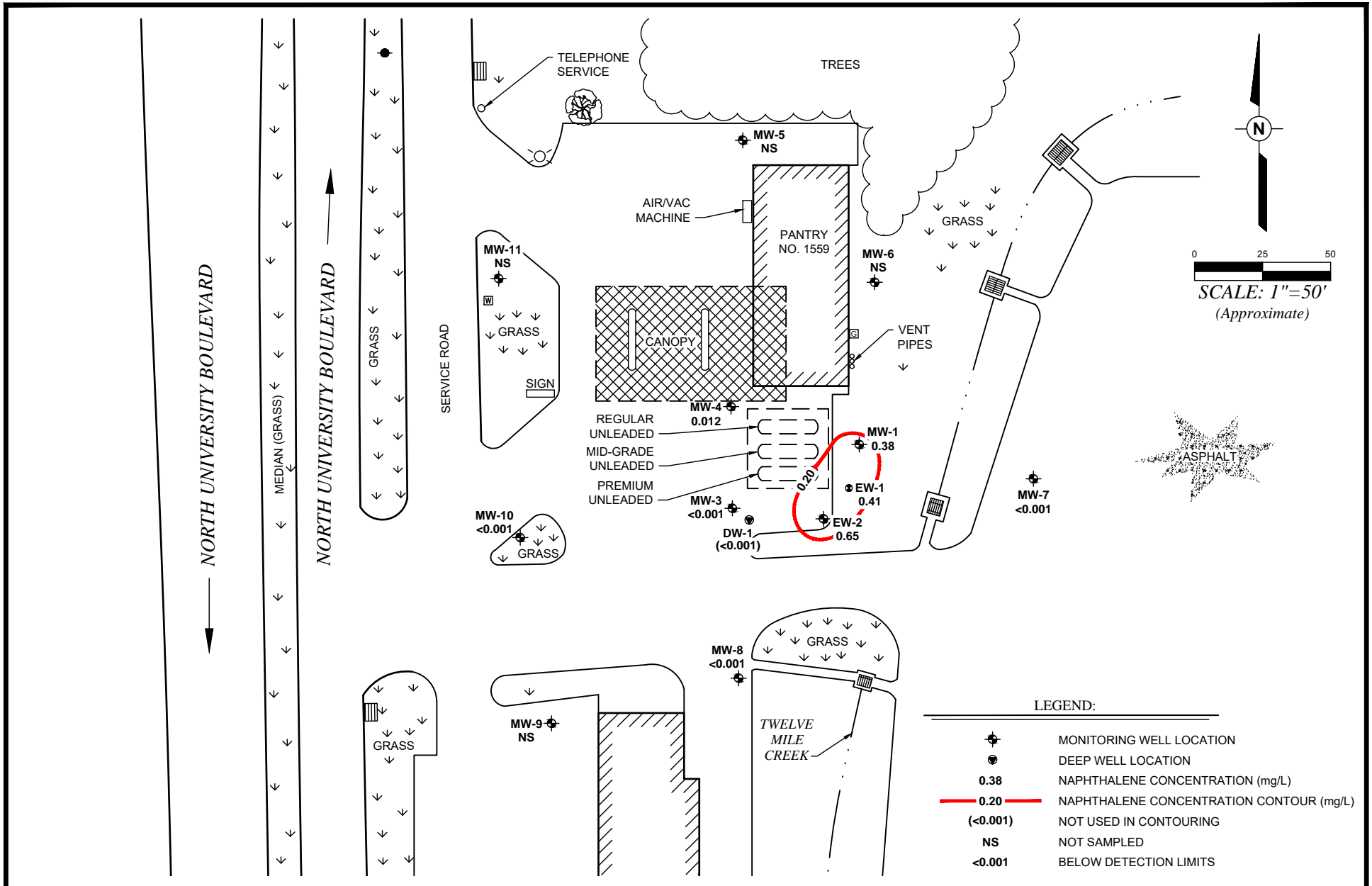


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PROJECT NUMBER: 262724	PHASE: MCAP

**CIRCLE K STORES, INC.**  
**CIRCLE K STORE NO. 2721559**  
 10 NORTH UNIVERSITY BOULEVARD  
 MOBILE, ALABAMA

**MTBE CONCENTRATIONS  
 IN GROUNDWATER  
 (JUNE 21, 2019)**

FIGURE  
 NUMBER  
**5**

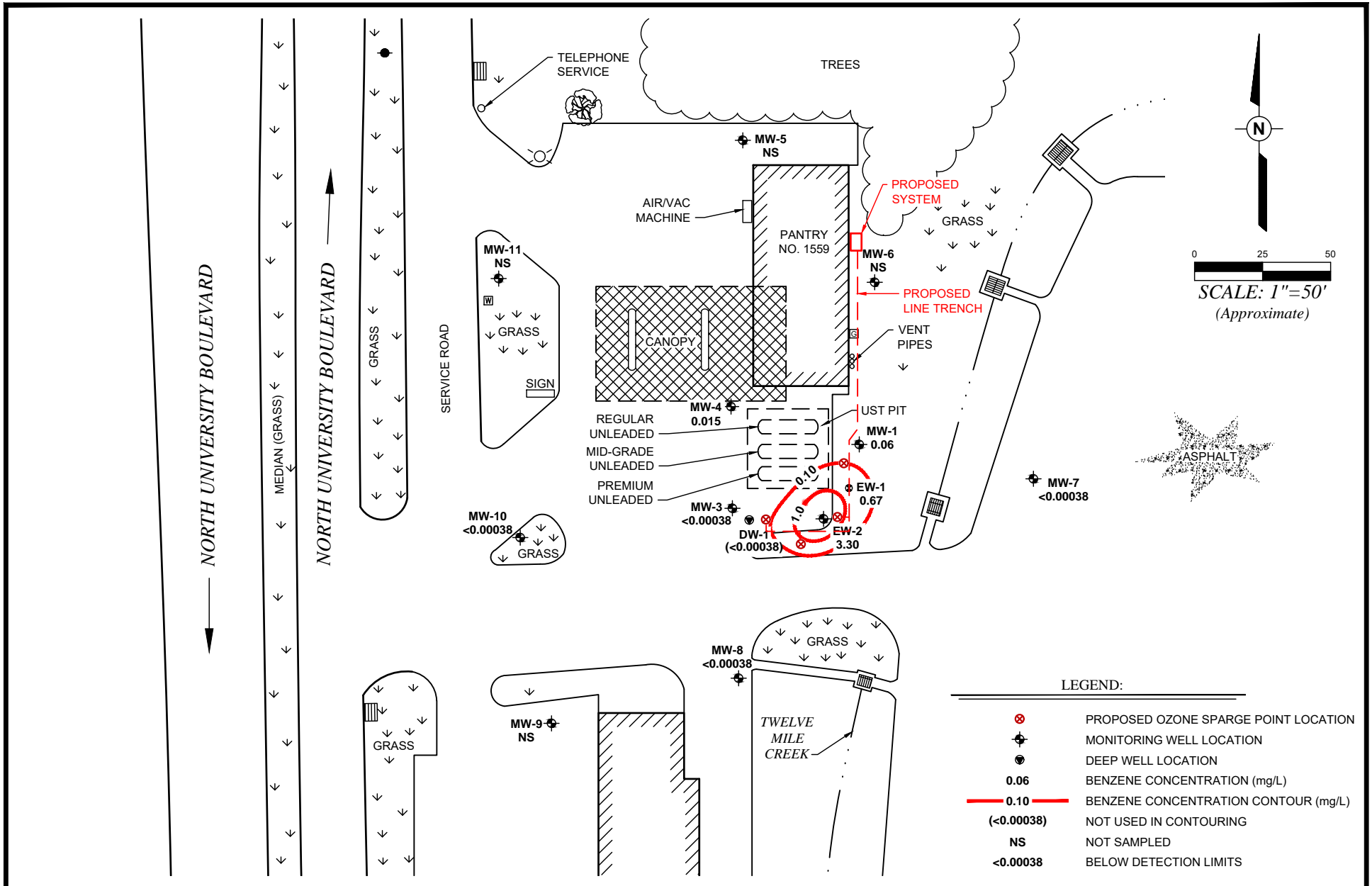


<b>PPM</b> PPM CONSULTANTS, INC. www.ppmco.com	
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PROJECT NUMBER: 262724	PHASE: MCAP

**CIRCLE K STORES, INC.**  
**CIRCLE K STORE NO. 2721559**  
 10 NORTH UNIVERSITY BOULEVARD  
 MOBILE, ALABAMA

**NAPHTHALENE CONCENTRATIONS  
 IN GROUNDWATER  
 (JUNE 21, 2019)**

FIGURE  
 NUMBER  
**6**



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PROJECT NUMBER:

262724

PHASE:

MCAP

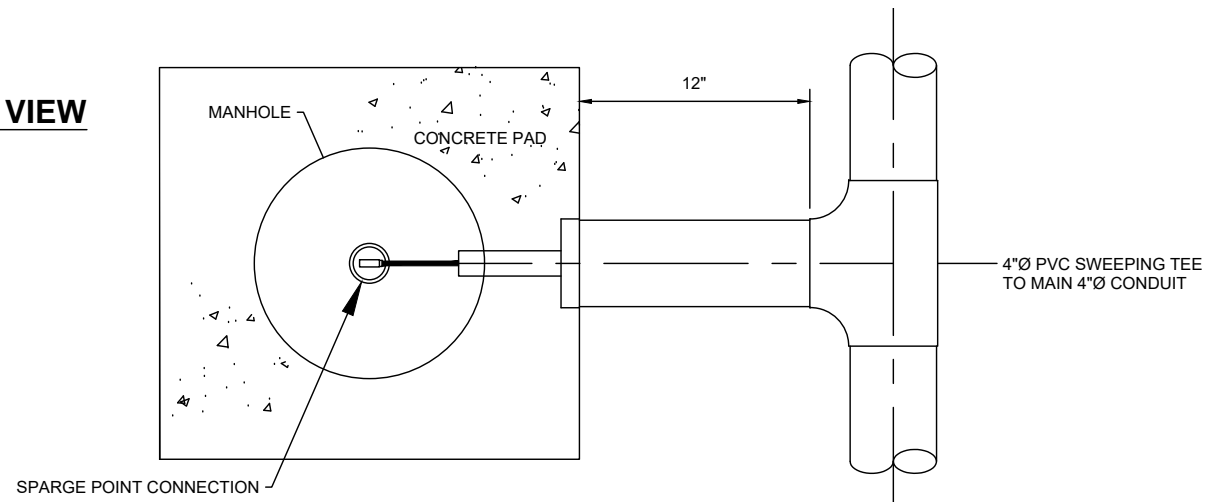
CIRCLE K STORES, INC.  
CIRCLE K STORE NO. 2721559  
10 NORTH UNIVERSITY BOULEVARD  
MOBILE, ALABAMA

PROPOSED OZONE SYSTEM LAYOUT

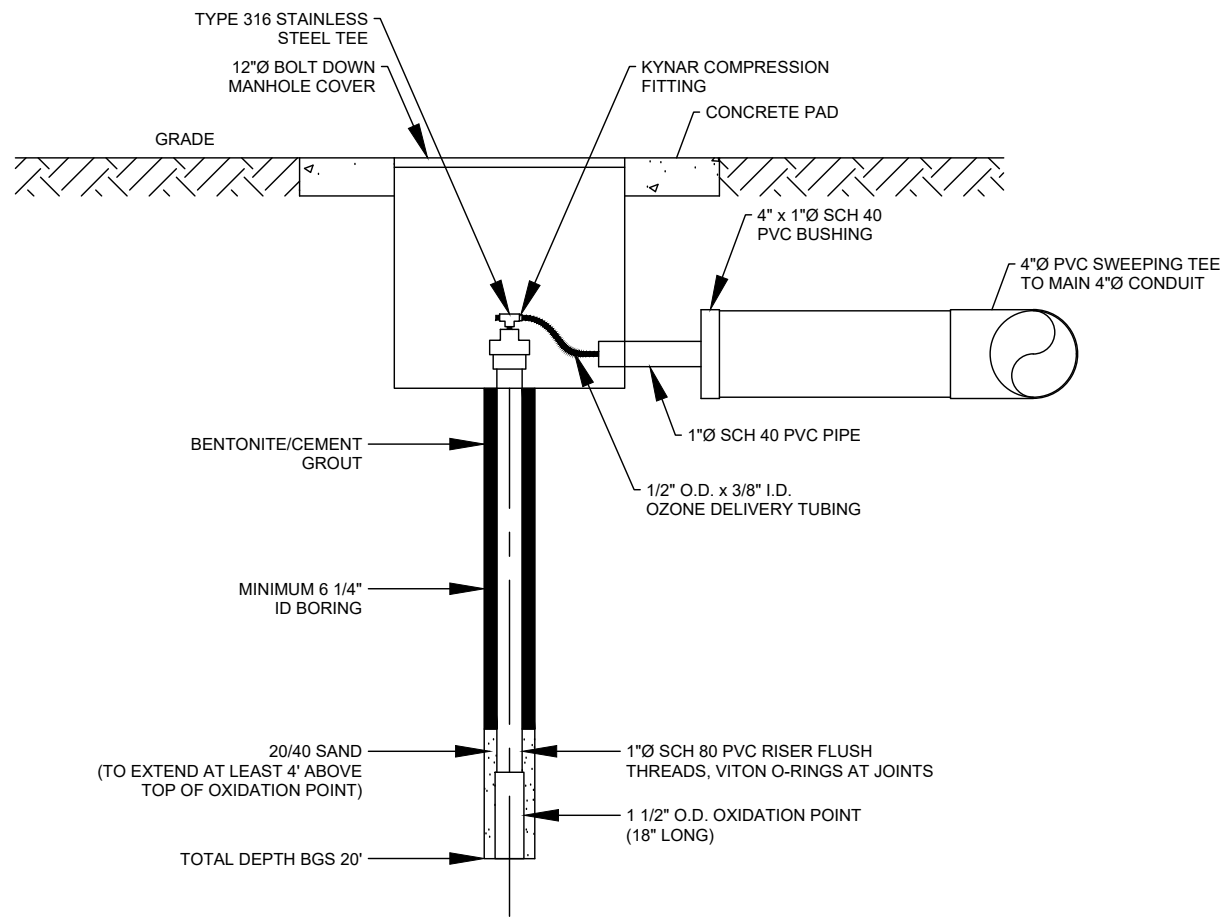
FIGURE NUMBER

7

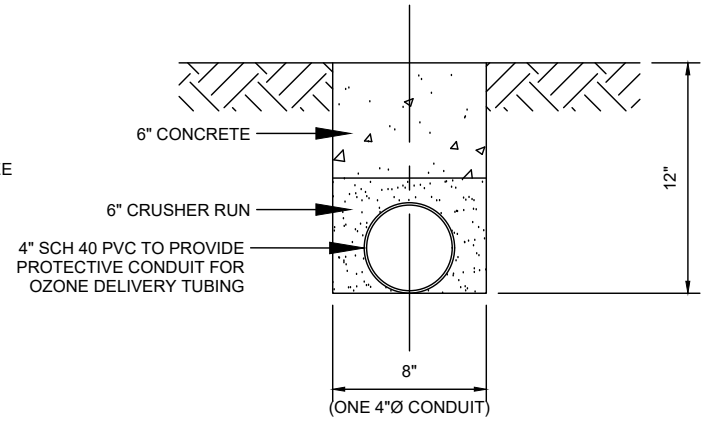
**TYPICAL PLAN VIEW**  
NOT TO SCALE



- NOTES:**
1. WELLHEAD CONNECTIONS, RISER AND OXIDATION POINTS TO BE PROVIDED BY EQUIPMENT MANUFACTURER.
  2. OZONE DELIVERY TUBING TO BE PROVIDED BY EQUIPMENT MANUFACTURER.
  3. OZONE DELIVERY TUBING TO BE INSTALLED DURING PLACEMENT OF 4"Ø SCHEDULE 40 PVC CONDUIT.



**TYPICAL SPARGE POINT DETAIL**  
NOT TO SCALE



**TYPICAL TRENCH DETAIL**  
NOT TO SCALE

<b>PPM</b> PPM CONSULTANTS, INC. www.ppmco.com	
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PROJECT NUMBER: 262724	PHASE: MCAP

**CIRCLE K STORES, INC.**  
**CIRCLE K STORE NO. 2721559**  
10 NORTH UNIVERSITY BOULEVARD  
MOBILE, ALABAMA

TYPICAL OZONE SPARGE POINT CONSTRUCTION DETAILS

FIGURE NUMBER  
**8**

## **APPENDIX B – TABLES**

**TABLE 1**  
**SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft., BGS)	Depth to Product (ft., BTOC)	Depth to Water (ft., BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-1	Preliminary	7/1/13	20.00	136.72	5.00-20.00	NE	13.97	--	122.75
	Secondary	11/11/13				NE	14.07	--	122.65
	GWM1	8/27/14				NE	13.10	--	123.62
	GWM2	11/24/14				NE	13.85	--	122.87
	GWM3	2/26/15				13.92	14.55	0.63	122.64*
	GWM4	5/26/15				12.44	12.97	0.53	124.69*
	RNA1	2/23/16				12.55	12.62	0.07	124.22*
	RNA2	6/27/16				NE	12.82	--	123.90
	RNA3	10/24/16				NE	12.96	--	123.76
	RNA4	2/24/17				NE	13.00	--	123.72
	RNA5	6/27/17				NE	10.49	--	126.23
	RNA6	10/23/17				NE	10.20	--	126.52
	RNA7	2/20/18				NE	11.50	--	125.22
	RNA8	6/21/18				NE	11.24	--	125.48
RNA9	10/29/18	NE	12.53	--	124.19				
RNA10	2/26/19	NE	12.91	--	123.81				
RNA11	6/21/19	NE	13.03	--	123.69				
MW-2	Preliminary	7/1/13	20.00	136.76	5.00-20.00	NE	13.61	--	123.15
	Secondary	11/11/13				13.45	13.90	0.45	123.20*
	GWM1	8/27/14				12.76	13.39	0.63	123.84*
	GWM2	11/24/14				13.39	14.02	0.63	123.21*
	GWM3	2/26/15				13.50	14.25	0.75	123.07*
	GWM4	5/26/15				12.25	12.28	0.03	124.34*
	RNA1	2/23/16				12.30	12.92	0.62	124.93*
	RNA2	6/27/16				12.61	13.01	0.40	124.05*
	RNA3	10/24/16				12.74	12.92	0.18	123.97*
	RNA4	2/24/17				12.95	13.00	0.05	123.79*
	RNA5	6/27/17				10.62	10.97	0.35	125.88*
	RNA6	10/23/17				Converted to EW-2 on 8/18/17			
MW-3	Preliminary	7/1/13	20.00	136.27	5.00-20.00	NE	11.91	--	124.36
	Secondary	11/11/13				NE	12.16	--	124.11
	GWM1	8/27/14				NE	11.16	--	125.11
	GWM2	11/24/14				NE	11.90	--	124.37
	GWM3	2/26/15				NE	12.20	--	124.07
	GWM4	5/26/15				NE	10.89	--	125.38
	RNA1	2/23/16				NE	10.78	--	125.49
	RNA2	6/27/16				NE	10.84	--	125.43
	RNA3	10/24/16				NE	11.03	--	125.24
	RNA4	2/24/17				NE	11.24	--	125.03
	RNA5	6/27/17				NE	9.10	--	127.17
	RNA6	10/23/17				NE	9.04	--	127.23
	RNA7	2/20/18				NE	9.58	--	126.69
	RNA8	6/21/18				NE	9.45	--	126.82
RNA9	10/29/18	NE	10.59	--	125.68				
RNA10	2/26/19	NE	11.15	--	125.12				
RNA11	6/21/19	NE	11.21	--	125.06				

**TABLE 1**  
**SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft., BGS)	Depth to Product (ft., BTOC)	Depth to Water (ft., BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-4	Preliminary	7/1/13	20.00	136.88	5.00-20.00	NE	12.94	--	123.94
	Secondary	11/11/13				NE	13.18	--	123.70
	GWM1	8/27/14				NE	11.91	--	124.97
	GWM2	11/24/14				NE	12.79	--	124.09
	GWM3	2/26/15				NE	13.21	--	123.67
	GWM4	5/26/15				NE	11.59	--	125.29
	RNA1	2/23/16				NE	11.38	--	125.50
	RNA2	6/27/16				NE	11.38	--	125.50
	RNA3	10/24/16				NE	11.51	--	125.37
	RNA4	2/24/17				NE	11.50	--	125.38
	RNA5	6/27/17				NE	9.51	--	127.37
	RNA6	10/23/17				NE	9.25	--	127.63
	RNA7	2/20/18				10.06	10.08	0.02	126.81*
	RNA8	6/21/18				NE	9.80	--	127.08
RNA9	10/29/18	NE	10.80	--	126.08				
RNA10	2/26/19	NE	11.33	--	125.55				
RNA11	6/21/19	NE	11.35	--	125.53				
MW-5	Secondary	11/11/13	20.00	137.76	5.00-20.00	NE	10.59	--	127.17
	GWM1	8/27/14				NE	9.59	--	128.17
	GWM2	11/24/14				NE	10.20	--	127.56
	GWM3	2/26/15				NE	10.50	--	127.26
	GWM4	5/26/15				NE	9.47	--	128.29
	RNA1	2/23/16				NE	9.05	--	128.71
	RNA2	6/27/16				NE	8.98	--	128.78
	RNA3	10/24/16				NE	9.23	--	128.53
	RNA4	2/24/17				NE	9.27	--	128.49
	RNA5	6/27/17				NE	8.05	--	129.71
	RNA6	10/23/17				NE	7.26	--	130.50
	RNA7	2/20/18				NE	8.19	--	129.57
	RNA8	6/21/18				NE	8.15	--	129.61
	RNA9	10/29/18				NE	9.07	--	128.69
RNA10	2/26/19	NE	9.28	--	128.48				
RNA11	6/21/19	NE	9.62	--	128.14				
MW-6	Secondary	11/11/13	20.00	137.56	5.00-20.00	NE	14.51	--	123.05
	GWM1	8/27/14				NE	13.74	--	123.82
	GWM2	11/24/14				NE	14.15	--	123.41
	GWM3	2/26/15				NE	14.39	--	123.17
	GWM4	5/26/15				NE	13.33	--	124.23
	RNA1	2/23/16				NE	13.17	--	124.39
	RNA2	6/27/16				NE	13.41	--	124.15
	RNA3	10/24/16				NE	13.52	--	124.04
	RNA4	2/24/17				NE	13.46	--	124.10
	RNA5	6/27/17				NE	11.53	--	126.03
	RNA6	10/23/17				NE	10.60	--	126.96
	RNA7	2/20/18				NE	12.22	--	125.34
	RNA8	6/21/18				NE	12.30	--	125.26
	RNA9	10/29/18				NE	13.15	--	124.41
RNA10	2/26/19	NE	13.42	--	124.14				
RNA11	6/21/19	NE	13.64	--	123.92				

**TABLE 1**  
**SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft., BGS)	Depth to Product (ft., BTOC)	Depth to Water (ft., BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-7	Secondary	11/11/13	20.00	130.54	5.00-20.00	NE	12.64	--	117.90
	GWM1	8/27/14				NE	11.87	--	118.67
	GWM2	11/24/14				NE	12.14	--	118.40
	GWM3	2/26/15				NE	12.55	--	117.99
	GWM4	5/26/15				NE	11.70	--	118.84
	RNA1	2/23/16				NE	11.55	--	118.99
	RNA2	6/27/16				NE	12.11	--	118.43
	RNA3	10/24/16				NE	12.06	--	118.48
	RNA4	2/24/17				NE	12.10	--	118.44
	RNA5	6/27/17				NE	11.45	--	119.09
	RNA6	10/23/17				NE	11.45	--	119.09
	RNA7	2/20/18				NE	11.24	--	119.30
RNA8	6/21/18	NE	11.66	--	118.88				
RNA9	10/29/18	NE	11.51	--	119.03				
RNA10	2/26/19	NE	12.30	--	118.24				
RNA11	6/21/19	NE	12.08	--	118.46				
MW-8	Secondary	11/11/13	20.00	134.71	5.00-20.00	NE	10.95	--	123.76
	GWM1	8/27/14				NE	10.07	--	124.64
	GWM2	11/24/14				NE	10.71	--	124.00
	GWM3	2/26/15				NE	11.01	--	123.70
	GWM4	5/26/15				NE	9.78	--	124.93
	RNA1	2/23/16				NE	9.71	--	125.00
	RNA2	6/27/16				NE	9.89	--	124.82
	RNA3	10/24/16				NE	10.07	--	124.64
	RNA4	2/24/17				NE	10.22	--	124.49
	RNA5	6/27/17				NE	8.42	--	126.29
	RNA6	10/23/17				NE	8.25	--	126.46
	RNA7	2/20/18				NE	8.88	--	125.83
RNA8	6/21/18	NE	8.68	--	126.03				
RNA9	10/29/18	NE	9.66	--	125.05				
RNA10	2/26/19	NE	10.18	--	124.53				
RNA11	6/21/19	NE	10.21	--	124.50				
MW-9	Secondary	11/11/13	18.00	135.34	3.00-18.00	NE	10.32	--	125.02
	GWM1	8/27/14				NE	9.40	--	125.94
	GWM2	11/24/14				NE	10.12	--	125.22
	GWM3	2/26/15				NE	10.45	--	124.89
	GWM4	5/26/15				NE	9.18	--	126.16
	RNA1	2/23/16				NE	9.11	--	126.23
	RNA2	6/27/16				NE	9.06	--	126.28
	RNA3	10/24/16				NE	9.32	--	126.02
	RNA4	2/24/17				NE	9.58	--	125.76
	RNA5	6/27/17				NE	7.84	--	127.50
	RNA6	10/23/17				NE	7.54	--	127.80
	RNA7	2/20/18				NE	8.17	--	127.17
RNA8	6/21/18	NE	7.95	--	127.39				
RNA9	10/29/18	NE	9.01	--	126.33				
RNA10	2/26/19	NE	9.53	--	125.81				
RNA11	6/21/19	NE	9.60	--	125.74				



**TABLE 1**  
**SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft., BGS)	Depth to Product (ft., BTOC)	Depth to Water (ft., BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
MW-10	Secondary	11/11/13	20.00	136.74	5.00-20.00	NE	10.32	--	126.42
	GWM1	8/27/14				NE	9.14	--	127.60
	GWM2	11/24/14				NE	10.00	--	126.74
	GWM3	2/26/15				NE	10.37	--	126.37
	GWM4	5/26/15				NE	9.02	--	127.72
	RNA1	2/23/16				NE	8.72	--	128.02
	RNA2	6/27/16				NE	8.56	--	128.18
	RNA3	10/24/16				NE	8.57	--	128.17
	RNA4	2/24/17				NE	8.83	--	127.91
	RNA5	6/27/17				NE	7.32	--	129.42
	RNA6	10/23/17				NE	6.50	--	130.24
	RNA7	2/20/18				NE	7.25	--	129.49
	RNA8	6/21/18				NE	7.16	--	129.58
RNA9	10/29/18	NE	8.32	--	128.42				
RNA10	2/26/19	NE	8.62	--	128.12				
RNA11	6/21/19	NE	8.92	--	127.82				
MW-11	Secondary	11/11/13	20.00	137.30	5.00-20.00	NE	8.68	--	128.62
	GWM1	8/27/14				NE	7.40	--	129.90
	GWM2	11/24/14				NE	8.26	--	129.04
	GWM3	2/26/15				NE	8.68	--	128.62
	GWM4	5/26/15				NE	7.44	--	129.86
	RNA1	2/23/16				NE	6.87	--	130.43
	RNA2	6/27/16				NE	6.61	--	130.69
	RNA3	10/24/16				NE	7.08	--	130.22
	RNA4	2/24/17				NE	7.20	--	130.10
	RNA5	6/27/17				NE	5.50	--	131.80
	RNA6	10/23/17				NE	4.53	--	132.77
	RNA7	2/20/18				NE	5.79	--	131.51
	RNA8	6/21/18				NE	5.54	--	131.76
RNA9	10/29/18	NE	6.87	--	130.43				
RNA10	2/26/19	NE	7.02	--	130.28				
RNA11	6/21/19	NE	7.48	--	129.82				
DW-1	Secondary	11/11/13	45.00	136.74	40.00-45.00	NE	17.46	--	119.28
	GWM1	8/27/14				NE	16.91	--	119.83
	GWM2	11/24/14				NE	17.10	--	119.64
	GWM3	2/26/15				NE	17.30	--	119.44
	GWM4	5/26/15				NE	17.47	--	119.27
	RNA1	2/23/16				NE	16.47	--	120.27
	RNA2	6/27/16				NE	16.94	--	119.80
	RNA3	10/24/16				NE	16.57	--	120.17
	RNA4	2/24/17				NE	17.25	--	119.49
	RNA5	6/27/17				NE	16.90	--	119.84
	RNA6	10/23/17				NE	16.25	--	120.49
	RNA7	2/20/18				NE	16.14	--	120.60
	RNA8	6/21/18				NE	16.64	--	120.10
RNA9	10/29/18	NE	16.33	--	120.41				
RNA10	2/26/19	NE	17.28	--	119.46				
RNA11	6/21/19	NE	16.97	--	119.77				

**TABLE 1**  
**SUMMARY OF GROUNDWATER ELEVATION SURVEY DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Date	Total Depth (ft. BGS)	Top of Casing Elevation (ft. AMSL)	Screened Interval (ft., BGS)	Depth to Product (ft., BTOC)	Depth to Water (ft., BTOC)	Free Product Thickness (ft.)	Groundwater Elevation (ft. AMSL)
EW-1	RNA1	2/23/16	20.00	135.68	5.00-20.00	NE	11.09	--	124.59
	RNA2	6/27/16				NE	11.31	--	124.37
	RNA3	10/24/16				NE	11.47	--	124.21
	RNA4	2/24/17				NE	11.68	--	124.00
	RNA5	6/27/17				NE	9.20	--	126.48
	RNA6	10/23/17				NE	8.90	--	126.78
	RNA7	2/20/18				NE	10.05	--	125.63
	RNA8	6/21/18				NE	9.82	--	125.86
	RNA9	10/29/18				NE	11.05	--	124.63
	RNA10	2/26/19				NE	11.52	--	124.16
	RNA11	6/21/19				NE	11.61	--	124.07
EW-2	RNA6	10/23/17	20.00	135.73	5.00-20.00	10.00	10.05	0.05	125.72*
	RNA7	2/20/18				10.91	11.22	0.31	124.74*
	RNA8	6/21/18				NE	10.69	--	125.04
	RNA9	10/29/18				NE	11.90	--	123.83
	RNA10	2/26/19				NE	12.44	--	123.29
	RNA11	6/21/19				NE	12.43	--	123.30

Notes: AMSL: Above Mean Sea Level.  
Top of casing elevation is based on a benchmark (BM) elevation of 137 feet AMSL for landsurface at MW-1 taken from the Spring Hill, Alabama 7.5 Minute Topographic Map.  
BGS: Below Ground Surface  
AMSL: Above Mean Sea Level.  
BTOC: Below Top of Casing  
NE: Not Encountered  
\*: Groundwater elevation corrected for the presence of free product using a specific gravity conversion of 0.75

Source: PPM Consultants, Inc.  
PPM Project No. 262724-MCAP

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	Naphthalene	
MW-1	Preliminary	7/1/13	<b>14.0</b>	26	3.10	16	13.97	<0.15	NA	
	Secondary	11/11/13	<b>4.20</b>	9.30	1.40	6.60	21.50	<0.037	0.34	
	GWM1	8/27/14	<b>6.50</b>	24	2.90	14	13.85	<0.074	0.36	
	GWM2	11/24/14	<b>5.60</b>	18	2.00	10	35.60	<0.074	0.19	
	GWM3	2/26/15	Not Sampled - Free Product							
	GWM4	5/26/15	<b>8.40</b>	57	9.60	55	130	<0.15	1.30	
	RNA1	2/23/16	Not Sampled - Free Product							
	RNA2	6/27/16	<b>3.90</b>	30	4.30	19	57.2	<0.19	0.57	
	RNA3	10/24/16	<b>2.30</b>	15	3.40	14	34.7	<0.074	0.65	
	RNA4	2/24/17	<b>3.00</b>	20	3.40	14	40.4	<0.19	0.39	
	RNA5	6/27/17	<b>1.20</b>	6.90	2.20	9.80	20.1	<0.037	0.80	
	RNA6	10/23/17	<b>1.60</b>	9.40	2.60	15	28.6	<0.037	0.91	
	RNA7	2/20/18	<b>2.40</b>	46	5.10	31	84.5	<0.15	0.47	
	RNA8	6/21/18	<b>0.58</b>	9.20	1.10	8.0	18.88	<0.037	0.70	
	RNA9	10/29/18	0.064	1.30	0.23	1.50	3.094	<0.0037	0.37	
RNA10	2/26/19	0.027	0.81	0.24	1.60	2.677	<0.0074	0.23		
RNA11	6/21/19	0.06	2.40	0.45	3.60	6.51	<0.0074	0.38		
<b>SSCAL POC Well</b>			<b>0.539</b>	<b>108</b>	<b>75.4</b>	<b>175</b>	<b>--</b>	<b>2.15</b>	<b>2.15</b>	
MW-2	Preliminary	7/1/13	11	77	3.90	25	116.9	<0.37	NA	
	Secondary	11/11/13	Not Sampled - Free Product							
	GWM1	8/27/14	Not Sampled - Free Product							
	GWM2	11/24/14	Not Sampled - Free Product							
	GWM3	2/26/15	Not Sampled - Free Product							
	GWM4	5/26/15	<b>6.20</b>	65	4.40	27	102.6	<0.15	0.49	
	RNA1	2/23/16	Not Sampled - Free Product							
	RNA2	6/27/16	Not Sampled - Free Product							
	RNA3	10/24/16	Not Sampled - Free Product							
	RNA4	2/24/17	Not Sampled - Free Product							
	RNA5	6/27/17	Not Sampled - Free Product							
	RNA6	10/23/17	Converted to EW-2 on 8/18/17							
<b>SSCAL POC Well</b>			<b>0.539</b>	<b>108</b>	<b>75.4</b>	<b>175</b>	<b>--</b>	<b>2.15</b>	<b>2.15</b>	

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	Naphthalene
MW-3	Preliminary	7/1/13	<b>1.0</b>	0.58	0.22	1.60	3.40	<0.0074	NA
	Secondary	11/11/13	<b>0.59</b>	0.19	0.095	0.59	1.47	<0.0037	0.0059
	GWM1	8/27/14	<b>0.67</b>	0.068	0.093	0.98	1.811	<0.0037	<0.005
	GWM2	11/24/14	0.47	0.53	0.086	0.69	1.776	0.0028	<0.002
	GWM3	2/26/15	0.46	0.41	0.065	0.88	1.815	<0.0037	<0.005
	GWM4	5/26/15	0.47	0.52	0.11	1.20	2.30	<0.0037	0.0054
	RNA1	2/23/16	0.13	0.027	0.036	0.79	0.983	0.0012	0.0055
	RNA2	6/27/16	0.077	0.032	0.053	0.45	0.612	<0.0015	0.015
	RNA3	10/24/16	0.018	0.0012	0.0097	0.16	0.1889	<0.00074	0.0043
	RNA4	2/24/17	0.014	0.0023	0.0036	0.046	0.0659	<0.00074	0.001
	RNA5	6/27/17	0.14	0.80	0.35	1.70	2.99	<0.0074	0.072
	RNA6	10/23/17	0.038	0.22	0.16	1.00	1.418	<0.0037	0.055
	RNA7	2/20/18	0.00044 J	0.0016	0.0024	0.012	0.01644	<0.00074	0.0021
	RNA8	6/21/18	0.0032	0.026	0.051	0.26	0.3402	<0.0015	0.015
	RNA9	10/29/18	<0.00038	<0.00041	0.00076 J	0.011	0.01176	<0.00074	0.0016
RNA10	2/26/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001	
RNA11	6/21/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001	
<b>SSCAL Source Well</b>			<b>0.539</b>	<b>108</b>	<b>75.4</b>	<b>175</b>	<b>--</b>	<b>2.15</b>	<b>2.15</b>
MW-4	Preliminary	7/1/13	<b>6.40</b>	7.50	1.30	5.30	20.50	<0.037	NA
	Secondary	11/11/13	<b>3.60</b>	7.30	1.30	5.40	17.60	<0.037	0.086
	GWM1	8/27/14	<b>1.90</b>	6.40	1.50	6.10	15.90	<0.037	0.10
	GWM2	11/24/14	<b>1.50</b>	1.30	0.67	2.60	6.07	<0.0074	0.054
	GWM3	2/26/15	<b>2.20</b>	2.20	1.00	4.40	9.80	<0.019	0.11
	GWM4	5/26/15	<b>3.20</b>	13	3.10	13	32.3	<0.037	0.28
	RNA1	2/23/16	<b>1.20</b>	4.10	2.40	10	17.7	<0.15	0.19
	RNA2	6/27/16	<b>0.64</b>	2.70	1.40	4.40	9.14	<0.019	0.18
	RNA3	10/24/16	0.31	0.064	0.50	1.80	2.674	<0.0074	0.084
	RNA4	2/24/17	0.39	1.200	0.50	1.70	3.79	<0.015	0.062
	RNA5	6/27/17	<b>0.58</b>	2.60	1.00	3.40	7.58	<0.015	0.15
	RNA6	10/23/17	0.37	2.30	1.10	4.60	8.37	<0.015	0.13
	RNA7	2/20/18	0.20	4.10	2.70	11	18	<0.015	0.16
	RNA8	6/21/18	0.099	0.46	0.22	0.72	1.499	<0.0037	0.037
	RNA9	10/29/18	0.0014	0.0012	0.004	0.014	0.0206	<0.00074	0.0015
RNA10	2/26/19	0.003	0.0027	0.02	0.07	0.0957	<0.00074	0.0018	
RNA11	6/21/19	0.015	0.0021	0.053	0.032	0.1021	<0.00074	0.012	
<b>SSCAL POC Well</b>			<b>0.539</b>	<b>108</b>	<b>75.4</b>	<b>175</b>	<b>--</b>	<b>2.15</b>	<b>2.15</b>

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	Naphthalene	
MW-5	Secondary	11/11/13	<0.00034	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	0.00065 J	0.00065	<0.00074	<0.001	
	RNA2	6/27/16	Not Sampled - Per ADEM							
	RNA3	10/24/16	Not Sampled - Per ADEM							
	RNA4	2/24/17	Not Sampled - Per ADEM							
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	Not Sampled - Per ADEM							
	RNA7	2/20/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA8	6/21/18	Not Sampled - Per ADEM							
	RNA9	10/29/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001	
RNA10	2/26/19	Not Sampled - Per ADEM								
RNA11	6/21/19	Not Sampled - Per ADEM								
<b>Onsite Tier II Target Levels</b>			<b>309</b>	<b>526</b>	<b>169</b>	<b>175</b>	<b>--</b>	<b>48,800</b>	<b>31</b>	
MW-6	Secondary	11/11/13	<0.00034	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA2	6/27/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA3	10/24/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA4	2/24/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA7	2/20/18	Not Sampled - Per ADEM							
	RNA8	6/21/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA9	10/29/18	Not Sampled - Per ADEM							
RNA10	2/26/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
RNA11	6/21/19	Not Sampled - Per ADEM								
<b>SSCAL POC Well</b>			<b>0.345</b>	<b>69</b>	<b>48.3</b>	<b>175</b>	<b>--</b>	<b>1.38</b>	<b>1.38</b>	

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	Naphthalene	
MW-7	Secondary	11/11/13	<0.00034	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA2	6/27/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA3	10/24/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA4	2/24/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	Not Sampled - Per ADEM							
	RNA7	2/20/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA8	6/21/18	Not Sampled - Per ADEM							
	RNA9	10/29/18	Not Sampled - Per ADEM							
RNA10	2/26/19	Not Sampled - Per ADEM								
RNA11	6/21/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
<b>SSCAL POC Well</b>			<b>0.195</b>	<b>39</b>	<b>27.3</b>	<b>175</b>	<b>--</b>	<b>0.78</b>	<b>0.78</b>	
MW-8	Secondary	11/11/13	<0.00034	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA2	6/27/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA3	10/24/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA4	2/24/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA7	2/20/18	Not Sampled - Per ADEM							
	RNA8	6/21/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA9	10/29/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001	
RNA10	2/26/19	Not Sampled - Per ADEM								
RNA11	6/21/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
<b>SSCAL POC Well</b>			<b>0.227</b>	<b>45.5</b>	<b>31.8</b>	<b>175</b>	<b>--</b>	<b>0.91</b>	<b>0.91</b>	

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	Naphthalene	
MW-9	Secondary	11/11/13	<0.00034	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA2	6/27/16	Not Sampled - Per ADEM							
	RNA3	10/24/16	Not Sampled - Per ADEM							
	RNA4	2/24/17	Not Sampled - Per ADEM							
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	Not Sampled - Per ADEM							
	RNA7	2/20/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA8	6/21/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA9	10/29/18	Not Sampled - Per ADEM							
RNA10	2/26/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
RNA11	6/21/19	Not Sampled - Per ADEM								
<b>Onsite Tier II Target Levels</b>			<b>309</b>	<b>526</b>	<b>169</b>	<b>175</b>	<b>--</b>	<b>48,800</b>	<b>31</b>	
MW-10	Secondary	11/11/13	<0.00034	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA2	6/27/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA3	10/24/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA4	2/24/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA7	2/20/18	Not Sampled - Per ADEM							
	RNA8	6/21/18	Not Sampled - Per ADEM							
	RNA9	10/29/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001	
RNA10	2/26/19	Not Sampled - Per ADEM								
RNA11	6/21/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
<b>Onsite Tier II Target Levels</b>			<b>309</b>	<b>526</b>	<b>169</b>	<b>175</b>	<b>--</b>	<b>48,800</b>	<b>31</b>	

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	Naphthalene	
MW-11	Secondary	11/11/13	<0.00034	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA2	6/27/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA3	10/24/16	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA4	2/24/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA7	2/20/18	Not Sampled - Per ADEM							
	RNA8	6/21/18	Not Sampled - Per ADEM							
	RNA9	10/29/18	Not Sampled - Per ADEM							
RNA10	2/26/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
RNA11	6/21/19	Not Sampled - Per ADEM								
<b>Onsite Tier II Target Levels</b>			<b>309</b>	<b>526</b>	<b>169</b>	<b>175</b>	<b>--</b>	<b>48,800</b>	<b>31</b>	
DW-1	Secondary	11/11/13	0.001	<0.0007	<0.0005	0.0033	0.0043	<0.00074	<0.001	
	GWM1	8/27/14	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	GWM2	11/24/14	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM3	2/26/15	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	GWM4	5/26/15	<0.00038	0.0025	<0.0005	0.0013 J	0.00155	<0.00074	<0.001	
	RNA1	2/23/16	<0.00038	<0.0007	<0.0005	<0.0006	BDL	<0.00074	<0.001	
	RNA2	6/27/16	Not Sampled - Per ADEM							
	RNA3	10/24/16	Not Sampled - Per ADEM							
	RNA4	2/24/17	Not Sampled - Per ADEM							
	RNA5	6/27/17	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA6	10/23/17	0.00066 J	0.0012	0.00097 J	0.0066 J	0.00943	<0.00074	<0.001	
	RNA7	2/20/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA8	6/21/18	<0.00038	<0.0007	<0.0005	<0.0016	BDL	<0.00074	<0.001	
	RNA9	10/29/18	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001	
RNA10	2/26/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
RNA11	6/21/19	<0.00038	<0.00041	<0.0005	<0.0016	BDL	<0.00074	<0.001		
<b>SSCAL POC Well</b>			<b>0.539</b>	<b>108</b>	<b>75.4</b>	<b>175</b>	<b>--</b>	<b>2.15</b>	<b>2.15</b>	



**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL DATA**  
**CIRCLE K STORE NO. 2721559 (Former Pantry No. 1559)**  
**10 NORTH UNIVERSITY BOULEVARD, MOBILE, ALABAMA**

Well I.D.	Event	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Total BTEX	MTBE	Naphthalene
EW-1	RNA1	2/23/16	<b>3.0</b>	4.1	1.70	11	19.8	<0.015	0.22
	RNA2	6/27/16	<b>0.59</b>	0.62	0.22	1.4	2.83	<0.0074	0.11
	RNA3	10/24/16	<b>1.10</b>	0.84	0.43	1.9	4.27	<0.0074	0.18
	RNA4	2/24/17	<b>4.60</b>	9.50	2.50	10	26.6	<0.074	0.32
	RNA5	6/27/17	<b>5.30</b>	26	4.60	19	54.9	<0.15	0.64
	RNA6	10/23/17	<b>5.40</b>	31	4.70	22	63.1	<0.15	0.74
	RNA7	2/20/18	<b>2.50</b>	20	2.50	18	43.0	<0.074	0.33
	RNA8	6/21/18	<b>1.60</b>	7.40	1.70	11	21.7	<0.037	0.63
	RNA9	10/29/18	<b>0.82</b>	3.20	0.95	8.3	13.27	<0.015	0.28
	RNA10	2/26/19	<b>1.30</b>	10	1.50	11	23.8	<0.074	0.30
	RNA11	6/21/19	<b>0.67</b>	6.00	1.30	15	22.97	<0.037	0.41
<b>SSCAL POC Well</b>			<b>0.539</b>	<b>108</b>	<b>75.4</b>	<b>175</b>	<b>--</b>	<b>2.15</b>	<b>2.15</b>
EW-2	RNA6	10/23/17	<b>5.20</b>	57	5.20	34	101.4	<0.19	0.91
	RNA7	2/20/18	<b>3.50</b>	62	5.40	38	108.9	<0.19	0.63
	RNA8	6/21/18	<b>2.60</b>	43	4.60	30	80.2	<0.15	0.78
	RNA9	10/29/18	<b>2.20</b>	30	2.70	17	51.9	<0.074	0.45
	RNA10	2/26/19	<b>2.00</b>	24	1.80	12	39.8	<0.19	0.27
	RNA10dup	2/26/19	<b>2.00</b>	26	1.90	13	42.9	<0.19	0.25
	RNA11	6/21/19	<b>3.30</b>	47	3.20	23	76.5	<0.15	0.65
	RNA11dup	6/21/19	<b>3.30</b>	51	4.30	32	90.6	<0.15	1.30
<b>SSCAL POC Well</b>			<b>0.539</b>	<b>108</b>	<b>75.4</b>	<b>175</b>	<b>--</b>	<b>2.15</b>	<b>2.15</b>

**Notes:** All Readings are in milligrams per Liter (mg/L) equivalent to parts per million  
BTEX: Benzene, toluene, ethylbenzene, xylenes  
MTBE: Methyl tertiary butyl ether  
PAH: Polynuclear Aromatic Hydrocarbons  
BTEX / MTBE / naphthalene analysis for monitoring wells conducted per EPA Test Method 8260B  
PAH analysis for select monitoring wells conducted per EPA Test Method 8270C  
DUP: Duplicate sample collected from well EW-2  
SSCAL: Site Specific Corrective Action Limit  
NA: Not Analyzed  
**Bold** type indicates the concentration exceeded SSCAL

Source: PPM Consultants, Inc.  
PPM Project No. 262724-MCAP

**APPENDIX C – EQUIPMENT MANUFACTURER’S  
QUOTATION/SPECIFICATIONS**

## Proposal for

**PPM-Spanish Fort**  
**Circle K 1559**  
**Mobile, AL**  
8/26/2019



**Prepared for**  
**Rodney Kilgore**  
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**Prepared by**  
**Kevin Gomes | kgomes@h2oengineering.com | 805-547-0303**

# 1 Executive Summary

H2O Engineering is pleased to provide PPM-Spanish Fort with the following proposal to supply a detailed engineering package and fabricated OSU20-52 rental or purchase. In this proposal, you will find all the commercial and technical details for the water treatment solution designed, fabricated and packaged by H2O Engineering, Inc.

During communication with Rodney Kilgore regarding this project, several needs were identified. These include:

- Select a firm who has extensive 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.

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## 2 H<sub>2</sub>O Engineering Scope of Supply

### 2.1 Base System Specifications

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 Ozone Sparge System Design Basis

- The sparge system is rated to produce 52 g/h (2.75 lb/day) of ozone. Ozone pressure will be boosted through a diaphragm pump to a maximum 50 psi.
- Oxygen is created by an oxygen concentrator, 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

#### 2.1.2 Feed Gas Air Compressor

- 6.2 CFM @ 35 PSI
- Includes inlet particulate filter, adjustable intake valve, air intercooler with water trap, and PLC controlled drain valve

#### 2.1.3 Oxygen Concentrator

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

#### 2.1.4 Oxygen Purity Monitor

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

#### 2.1.5 Ozone Generator

- 52 g/h total (2.75 lb/day) at up to 5% by weight ozone from oxygen at 30 SCFH, 10 PSIG
- Integrated alarms with dry contact to PLC
- Backpressure regulator downstream of generator to control feed gas pressure, provide optimum ozone output, and isolate ozone generator from variable manifold pressure



## 2.1.6 Ozone Delivery Pump

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

## 2.1.7 Blend Air Compressor

- 3.5 SCFM @ up to 90 PSI
- Includes inlet particulate filter, air intercooler with water trap, and PLC controlled drain valve
- Refrigerated air drier (optional)

## 2.1.8 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

## 2.1.9 Ozone Sparge System Enclosure

### 2.1.9.1 *Dimensions*

- Overall Dimensions: 60.5"H x 40"W x 23.75"D

### 2.1.9.2 *Cabinet Enclosure*

- Floor Mount
- Total Weight: 500 lbs
- Exterior painted blue
- Interior ozone monitor
- Connected to system PLC
- Alarm set point: 1.0 ppmv
- Climate Control
- PLC controlled fan ventilation

### 2.1.9.3 *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

## 2.1.10 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 2 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)

## 2.1.11 Electrical Requirements

- Final electric service connection (240V/60 Hz, 30A) by others
- All control components to be UL 508A listed

## 2.2 Ancillary Materials and Specifications

### 2.2.1 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

### 2.2.2 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

### 2.2.3 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

### 2.2.4 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

### 2.2.5 Ozone Delivery Tubing: TUB-PFA-8

- PFA
- 1/2" OD x 3/8" ID

### 2.2.6 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

## 2.3 Service Kits and Other Equipment Options

### 2.3.1 Service & Maintenance Kit Specifications

#### 2.3.1.1 OSUX-52 Six Month Service Kit (SeriesC), includes

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

- S-ELH-FN-102-F 10" Cooling Fan Filter
- V-C-104 1/4" MPT 316SS Check Valve
- S-IFS-100-F Filter Element for 1/4" Bowl
- S-IFS-101-F Filter Element for 3/8" Bowl
- S-FB-100-F Water Separator Filter & O-Ring
- F-OR-100 Inline Oil/Particulate Filter

#### 2.3.1.2 OSUX-52 Twelve Month Service Kit (Series C), includes

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

- S-ELH-FN-102-F 10" Cooling Fan Filter
- V-C-104 1/4" MPT 316SS Check Valve
- S-ECH-O3-200a O3 Sensor, 0-2 ppm replacement sensor
- S-IFS-100-F Filter Element for 1/4" Bowl
- S-IFS-101-F Filter Element for 3/8" Bowl
- S-FB-100-F Water Separator Filter & O-Ring
- V-PR-101 Manifold Pressure Relief Valve, 100psi
- V-PR-207 Oxygen Pressure Relief Valve, 45psi
- S-V-S-103-SK Solenoid Valve Rebuild Kit
- S-CMP-O3-100-SK ODP Compressor Rebuild Kit
- S-CMP-O2-105-SK Oxygen Compressor Rebuild Kit
- S-CMP-AFB-103-SK Air Flow Booster Compressor Rebuild Kit
- F-OR-100 Inline Oil/Particulate Filter

### 2.3.2 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.

### 2.3.3 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

### 2.3.4 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.: -25° to +55°C
- 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.)

## 3 Engineering Submittals

### 3.1 Base Package

<b>Deliverable</b>	<b>Description</b>
P&ID – Process & Instrumentation Diagram	Diagram of all process components, sensors, instrumentation, pipe sizes and materials, main equipment specifications and control signals/alarms/interlocks.
System Overview Narrative	Document describing system operation to delineate primary functions of all major equipment and how each component is controlled.
Spare Parts List	Recommended critical spare parts list for the system.
Major Equipment Cut Sheets and Vendor Manuals	All cut sheets or user manuals for all major equipment on the skid. Includes items like pumps, controls, sensors, control valves, tanks etc.
1 Hour Webinar Design Review	1 Hour webinar reviewing total project scope and presented submittals.
Shipping Pack List	List of items shipping to customer including loose-packed items like filters or spare parts

## 3.2 Optional Engineering Documentation

The following is a list which can be provided to the client upon request. H2O Engineering to provide estimate based on scope of project.

<b>Deliverable</b>	<b>Description</b>
GA - Skid General Arrangement	Drawing of 3D skid with plan/elevation/side views to denote skid dimensions, plumbing inlet/outlet connections, electrical connections, lifting/loading points and includes main equipment bill of materials.
Seismic Anchorage Structural Engineering Package	Complete structural drawings for skid anchoring signed/stamped by PE Engineer.
Electrical Schematics	Drawing of main skid power connections, disconnect, equipment schedule and component layout of panel.  Electrical schematic drawing showing all wire connections within the control panel and component layout of the panel.
Control Narrative	Document describing the overall control scheme for the skid, HMI menu overview and alarm scheme.
I/O Table and SOO	Spreadsheet and documentation of all skid control set points, PLC I/O, alarms, Sequence of Operation and PID control loops
PLC / HMI Code	PLC and HMI specific code the skid. These are the actual program files uploaded to the device. ***Requires executed limited use and license agreement***
User Manual	PDF document describing operation of skid. Includes information about safety, installation, operation, control, maintenance, troubleshooting, alarms, spare parts, drawings & warranty
In Person Design Review	An in person design review can be conducted with the customer's design and operations team.

## 4 Startup Services

Item	Description	Scope of Supply	
		H2O Engineering	PPM
<b>Equipment Installation and Technical Advisory Services</b>	Unloading the equipment, rigging the equipment into place, connecting existing power wiring to control panel, verifying adequate drainage, testing for adequate water pressure, and testing power supply.		X
	Remote technical support of Equipment Installation	X	
<b>Plumbing, Electrical and Pre-Startup Inspection</b>	Plumbing and electrical connections to be finalized before H2O Engineering installation visit. All plumbing and electrical connections to the equipment to be performed by the customer.		X
	Includes time to inspect installation work, address questions, develop punch list of completion items necessary prior to startup.	X	
<b>Commissioning Checklist</b>	H2O Engineering to provide pre-commissioning checklist to client.	X	
	Complete pre-commissioning checklist and send completed form to H2O Engineering prior to site mobilization for startup services.		X
<b>Equipment Startup</b>	Includes operating the equipment manually, operating the equipment automatically, setting and testing control system, and putting system into automatic operation. Also includes informal, hands-on training conducted by the service technician in front of the equipment.	X	



## 4.1 Startup Services Scope of Work

- This total assumes no weekends, or a holiday are required and is based on an eight-hour workday.
- Travel time to and from the job site for H2O Engineering Field Service personnel is included in this estimate.
- To ensure personnel availability, H2O Engineering requires a minimum of four weeks' advance notice to schedule equipment start-ups.
- The commissioning plan does not allow for site specific safety training. Any site-specific safety training required will be billed at H2O Engineering's Field Service Labor Rates.
- On-time completion of H2O Engineering's startup and commissioning services requires satisfactory installation of all equipment by Customer (where not included above). If additional service time is required for H2O Engineering's commissioning scope due to Customer's changes in scope or delays in completion of installation, additional charges will apply, billed at H2O Engineering's Field Service Labor Rates.

## 5 Commercial Offer

### 5.1 Base System

#### 5.1.1 Purchase Option

Description	Price
OSU20-52 Purchase	\$52,000.00
Estimated Shipping	\$800.00
<b>Total</b>	<b>\$52,800.00</b>

#### 5.1.2 Rental Option

Description	Price
OSU20-52 Rental: Rental rate per month \$4,000.00 @18 months	\$72,000.00
Security deposit for Rental	\$1,500.00
Estimated Shipping	\$800.00
<b>Total</b>	<b>\$74,300.00</b>

### 5.2 Ancillary Materials

Description	Price
In-Situ Oxidation Point      \$319.04/point      QTY: 4	\$1,276.16
Riser Pipe (10ft)      \$35.75/10ft. riser      QTY: 8	\$286.00
Riser Pipe (5ft)      \$26.07/5ft. riser      QTY: 4	\$104.28
Well Head Connections      \$143.85/WHC      QTY: 4	\$575.40
Ozone Delivery Tubing      \$4.33/foot      QTY: 500 ft.	\$2,165.00
Estimated Well Materials Shipping	\$400.00
<b>Total</b>	<b>\$4,806.84</b>

### 5.3 Service Kits

Description	Price
Six Month Service Kit      SKC52-06-C	\$417.00
Twelve Month Service Kit      SKC52-12-C	\$1,360.82
<b>Total</b>	<b>\$1,777.82</b>

## 5.4 Freight

A shipping estimate will be supplied upon contract award. All pricing is FOB/FCA (INCOTERMS 2010) from designated factory.

## 5.5 Invoicing and Payment Terms

Terms are as follows with credit approval.

### 5.5.1 Equipment

Equipment shipment is contingent on receipt of initial milestone payment.

- 50% invoiced with order due upon receipt of invoice
- 25% invoiced with engineering submittal due upon receipt of invoice
- 15% invoiced 2 weeks prior to shipment due NET 30
- 10% invoiced at shipment due NET 30

### 5.5.2 Consumables

- Invoiced upon shipment due NET 30

### 5.5.3 Labor Services

- Invoiced upon completion of work or at the end of the month; whichever occurs first, due NET 30.

## 5.6 Project Schedule

The Buyer and Seller will arrange a kick-off meeting after contract acceptance to develop firm deliverable and shipment schedule. Title and risk of loss will transfer upon delivery in accordance with FCA (INCOTERMS 2010) designated factory.

## 5.7 Equipment Shipment and Delivery

Firm shipment estimate to be determined upon award of contract. The Buyer and Seller will arrange a kick-off meeting after contract acceptance to develop firm shipment schedule. Title and risk of loss will transfer upon delivery in accordance with FCA (INCOTERMS 2010) designated factory.

Project cost is based on standardized shipping lead times (does not include expedited shipping)

## 5.8 Pricing Notes

- All prices quoted are in USD. Quote is good for 30 days from date of quotation.
- Any sales or value added tax is not included.
- The customer will pay all applicable local, state, provincial, or federal taxes and duties.
- The equipment delivery date, start date, and date of commencement of operations are to be negotiated.
- Commercial terms and conditions shall be in accordance with H2O Engineering's Standard Terms and Conditions of Sale.
- This proposal and the rates provided herein are subject to final site, environmental, H2O Engineering compliance check, and financial due diligence by H2O Engineering.
- This proposal supersedes all previous proposals and correspondence.
- Seller's price and delivery schedule are based on the assumption that Buyer will take delivery as and when foreseen by the schedule. Where this is not the case, the Parties must agree in advance an alternative place of delivery, failing which the Seller will be entitled to ship the equipment to storage. Buyer shall issue a Change Order to take into account any additional cost or delay incurred by H2O Engineering in implementing this change.
- Seller may manufacture and source the Equipment and any part thereof globally in the country or countries of its choosing, provided that the Equipment complies with all of the requirements specified in this Agreement.

## 5.9 Conditional Offering

Customer understands that this proposal has been issued based upon the information provided by customer, and currently available to, H2O Engineering at the time of proposal issuance. Any changes or discrepancies in site conditions (including but not limited to system influent water characteristics, changes in environmental, health, and safety (EH&S) conditions, and/or newly discovered EH&S concerns), Customer financial standing, Customer requirements, or any other relevant change, or discrepancy in, the factual basis upon which this proposal was created, may lead to changes in the offering, including but not limited to changes in pricing, warranties, quoted specifications, or terms and conditions. H2O Engineering's offering in the proposal is conditioned upon a full H2O Engineering EH&S and Customer financial review.

## 5.10 After Sales Service

Should you want to learn more about H2O Engineering's expert service offerings on your equipment, please contact your local H2O Engineering Water Treatment Technologist or visit our website <http://www.h2oengineering.com> to get connected with a Customer Service Representative in your region. In North America, please dial 1-866-987-0303 to contact a customer service representative.

## 5.11 Limited Warranty and Disclaimers

### 5.11.1 Limited Express Warranty.

As to parts and/or equipment supplied by H2O Engineering, Inc. ("H2O Engineering"), H2O Engineering warrants these parts to be free from material defects in material or workmanship for

a period of 12 months commencing on the date of original shipment from H2O Engineering; provided, however, the one (1) year warranty period shall begin on the earlier to occur of: (i) installation date, if the installation is performed by H2O Engineering; or (ii) on the sixtieth (60th) day following the date of the original shipment from H2O Engineering to Customer. This warranty shall be limited to the repair or replacement of parts and the labor and services required to repair the equipment. Notwithstanding anything to the contrary, any materials used in connection with such equipment that are not manufactured by H2O Engineering shall carry no warranty from H2O Engineering.

To assist us in providing you with services under this warranty, kindly return to H2O Engineering a copy of the invoice along with the following information:

- End user name;
- Complete address, including telephone number;
- Date installed;
- Complete model and serial number information; and
- Name of company from which the unit was purchased.

### 5.11.2 Repairs and replacement parts.

Repairs and Replacement parts provided under this warranty shall carry only the unexpired portion of this warranty or 90 days, whichever is longer. Implied warranties, including but not limited to warranties of fitness for particular purpose, merchantability, use or application, and all other obligations or liabilities on the part of H2O Engineering are null and void, unless such warranties, obligations or liabilities are expressly agreed to in a writing signed by H2O Engineering.

### 5.11.3 How to Obtain Service under H2O Engineering's Limited Warranty.

#### 5.11.3.1 For Purchased Equipment.

If any parts appear defective, Customer immediately shall notify H2O Engineering in writing via email at [warranty@h2oengineering.com](mailto:warranty@h2oengineering.com) and provide H2O Engineering with reasonable opportunity to make inspections and tests. H2O Engineering's obligations under this warranty are limited to the repair or replacement at its facility in San Luis Obispo, California of any part which proves to be defective. If Customer asks H2O Engineering to inspect, test and/or replace defective parts at Customer's premises, Customer agrees to pay for all reasonable traveling time, accommodations and associated expenses incurred by H2O Engineering's representative. Notwithstanding the foregoing, H2O Engineering's labor costs to complete the repair/replacement will be covered by H2O Engineering in accordance with the terms and conditions hereof. Equipment shall not be returned to H2O Engineering for inspection and testing without H2O Engineering's prior written authorization. H2O Engineering will provide Customer with a return goods authorization number ("RGA") to use for returned goods to be shipped to H2O Engineering, FOB San Luis Obispo, CA. The RGA number must appear prominently on the exterior of the shipped box(es). The product and/or part must be packaged either in its original packing material or in comparable and suitable packing material, if the

original is not available. Customer is solely responsible for paying shipping charges to H2O Engineering and for any damage to the product and/or part that may occur during shipment. It is recommended that Customer insure the shipment for the amount originally paid for the product and/or part. Repaired or replaced items will be shipped back to Customer at Customer's sole cost by H2O Engineering, FOB San Luis Obispo, California. If upon inspection at H2O Engineering's facility, H2O Engineering determines that there is no defect or that the damage to the product and/or part resulted from causes not within the scope of this limited warranty, then the Customer shall bear the cost of H2O Engineering's labor in connection with inspecting and testing the product and/or part and all return freight charges. Any unauthorized attempt by Customer or any of its agents or employees to repair H2O Engineering manufactured products without prior permission shall void this express warranty. For service, contact H2O Engineering Service directly at (805) 547-0303 or via email at [service@h2oengineering.com](mailto:service@h2oengineering.com).

5.11.3.2 **For Leased Equipment.** Please refer to the warranty terms contained in the Equipment Lease between Customer and H2O Engineering.

#### 5.11.4 Items Excluded from the Warranty.

This warranty does not apply to normally consumable parts or components, which shall include but not be limited to, filter cartridges, pump seals and/or fan filters. This warranty does not apply to any labor charges or property damage for physical removal or replacement of the equipment. This warranty does not extend to any product and/or part from which the assigned serial number has been removed or which has been damaged or rendered non-functioning as a result of any one or more of the following:

- an accident, misuse, alteration or abuse;
- an act of God such as flood, earthquake, hurricane, lightning or other disaster resulting only from the forces of nature;
- normal wear and tear;
- operation outside the usage parameters stated in the product user's manual;
- use of parts not sold by H2O Engineering;
- damage which may occur during shipping;
- service or unit modification not authorized by H2O Engineering;
- failure to meet service requirements as outlined in the Product Manual/User Guide;
- improper installation or application; and/or
- check value and solenoid valve failure.

#### 5.11.5 Claims and Returns.

Customer must inspect shipment for damage in the presence of the carrier at the time of delivery. Failure to bring any damages (obvious or concealed) to the attention of the carrier and noting such damages on the bill of lading will void any claim made against the carrier. Customer should save all packaging materials and immediately notify H2O Engineering of the damages. On all products shipped FOB shipping point, it is the responsibility of H2O Engineering to file a damage claim with the carrier. Therefore, Customer must furnish H2O Engineering with complete damage information immediately via email to [warranty@h2oengineering.com](mailto:warranty@h2oengineering.com). Customer should verify

contents of all shipments against the packing slip and carefully check all packaging materials for merchandise before discarding. Claims for shortages or inaccurate filling of orders must be made to H2O Engineering within ten (10) days of the shipment's delivery by the carrier. If any goods were shipped in error, H2O Engineering shall provide Customer with an RGA number. If H2O Engineering, in good faith, determines that any error was not H2O Engineering's, Customer shall be charged a 20% restocking fee for any products or parts returned for credit or exchange.

### 5.11.6 Exclusive Warranty; Miscellaneous Provisions.

Except for the express warranty provided herein, there is no other warranty (expressed or implied) on H2O products and/or parts; provided, however, that neither this warranty nor any other warranty, expressed or implied, including any implied warranties or merchantability of fitness, shall extend beyond the warranty period. Some states do not allow limitations on how long an implied warranty lasts, so that the above limitations or exclusions may not apply to all Customers.

No course of prior dealings between the parties and no usage of the trade shall be relevant to supplement or explain any term used in this warranty. Acceptance or acquiescence in a course of performance rendered under these terms shall not be relevant to determine the meaning of this warranty even though the accepting or acquiescing party has knowledge of the nature of the performance and opportunity for objection. Whenever a term defined by the California Uniform Commercial Code (the "Code") is used herein, the definition contained in the Code shall control.

It is stipulated by the parties that these terms shall be interpreted and construed according to the laws of the State of California and specifically the Uniform Commercial Code as adopted in the State of California as effective and in force on the effective date of this warranty (as provided below). Venue for any dispute arising under this Agreement shall be in the courts in and for San Luis Obispo County, California.

If any provision of this warranty or the application thereof is held to be unenforceable or invalid by any court of competent jurisdiction, the remainder of this warranty shall not be affected thereby and to this end only those provisions of this warranty are declared severable. If any provision of this warranty is determined by any court of competent jurisdiction to be invalid, illegal, or unenforceable to any extent, that provision shall, if possible, be construed as though more narrowly drawn, if a narrower construction would avoid such invalidity, illegality, or unenforceability or, if that is not possible, such provision shall, to the extent of such invalidity, illegality, or unenforceability, be severed, and the remaining provisions of this warranty shall remain in effect.

## 6 H2O Engineering Project Team Member

### 6.1 Robert Moncrief – President and CEO



Founded in 2000, H2O Engineering is recognized industry wide as a leader in water treatment system manufacturing and integration. As Founder, President and CEO of H2O Engineering, Robert's team has deployed over 400 sparge systems internationally and nationally, received two process patents utilized in many of their water treatment systems, and has manufactured Title 22 validated ozone equipment for tertiary water treatment in the State of California. Robert has fostered a sense of sustainable growth by developing long term relationships with many of the nation's leading water treatment and environmental engineering firms and partnering with key industry leaders who manufacture cutting edge, robust and reputable products.

### 6.2 Ben Corcoran – VP of Operations



As Vice President of Operations, Benjamin Corcoran directs all project processes and logistics, including materials procurement, resource planning, parts fabrication, product assembly, procedural implementation, and delivery logistics. Benjamin is responsible for H2O Engineering's facility requirements, manufacturing safety programs, final product inspection and prove-out and the company's UL 508A certification. Benjamin has been a part of the H2O Engineering team for the last 10 years.

### 6.3 Chris Nosti, P.E. – VP of Engineering



Chris Nosti is a Mechanical Engineering M.S. graduate from California Polytechnic State University, San Luis Obispo and is a Registered Professional Electrical Engineer in the State of California. As VP of Engineering, Chris is directly responsible for planning, organizing and directing all engineering efforts to ensure H2O Engineering's products and services meet the highest standards in quality and reliability. Chris directs the creation of Process & Instrumentation Diagrams, mechanical and electrical drawings, project Bill of Materials and the internal manufacturing reference materials so projects are built on time and to specification. Chris has over 10 years of experience designing mechanical and electrical systems and he specializes in managing complex engineering projects to ensure all customer requirements are met.



#### 6.4 Trevor Weiss – Water Process Engineer



Trevor Weiss is a Water Engineering M.S. graduate from California Polytechnic State University, San Luis Obispo. As Water Process Engineer, Trevor is responsible for presales system design including technology selection, water treatment modelling, system specifications, and project costing. Trevor is a bridge between sales and engineering and works with customers to better understand their technical needs to ensure projects are delivered on time and meet customer expectations. Trevor has hands-on experience in the manufacturing industry supporting production and research & development of new technologies related to water treatment.

#### 6.5 Kevin Gomes – Account Manager



Kevin Gomes has worked in the remediation industry for over 10 years assisting environmental consultants with the strategy, design and technology selection for over 300 sites nationwide. Kevin's focus has largely been working with in-situ chemical oxidation using ozone. He works directly with clients to select and size the proper equipment to meet their clean up goals. With more than 30 years of project management and sales experience, Kevin has a business-minded approach arriving at innovative solutions to technical problems.

#### 6.6 Erik Barker – Field Operations Supervisor



Erik Barker is the Field Operations Supervisor for H2O Engineering, Inc. Erik has close to 20 years of experience in the ozone and water purification industry. He currently oversees all service operations, in-house and in-field duties for both the Clean World and Pure Water divisions of H2O Engineering. In addition, Erik also oversees and maintains H2O Engineering's ozone remediation system rental fleet. Erik's experience provides a wide range of capabilities from system deployment and installation, to preventative maintenance and service, to system troubleshooting, prove-out and repairs.

## 7 Customer Testimonials



“Two years after installation and startup of our large-scale system they remain committed to ensuring our system operates as designed and we continue to use their service team as a result.”

Jorge Montoy, Sovereign Consulting Inc



“In our experiences with H2O Engineering, we have witnessed this company’s determination to deliver a quality product regardless of project obstacles and unforeseen interference that many vendors would charge an additional premium to resolve. H2O Engineering delivered the solution on time, on budget and in a professional manner.”

Anderson Dill Jr., Water Dynamics, Inc.



“It has been a pleasure to work with H<sub>2</sub>O Engineering on various projects at the Water Resource Recovery Facility. Their entire staff has shown a high degree of professionalism, dedication and attention to detail throughout the entire time frame of the projects. Their company has provided a value-based relationship with the Water Resource Recovery Facility for the City of San Luis Obispo.”

Howard Brewen, Water Resource Recovery Facility



“In the craft brewing industry, quality is top priority and continuous production is paramount. Not only has our water quality improved, but we've successfully integrated new equipment centers without interrupting process.”

Mark Fischer, Firestone Walker Brewing Company

## 8 H2O Engineering Project References

### 8.1 Sovereign Consulting – BP Former Paulsboro Terminal #4555, Paulsboro, NJ

#### Project Highlights

- 200 PPD of ozone
- Contaminants of concern:
  - Benzene, Chlorobenzene, Carbon Tetrachloride, 1,2-DCA
- The site consists of 100 acres on the Delaware river
- 416 injection points
- UL508A certified control panels
- System start-up in August 2012

The system consists of five shipping containers, one containing the air preparation equipment, two containing ozone generation equipment, and two containing the sparge manifolds. H2O Engineering bid on their standard bid spec as well as our own alternative design. The alternative design, created by H2O Engineering, will save BP approximately one million dollars in capital and power costs over the five-year duration of the project. The alternative design was ultimately selected. The alternative design also utilized control theory regression, maximizing up time and optimizing alarm conditions while ensuring safety of the operator. The system is capable of customizing up to 50 virtual banks at a time for unlimited sparge valve combinations.

**Sovereign Consulting, Kevin Wheeler,**  
Senior Engineer, [kwheeler@sovcon.com](mailto:kwheeler@sovcon.com)  
(609) 259-8200, Robbinsville, NJ.

**Sovereign Consulting, Jorge Montoy,**  
Senior Engineer, [JMontoy@sovcon.com](mailto:JMontoy@sovcon.com)  
(856) 425-0845, San Francisco, CA



Custom 200 ppd ozone sparge system - prove out

**“Two years after installation and startup of our large-scale system they remain committed to ensuring our system operates as designed and we continue to use their service team as a result.”** – Jorge Montoy

## 8.2 Environ – Transport Tank Cleaner, Carson, CA

### Project Highlights

- 38 shallow wells, 53 intermediate wells
- Fully enclosed 50ppd ozone trailer
- 100 point valve manifold, valve banks programmable via HMI
- Control panels to be UL certified
- Intelo-zone control logic theory

The design consists of a single mobile ozone sparge system producing 50 PPD. The full-scale ozone system injects ozone into 38 shallow groundwater zone injection wells and 53 intermediate groundwater zone injection wells. The system is moved to various locations around the site depending on remediation progress with a timeline for remediation of 3-5 years. The system has two valves active at all times and the control system allows for any combination of two sparge valves per sequence step. The original RFP called for an air-conditioned trailer enclosure to maintain 65°F within. The water chiller and air compressor both require high cooling air flow rates which would negate the efficacy of a system-wide air conditioner. Through the use of insulated walls and ceilings, and PLC controlled fan ventilation, the system maintains internal temperatures within degrees of ambient conditions without an air conditioner.

**Geosyntec, Erik Pearson,**

Project Manager, Epearson@environcorp.com  
(949) 798-3614, Irvine, CA.



### 8.3 Geosyntec – Chemical Drum Burial Site, Taunton, MA

#### Project Highlights

- Three systems
  - 27 ppd system (2x)
  - 44 ppd system
  - 98 ppd of ozone total.
- Contaminants of concern
  - TCE, cis-DCE, Chlorobenzene, 1,2,4-TCB
- 293 injection points
- System has been running from November 2010 to present.

H2O Engineering first built a 27 ppd pilot system for Geosyntec. Once the pilot was proven effective, Geosyntec purchased one 27 ppd and one 44 ppd system, keeping the 27 ppd rental as well. They are all three currently running at the site. H2O Engineering designed and built a custom air sparge system for Geosyntec with programming that coordinates with the ozone sparge system allowing both systems to utilize the same wells in sequence. H2O also designed and built a custom gas sampling system that correlates 5 gas concentration in the SVE influent to sparge operations of the three ozone systems.

#### **Geosyntec, Chapman Ross**

Senior Environmental Engineer, [cross@geosyntec.com](mailto:cross@geosyntec.com)  
(978) 206-5779, Acton, MA.



Ozone, SVE and air sparge systems installed at site.

## 8.4 Parsons Corp. – PG&E Service Yard, Tracy, CA

### Project Highlights

- 11 ppd of ozone
- 1 year project duration
- Contaminants of concern: TPHd

This reference was chosen to demonstrate a system employing PLC controlled fan ventilation in adverse conditions. This entire system is air cooled, yet maintains its ozone output specification during hot summer weather. System startup was in summer of 2012 and has had no temperature alarms to date. To demonstrate H2O's service capabilities, H2O Engineering retrofitted this system from 208VAC three phase to 240VAC single phase power while onsite, maintaining UL standards.

**Parsons Corporation, Mark Sarconi,**  
Project Manager, mark.sarconi@parsons.com  
(925) 941-3753, Walnut Creek, CA.



H<sub>2</sub>O Engineering's standard 11 ppd system



Parson's system after on-site retrofit.

## 9 Appendix

### 9.1 System Specification Sheet

## Ozone Remediation



H2O Engineering's ozone sparge technology delivers the highest concentration of ozone gas directly to the contaminated subsurface. Ozone is released in controlled time duration sequences via in-situ oxidation points. This feature can be programmed and recorded by the logic controller.

Effective for short-term "hot spot" remediation or full scale site cleanups, H2O Engineering's ozone sparge units are completely self-contained and are available in trailer and cabinet enclosures. While we have designed our standard units to handle most field conditions, we also offer custom systems to meet extraordinary site demands. Our systems have been successful with oxidizing petroleum hydrocarbons and chlorinated solvents such as TPHg, TPHd, BTEX, TCE, and PCE in both groundwater and soil applications.

### STANDARD FEATURES

- Featuring Intelo-zone® Control Technology
- Ozone Generator Output: 1.3 to 43.8 lbs/day, up to 6% concentration by weight
- PSA oxygen concentrator delivers 90% purity
- Ozone delivery pump features all ozone-resistant components
- Maximum ozone sparge pressure of 50 PSI
- Maximum air / breakthrough sparge pressure of 90 PSI
- Automatic regression from ozone to air / breakthrough mode upon high pressure detection
- Programmable Logic Controller (PLC) with Human Machine Interface (HMI)
- Selectable mode for ozone, ozone/air, oxygen, oxygen/air or air per sequence step
- Independent time duration control for each sequence step (programmable from 1 to 120 minutes)
- Independent time accumulators for tracking ozone vs. oxygen vs. air / breakthrough time per valve
- User configurable valve sparge sequence ordering
- Variable ozone output can be individually configured for each sequence
- Lag time between sparge cycles (programmable from 1 to 480 minutes)
- Suspend mode for planned nonoperational periods
- Delivery flow and pressure displayed and logged via PLC, viewable from HMI
- Automated maintenance notifications
- Ozone sparge port manifold includes ozone compatible solenoid valves, 1/2" Kynar® compression fittings and analog pressure transmitter
- 10, 20, 30 or 40 port manifolds available
- Distinctive built-in safety features:
  - Ambient ozone alarm/shutdown sensor
  - High pressure alarm/shutdown
  - Built-in thermal protection, high / low temperature alarms
  - Sensor failure alarm
- Remote shutdown Interface signal
- Remote ozone sensor connections
- PLC controlled air conditioning and heating in trailer version
- H2O Telemetry Packages (optional)
- Full one-year warranty includes materials and workmanship
- Service contracts and start-up assistance available
- Start-up Service Kit included



189 Granada Drive, San Luis Obispo, CA 93401 | 866.987.0303  
[www.h2oengineering.com](http://www.h2oengineering.com)



# Ozone Remediation



TELEMETRY SOFTWARE PACKAGE (OPTIONAL)

## SELF-CONTAINED

- 2-50 pounds/day ozone output
- Skid, trailer, or cabinet mounted systems available
- PSA oxygen generation with 90% or higher oxygen purity
- PLC automated system controls
- Online monitoring options available PH, ORP, DO, DO3, etc.
- Custom systems available for unique project needs
- Telemetry available for remote monitoring and controls

## LARGE-SCALE

- 50+ pounds/day ozone output
- Systems can be container mounted or permanently installed
- PSA or VSA oxygen generation with 90% or higher oxygen purity
- PLC automated system controls
- Online monitoring options available PH, ORP, DO, DO3, etc.
- Custom systems available for unique project needs
- Telemetry available for remote monitoring and controls

MODEL <sup>1</sup>	DELIVERED OZONE OUTPUT (lbs/day)	OZONE GAS CONCENTRATION (ppmv)	ENCLOSURE	ELECTRICAL REQUIREMENT <sup>2</sup> (VAC)	POWER CONSUMPTION <sup>3</sup> (kW)	MAXIMUM OPERATING FLOW (CFM)	MAXIMUM OPERATING PRESSURE <sup>4</sup> (PSI)
OSUX-26	1.4	2250	Cabinet	240/1Ø	3.4	3.8	50
OSUX-52	2.7	3570	Cabinet	240/1Ø	8.3	3.8	50
OSUX-104	5.5	4160	Cabinet	240/1Ø	10.3	4.2	50
MOSUX-26	1.4	2250	Cabinet	240/1Ø	3.4	3.8	50
MOSUX-52	2.7	3570	Trailer	240/1Ø	8.3	3.8	50
MOSUX-104	5.5	4160	Trailer	240/1Ø	10.3	4.2	50
MOSUX-208	11.0	11900	Trailer	208/3Ø	25.0	4.7	50
MOSUX-520	27.4	22180	Trailer	208/3Ø	40.0	7.3	50

**Notes:**

1. XX in model number denotes the amount of sparge valves.
2. Electrical requirement: 60 Hz, Single Phase (unless otherwise noted); All 240 VAC systems require a true neutral.
3. Air conditioning unit in mobile products consumes 1.69 kW during operation.
4. Maximum well breakthrough pressure = 90 PSI.



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# Sparge Well Materials



## Well Head Connection

Well Head Connections (WHC) are made from the highest quality materials available to maximize success of in-situ remediation treatments. The WHC features a Kynar® compression fitting, and a type 316 stainless steel inlet tee in a sealed Schedule 80 PVC body. A ¼" FPT access port is included to accommodate a pressure gauge for accurate pressure readings where they count the most. Well Head Connections are available for ½" or 1" H2O Engineering riser pipe sections. Any existing on-site 2" or 4" monitoring well casing can be easily modified using our 2" or 4" WHC fitting to accommodate our ozone sparge technology.

## Riser Pipe

Riser Pipe (RP) is an integral component of our complete In-Situ Oxidation Point (IOP) system. Each Riser Pipe section is sealed with an ozone-resistant Viton® o-ring to insure no leaks occur while under pressure. Schedule 80 PVC is used for the durability and ozone resistance required for harsh field conditions that often exist for in-situ remediation. Each 10-foot section is available in 1" ID.

## In-Situ Oxidation Points

Our In-Situ Oxidation Points (IOP) were designed by our engineering staff exclusively for use with our ozone sparge units. Each has a stainless steel body with 3/8" x 1-1/2" outlets and 50 mesh internal stainless steel screen. Made from ozone-resistant Stainless Steel, they are rigid by design and include a Viton® o-ring seal. These oxidation points provide maximum ozone transfer to the contaminated water table and soil. Efficient mass transfer means remediation takes place quickly and completely.

## STANDARD FEATURES

Ozone Delivery Tubing: PFA type Teflon®, 1/2" OD x 3/8" ID, up to 1000 FL continuous roll

### Well Head Connections (WHC):

WHC10 - Well Head Connection for 1" Pipe and 1/2" OD Compression Fitting for Tubing

WHC20 - Well Head Connection for 2" Pipe and 1/2" OD Compression Fitting for Tubing

WHC40 - Well Head Connection for 4" Pipe and 1/2" OD Compression Fitting for Tubing

### Riser Pipe (RP):

RP100 - 1.0" ID, 10-foot Section, Schedule 80 with Viton® O-Ring, and 1.0" x 8-TPI ASTM F-480

RP100-5 - 1.0" ID, 5-foot Section, Schedule 80 with Viton® O-Ring, and 1.0" x 8-TPI ASTM F-480

### In-Situ Oxidation Points (IOP):

IOP100-12-P - 1" OD x 12"L, Viton® O-Ring, and 1.0" x 8-TPI ASTM F-480 Male Flush Thread

NOTE: Retrofit materials for monitoring wells are available.



189 Granada Drive, San Luis Obispo, CA 93401 | 866.987.0303  
[www.h2oengineering.com](http://www.h2oengineering.com)



**APPENDIX D – SUBCONTRACTOR SPECIFICATIONS AND QUOTATION**

August 22, 2019

**PPM CONSULTANTS**

**Attn: Rodney Kilgore, P.G.**

**Project: Circle K – Mobile, AL**

**Submitted By:**

**Josh Gross**

**504.402.3560**

**josh.gross@gprsinc.com**

GPRS appreciates the opportunity to provide this proposal. Please visit our website ([www.gprsinc.com](http://www.gprsinc.com)) and contact any of the numerous references listed. Insurance certificate and W-9 can also be downloaded [here](#). Please feel free to contact us if you have any questions or need additional information.

### **SCOPE OF WORK**

GPRS understands the scope to be searching for underground utilities within the boundaries of the subject project site as indicated by the client in the provided drawing. Our standard practice is to attempt to trace any utilities for which there are structures visible from the work area. The client will be responsible for providing drawings or notifying GPRS of any utilities known to be entering the work area for which there are no apparent surface features or structures that are visible from the work area. The areas should be laid out, marked, and cleared of obstructions prior to our arrival in order to avoid additional charges. Please visit [www.simspec.org](http://www.simspec.org) for an overview of our industry-leading best practices that will be applied to this project.

### **EQUIPMENT**

- **350/400 MHz GPR Antenna.** The antenna is mounted in a stroller frame which rolls over the surface. The surface needs to be reasonably smooth and unobstructed in order to obtain readable scans. Obstructions such as curbs, landscaping, and vegetation will limit the feasibility of GPR. The data is displayed on a screen and marked in the field in real time. GPR works by sending pulses of energy into a material and recording the strength and the time required for the return of the reflected signal. Reflections are produced when the energy pulses enter into a material with different electrical properties from the material it left. The strength of the reflection is determined by the contrast in signal speed between the two materials. The total depth achieved can be as much as 8' or more with this antenna but can vary widely depending on the conductivity of the materials. Conductive soil types such as clay may limit maximum depths to 3' or less. As depth increases, targets must be larger in order to be detected and nonmetallic targets can be especially difficult to locate. Depths provided should always be treated as estimates as their accuracy can be affected by multiple factors. For more information, please visit: [Link](#)
- **Electromagnetic Pipe Locator.** The EM locator can passively detect the electromagnetic fields from live AC power or radio signals travelling along some conductive utilities. It can also be used in conjunction with a transmitter to connect directly to accessible, metallic pipes, risers, or tracer wires. A current is sent through the pipe or tracer wire at a specific frequency and the resulting EM field can then be detected by the receiver. A utility's ability to be located depends on a variety of factors including access to the utility, conductivity, grounding, interference from other fields, and many others. Depths provided should always be treated as estimates as their accuracy can be affected by multiple factors. For more information, please visit: [Link](#)
- **GPS.** This handheld GPS unit offers accuracy down to 4 inches, however, the accuracy will depend on the satellite environment and obstructions and should not be considered to be survey-grade. Features can be collected as points, lines, or areas and then exported into Google Earth or overlaid on a CAD drawing. For more information, please visit: [Link](#)

MAP OF SCAN AREA



**PROJECT COSTS**

SERVICE	SCOPE	PRICE	
SCANNING/FIELD MARKINGS	See desc. pg. 1-2	\$800 – 1,200	
MOBILIZATION		\$incl	
<b>ESTIMATED TOTAL</b>	Estimate ½ to 1 Day On-Site	<b>*\$800 – 1,200</b>	
<b>OPTIONAL SERVICES (INITIAL IF DESIRED)</b>			
WRITTEN REPORT	Report of findings with photos, example data, table of objects located/areas scanned, and hand sketch of results (if applicable).	Initial ____	\$200
GPS/CAD DRAWING	Findings will be collected with GPS and drafted in AutoCAD with an aerial image background. A linework version will also be provided if the client provides an existing drawing. Results are not survey-grade accuracy.	Initial ____	\$450

\*This price assumes that we will be given access to perform the work during normal weekday business hours (6am-5pm). As-builts and any other applicable drawings should be made available to GPRS prior to the project. A thorough utility search can only be completed if GPRS is given access to all utility structures, interior and exterior. This service is never a replacement for the use of the state One Call system (811). All of our technicians have OSHA-10 safety training or greater. Site-specific safety training is not included in this quote. Please notify us if this project requires additional safety training.

**TERMS & CONDITIONS**

1. Customer agrees to meet and perform all requirements described in this document and has fully read and understands all items listed within this document.
2. Customer acknowledges it understands that our results are based upon the quality of the data retrieved which is determined by a variety of factors, including, but not limited to, the limitations listed in the "Equipment" section of this document. These limitations are inherent to all locating equipment. The decision to proceed with drilling, excavation or any destructive methods is left entirely up to the customer.
3. GPRS is not liable for inaccurate data reporting or for any other reason, and customer agrees to release and indemnify GPRS and its owners and agents from all losses and damages from all alleged negligence and/or contract claims by customer or any third party. These terms and conditions supersede any other previous terms and conditions, or representation, either oral or written.
4. If GPRS provides maps or CAD drawings, please note that the map is not survey quality. These are representations of GPRS' utility findings performed on a previous date. The GPRS scan performed was of limited scope and utilities outside this scope are not shown.
5. GPRS does not conduct an investigation, analysis, or interpretation of soil composition, soil conditions, or geological or geophysical information, Customer acknowledges it understands that we are merely reporting retrieved data and that we do NOT provide professional geophysical, geological, engineering, or land surveying services. Customer should contact a professional in those fields if such services are needed.
6. Payment is due upon receipt of invoice.
7. If for some reason the technician arrives on site and the work is cancelled there will be a charge of \$500.00 per requested technician.

**ACCEPTED AND AGREED:**

Billing Company Name: \_\_\_\_\_

Billing Address: \_\_\_\_\_

Company Phone/Email: \_\_\_\_\_ PO#: \_\_\_\_\_ Job#: \_\_\_\_\_

Print Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_



PO Box 1147  
 Foxworth, MS 39483

# Cost Proposal

Date	Proposal #
8/26/2019	10894

Name / Address
PPM CONSULTANTS, INC. 5555 BANKHEAD HIGHWAY BIRMINGHAM, AL 35210

Re:
Environmental Services Circle K Store No. 2721559 PPM Project No. 262724.MCAP

Description	Unit	Qty	Rate	Total
Mobilize/Demobilize	lump sum	1	200.00	200.00T
Mileage	per mile	300	2.32	696.00T
Drill & Install (4) 20' Ozone Sparge Wells	per ft.	80	35.00	2,800.00T
12" Flush Mount Covers	per each	4	200.00	800.00T
Mobilize/Demobilize/Perdiem System Crew	lump sum	1	2,800.00	2,800.00T
Trench & Backfill - Soil	per ft.	100	16.00	1,600.00T
Trench & Backfill - Concrete/Ashpalt	per ft.	25	28.00	700.00T
Saw Cutting	per ft.	50	6.00	300.00T
Install 1" Sch 40 PVC Conduit & pull ozone tubing provided by others	per ft.	400	1.50	600.00T
Electricity Hook-up	lump sum	1	2,500.00	2,500.00T
Offload & Setup System	lump sum	1	1,500.00	1,500.00T

Customer Acceptance of Cost Proposal

\_\_\_\_\_  
 Authorized Signature Date

\*Payment Terms NTE 30 days upon project completion.  
 \*1.5% Interest will be charged monthly to all overdue invoices.

<b>Subtotal</b>	\$14,496.00
<b>Tax (0.0%)</b>	\$0.00
<b>Total</b>	\$14,496.00

Walker-Hill Environmental, Inc  
 Foxworth, MS Office  
 Phone: (601) 736-3500  
 Email: eric@whenv.com



August 27, 2019

**TO: Rodney Kilgore  
PPM Consultants**

**FROM: Wendy Powell  
EcoSouth Services**

**RE: Proposal for waste disposal and transportation**

**SITE: Circle K 2721559  
University Blvd  
Mobile, AL**

Thank you for allowing us the opportunity to offer a proposal for your waste disposal and transportation needs. The prices offered below are good for 60 days. I look forward to following up with you at your earliest convenience.

**TRANSPORTATION**

Transportation (per load)	=	\$250
Equipment Rental (per month)	=	\$75 if kept over 30 days
Delivery	=	\$75

**DISPOSAL**

Industrial solid waste (per ton)	=	\$28
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<b><u>ADEM PROFILE FEE</u></b>	=	\$250
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*\* The Alabama Department of Environmental Management (ADEM) mandates that all disposal sites collect and remit a fee to the State. This fee is currently **\$1.00 per ton**. The ADEM fee will be added to all levels of disposal pricing quoted above.*

Cell: (228) 297-0483  
Email: Wendy.powell@ecosouthservices.net

**APPENDIX E – TECHNICAL SAMPLING AND QA/QC PLAN**



## PPM CONSULTANTS, INC.

### 1.0 TECHNICAL SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER MONITORING

#### 1.1 PURPOSE

This Technical Sampling and Analysis (TS&A) Plan describes the methods and procedures to be followed during groundwater monitoring activities at leaking underground storage tank sites. Any modification to the sampling process will be addressed and described within in the monitoring reports.

#### 1.2 LIQUID GAUGING PROCEDURES

Prior to groundwater sampling, liquid levels are measured in each well to determine the groundwater elevation and flow direction. Liquid levels inside the wells are measured with a Solinst, ORS, or Keck interface probe from the top of the well casing using the same reference point from which the survey elevations determined during the assessment were recorded. Groundwater elevations at the site are calculated to a common datum. Calculations for determining the water table elevations are as follows:

$$GE = ETC - DTW$$

Where: GE = Groundwater elevation  
ETC = Elevation of top of casing  
DTW = Depth to water

For wells containing measurable quantities of free product, groundwater elevations were calculated using the following equation:

$$WTE = ETC - [DTW - SG \text{ product (PT)}]$$

Where: WTE = Adjusted water table elevation (ft)  
ETC = Elevation of top of casing  
DTW = Depth to water  
PT = Product Thickness (ft)  
SG = Specific Gravity  
SG gasoline = 0.755  
SG diesel = 0.844

Groundwater flow direction at the site is determined through groundwater contouring based on water table elevations calculated from the monitoring wells installed at the site.

### **1.3 GROUNDWATER SAMPLING PROCEDURES**

After the depth to water is measured, each well is purged of at least three well volumes of liquid prior to sampling using a submersible pump or bailer. Purged water is contained in sealed 55- gallon drums and disposed of at an approved disposal facility. Groundwater samples are collected using disposable bailers and immediately transferred into 40 ml glass VOA vials. The vials are immediately sealed and placed on ice inside coolers. The samples are shipped with chain-of custody forms via common courier to an independent testing laboratory for analysis. One trip blank and one duplicate sample are submitted per event for QA/QC purposes.

### **1.4 LABORATORY ANALYSES**

Laboratory analyses are performed by an independent testing laboratory. The laboratory used will maintain a Quality Assurance/Quality Control (QA/QC) program which utilizes spike and duplicate analysis. Groundwater samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTBX), methyl tertiary butyl ether (MTBE), and naphthalene per EPA SW-846, Test Method 8260B (or other approved method), and other parameters that may be applicable to the constituents of concern. Results of the internal QA/QC program used by the laboratory are included in each report.

## **2.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN**

### **2.1 PURPOSE**

This QA/QC Plan describes the procedures followed by personnel during the project to ensure that all data generated is accurate and representative of conditions encountered.

### **2.2 GROUNDWATER SAMPLING**

#### **2.2.1 Well Purging**

Groundwater is purged from monitoring wells prior to sampling to ensure each sample is representative of existing subsurface conditions. At a minimum, three well volumes of standing water are purged using a submersible pump or bailer. Only water inside the upper column of the well is purged. Each well is purged at a minimal rate to avoid aeration through cascading action of groundwater in the screened interval. When the bailing method is employed, the bailer is slowly lowered and retrieved from the groundwater to minimize aeration inside the well. Groundwater in wells is allowed to recover to near static water level before sampling.

### **2.2.2 Sample Collection**

Groundwater samples are collected using disposable bailers. Procedures for sampling groundwater are described below:

- 1) The bailer is lowered into the well slowly to avoid aeration of the sample;
- 2) The bailer is filled from the top of the water column and retrieved; and
- 3) The first bailer of water is transferred from the bottom of the bailer into 40 ML, prepared VOA vials or applicable containers specific to the analyte. The sample container is filled completely to the top and tightly sealed. Samples are placed on ice immediately following collection.

### **2.2.3 Decontamination**

Disposable vinyl gloves are worn during well purging and sample collection. During well purging, the gloves are changed between each well. Gloves are also changed between each sample acquisition during the sampling process. When a pump is used, all downhole equipment is decontaminated between each use by circulating clean water and phosphate-free detergent. Disposable bailers are used for collecting samples; therefore, no additional decontamination procedures are employed.

### **2.2.4 Sample Dispatch**

Groundwater samples are packed in individual plastic protective envelopes (bubble pack) inside a cooler to avoid breakage during shipment. The coolers used are insulated to maintain sample temperature near 4 C. Each cooler is sealed with tape to discourage tampering. The samples are shipped to the laboratory via common courier.

## **2.3 SAMPLE CUSTODY**

A traceable link is established from the time samples are obtained until submission of analytical results. The following section describes chain-of-custody (COC) procedures which are adhered to during the project to establish that traceable link.

### **2.3.1 Documentation**

Protocols for documentation are used to ensure appropriate sample identification and transfer. This documentation includes sample labels, seals, and COC forms. Labels and seals will be filled out using water-proof ink. Information to be supplied on COC forms consists of the following:

- Project number and location of the site.
- Sample identification/location.
- Sample point (depth).
- Signature of collector.
- Date and time of sample collection,
- Sample matrix (water).
- Method of preservation (HC1),
- Number of containers per sample location.
- Analytical method requested.
- Name of person(s) in possession of the COC and samples.
- Applicable remarks.

Custody seals are placed on coolers in such a manner that the container cannot be opened without breaking the seal. At least two seals are used, (one on either side of the cooler).

### **2.3.2 Custody Procedures**

COC procedures implemented during the project are as follows:

- Each sample collected for the project is entered on the COC record.
- The original COC record accompanies the sample containers during transport to document their custody.
- The shipping` package is sealed with strapping tape and a custody seal affixed. The seal is placed on the package in such a manner that the package cannot be opened without breaking the seal. The seal documents that the samples remained unaltered during shipment through the common parcel carrier.
- The laboratory assumes custody of the sample upon receipt and a designated sample custodian is charged with sample care and receipt.
- The laboratory retains custody of the sample

## **2.4 QUALITY CONTROL CHECKS**

The following quality control checks are implemented during the project to verify the adherence to the QA/QC plan, and to provide measurement for method and samplers performance.

### **2.4.1 Trip Blanks**

Trip blanks are used to determine the QA/QC of sample handling procedures. The trip blanks are filled with distilled water in the laboratory and will accompany the cooler to and from the project site. One trip blank is sent per cooler.

### **2.4.2 Duplicate Samples**

Duplicate groundwater samples are collected to provide a check on sampling techniques as well as laboratory equipment. Duplicate samples are collected simultaneously from the same well and labeled with a different well designation number. Duplicate samples are collected at a frequency of one per 10 samples submitted for laboratory analysts. s in a secure area for a minimum of one month following the date of receipt. At that time, the samples are disposed of in accordance with appropriate disposal procedures.

- The sampler maintains the final copy of the COC to verify that the samples were collected and sent to the laboratory.

**APPENDIX F – OZONE UNIT MONITORING FORMS**



## OZONE SYSTEM FIELD MONITORING FORM

*MISCELLANEOUS*

Ambient Temperature (°F)	Ozone Reading in Enclosure (ppm)	Ozone Reading in Service Bay (ppm)

System Run Time (hrs)	Cycle Lag Time (minutes)	System Components Checked for Leaks (Y / N)	SP Connections Checked for Leaks (Y / N)

Well ID	Depth to Water (ft BTOC)	Induced Pressure Reading (psi)	Other Info
MW-1			
MW-3			
MW-4			
MW-6			
MW-7			
MW-8			
MW-9			
MW-10			
MW-11			
DW-1			
EW-1			
EW-2 (MW-2)			



OZONE SYSTEM FIELD MONITORING FORM

COMMENTS:

Lined area for entering comments, consisting of multiple horizontal lines.

**APPENDIX G – SITE HEALTH AND SAFETY PLAN**

# **HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM**

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## **HEALTH AND SAFETY PLAN**

**CIRCLE K STORES, INC.  
CIRCLE K STORE NO. 2721559  
10 NORTH UNIVERSITY BOULEVARD  
MOBILE, ALABAMA  
MOBILE COUNTY**

**PPM PROJECT NO. 262724-  
MCAP**

**SEPTEMBER 2019**



**PREPARED UNDER THE DIRECTION OF:**  
JERI F. THRASHER, CSP | MBA / HEALTH AND SAFETY DIRECTOR  
1600 LAMY LANE, MONROE, LOUISIANA 71201  
(P) 318.812.3454 / (C) 318.884.8188



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<b>11.0</b>	<b>CONFINED SPACE.....</b>	<b>53</b>
<b>12.0</b>	<b>LIST OF ABBREVIATIONS .....</b>	<b>54</b>



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## PROJECT CHECKLIST – HASP AND JSA

### Project/Task and Corresponding Job Safety Analysis:

- |   |  |
|---|--|
| <input type="checkbox"/> Asbestos Inspection<br><input type="checkbox"/> Carbon Change-Out<br><input type="checkbox"/> Chemical Injection<br><input type="checkbox"/> DPVE/SVE/Air Sparge Installation<br><input type="checkbox"/> DPVE/SVE/Air Sparge Demobilization<br><input type="checkbox"/> Drilling/Probing [Hand Auger]<br><input type="checkbox"/> Drilling/Probing [Heavy Equipment]<br><input type="checkbox"/> Mobile Vacuum Event [Emergency Response]<br><input type="checkbox"/> Ozone System Installation | <input type="checkbox"/> Ozone System Demobilization<br><input type="checkbox"/> Remediation System Modification* [specify below]<br><input type="checkbox"/> Spill Bucket Replacement/Closure<br><input type="checkbox"/> Trenching/Excavation<br><input type="checkbox"/> UST Pull/Closure<br><input type="checkbox"/> Well Plugging and Abandonment [Grout In Place]<br><input type="checkbox"/> Well Plugging and Abandonment [Overdrilling]<br><input type="checkbox"/> Other* [specify below and contact HSD with details] |
|---|--|

### Hazard Assessment:

### Protective Equipment:

#### Chemical Hazards

#### Physical/Biological Hazards

- 
- Acids [HCl, HNO
- <sub>3</sub>
- , H
- <sub>3</sub>
- PO
- <sub>4</sub>
- , H
- <sub>2</sub>
- SO
- <sub>4</sub>
- ]
- 
- 
- Activated Carbon
- 
- 
- Alconox®/Liquinox®/Isopropanol
- 
- 
- Asbestos
- 
- 
- Bases [NaOH/KOH/CaOH
- <sub>2</sub>
- /NH
- <sub>3</sub>
- /Na
- <sub>2</sub>
- CO
- <sub>3</sub>
- ]
- 
- 
- Calibration Gas [Meth/Hex/Isobutyl]
- 
- 
- Carbon Dioxide [Dry Ice]
- 
- 
- Chlorinated Solvents [Dry Cleaners]
- 
- 
- Descaling Agents [Analytix AN-754GH]
- 
- 
- Diesel/PAHs
- 
- 
- Dust [Nuisance/Concrete]
- 
- 
- Dust [Granular Carbon/Aluminum Oxide]
- 
- 
- Fuel Gases [Meth/Hex/Butane/Prop]
- 
- 
- Gasoline [BTEX]
- 
- 
- Hydrogen Sulfide[H
- <sub>2</sub>
- S]
- 
- 
- Kerosene
- 
- 
- Metals [As/Cd/Cr/Cu/Pb/Hg/Zn]
- 
- 
- Methyl-Tertiary Butyl Ether [MTBE]
- 
- 
- Oil/Lubricating Oils
- 
- 
- Oxidizer [NXT/ORC®/ORC Advanced®]
- 
- 
- Oxidizer [RegenOx A/B™]
- 
- 
- Ozone
- 
- 
- Ozone/Hydrogen Peroxide
- 
- 
- Pesticides [Industrial/Agricultural]
- 
- 
- Polychlorinated Biphenyls [PCB]
- 
- 
- 
- Other C/P/B Hazard\* [contact HSD]
- 
- 
- Unknown C/P/B Hazard\* [contact HSD]

- 
- Aerial Lifts
- 
- 
- Biological
- 
- 
- Combustion/Flammability
- 
- 
- Compressed Gas [cylinders]
- 
- 
- Concrete [coring/cutting]
- 
- 
- Cuts/Lacerations
- 
- 
- Driving
- 
- 
- Drowning
- 
- 
- Electrical
- 
- 
- Elevated Working Surfaces
- 
- 
- Forklift/Crane [truck-mount]
- 
- 
- Hand/Power Tools
- 
- 
- Heat/Cold Stress
- 
- 
- Heavy Equipment
- 
- 
- Illumination
- 
- 
- Ladder Safety
- 
- 
- Material Handling [back safety]
- 
- 
- Noise
- 
- 
- Repetitive Motion
- 
- 
- Scaffolding/Scissor Lifts
- 
- 
- Slips/Trips/Falls
- 
- 
- Traffic or Secluded Sites
- 
- 
- Uneven Working Surfaces
- 
- 
- Unstable Soils/Cave-Ins

- 
- Apron and Goggles
- 
- 
- Booties/Foot Covers
- 
- 
- Ear Plugs/Canal Caps
- 
- 
- Face Shield
- 
- 
- Flame-Retardant Clothing
- 
- 
- Hand – Cotton Gloves
- 
- 
- Hand – Kevlar Gloves
- 
- 
- Hand – Leather Gloves
- 
- 
- Hand – Nitrile Gloves
- 
- 
- Hand – Other\*
- 
- 
- Hard Hat [Class E]
- 
- 
- Harness and Lanyard
- 
- 
- High Visibility Shirt/Vest
- 
- 
- Protective Suits [tyvek]\*
- 
- 
- Reflective Shirt/Vest
- 
- 
- Respirator [air-purifying]\*
- 
- 
- Respirator [supplied air]\*
- 
- 
- Safety Glasses
- 
- 
- Steel-Toed Boots
- 
- 
- Other PPE\* [contact HSD]

### Documentation Required:

- 
- Ambient Air Monitoring
- 
- 
- Crane Operator Inspection
- 
- 
- Forklift Safety Inspection
- 
- 
- HASP Acknowledgement Form
- 
- 
- Incident Report/Log [as applicable]
- 
- 
- Subsurface Clearance Checklist
- 
- 
- Tailgate Safety Meeting Log
- 
- 
- Trench/Excavation Inspection

### Return Pages in the Following Order:

- § HASP Coverpage
- § Project Checklist
- § Emergency Summary Information and Maps
- § Personnel Roles and Responsibilities, p.3
- § One Call (if electronic copy)
- § Subsurface Clearance Checklist
- § Ambient Air
- § Trench/Excavation Checklist
- § HASP Acknowledgment
- § Tailgate Logs

HASP Generated By [Print Name]: \_\_\_\_\_

Date Generated: \_\_\_\_\_





# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## EMERGENCY SUMMARY INFORMATION

### Medical Facility:

In cases of incidents or near-misses, the Health and Safety Director (HSD) must be verbally contacted immediately once any spills/releases have been contained and appropriately isolated. Incidents resulting in injury or illness must be reported immediately to the HSD for further instruction and injury case management. 911 should be called for life-threatening cases or cases requiring immediate attention. Be prepared to administer CPR and first aid care only if you have been trained to do so, acquire consent from injured worker (unless unconscious in which consent is implied), and training is up-to-date.

Name of Hospital: Sspringhill Medical Center Phone: 251-344-9630  
 Address: 3719 Dauphin Street City, State: Mobile, AL Zip: 36608  
 Directions and Map: See attached (next page) Distance: 3.6 miles Time: 14 mins

### Company and Emergency Contact Information:

Agency/Emergency Responder	Telephone	Website
Fire Department / Police Department / Ambulance	911	--
Center for Disease Control and Prevention	800-232-4636	<a href="http://www.cdc.gov">www.cdc.gov</a>
CDC – Public Health Preparedness and Response	404-639-7405	<a href="mailto:cdcinfo@cdc.gov">cdcinfo@cdc.gov</a>
CDC – Bioterrorism Preparedness and Response	404-639-0385	<a href="mailto:cdcinfo@cdc.gov">cdcinfo@cdc.gov</a>
CDC – Toxic Substances and Disease Registry	770-488-7100	<a href="mailto:cdcinfo@cdc.gov">cdcinfo@cdc.gov</a>
Chemtrec [24-Hour Emergency Chemical Spill]	800-262-8200	<a href="mailto:chemtrec@chemtrec.com">chemtrec@chemtrec.com</a>
EPA RCRA Superfund Hotline	800-424-9346	--
Poison Control Center	800-222-1222	<a href="http://www.aapcc.org">www.aapcc.org</a>

PPM Contact Information	Representative	Office	Cell
Principal [Primary Regional Safety PIC]	Shawn Ivey	318-323-7270	318-237-0677
Principal [Alternate Regional Safety PIC]	Zane Hood	205-836-5650	205-240-9883
Health and Safety Director	Jeri Thrasher	318-812-3454	318-884-8188
Safety Supervisor [Baton Rouge]	David Durbin	225-293-7270	225-603-8050
Safety Supervisor [Birmingham]	Brandy Hall	205-836-5650	205-913-5471
Safety Supervisor [Jackson]	Regan Byrd	601-956-8233	601-862-8693
Safety Supervisor [Mobile/Pensacola]	Kay Williams	251-990-9000	251-753-4455
Safety Supervisor [Monroe]	Matt Colvin	318-812-3467	318-355-6415
Safety Supervisor [Orlando]	Amy Guilfoyle	407-240-1127	941-730-5600

Note: District and Project Managers can be contacted by using the office phone numbers provided for each location.

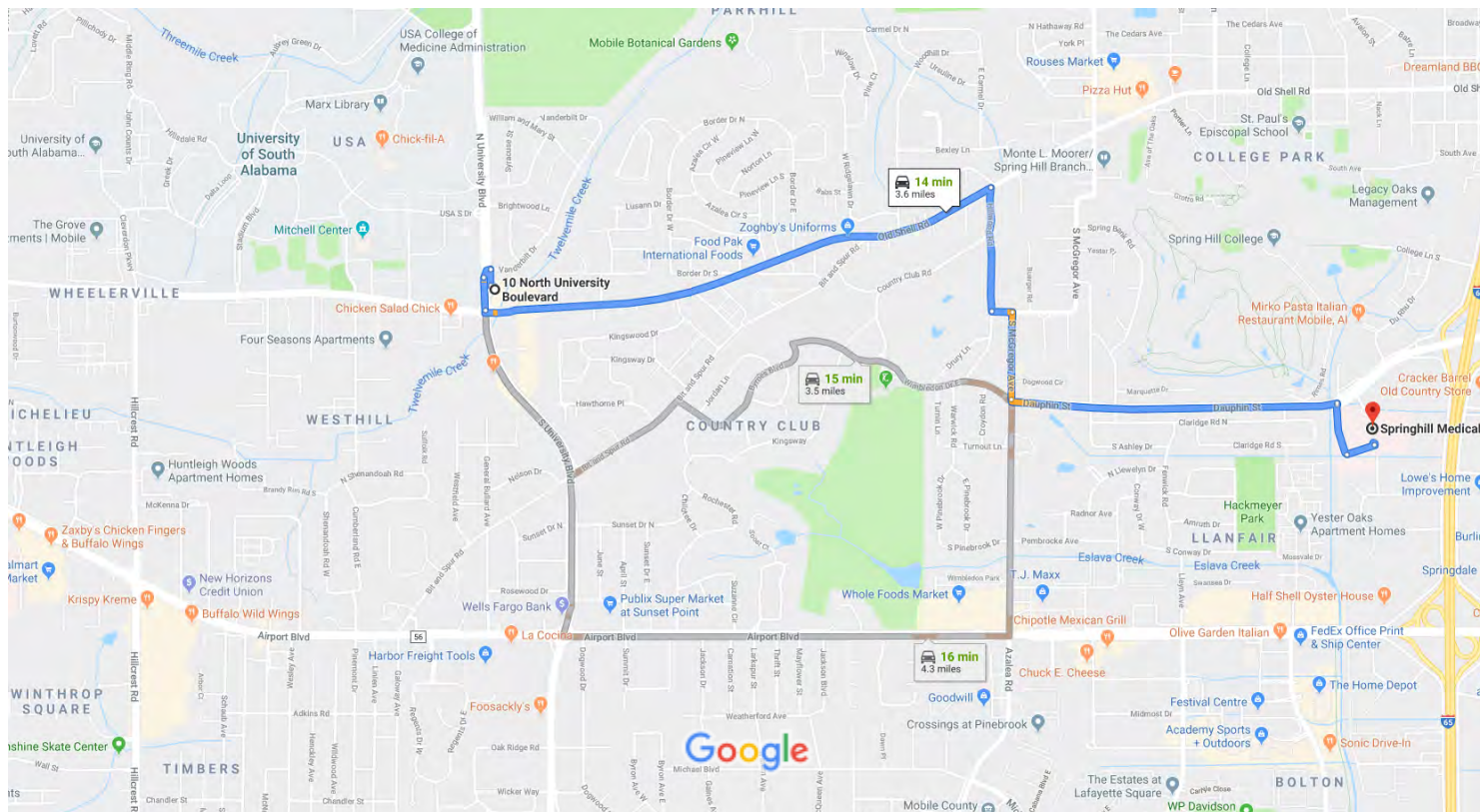
### Designated Break and Evacuation Locations:

Personal protective equipment is required at all times within the work zone and can only be doffed when in the site's designated break area. Smoking will be permitted within the break area pending the site's ambient contaminant concentrations. In the event of an emergency, workers must report to the designated evacuation area for a headcount. This site's designated break and evacuations areas are outlined as follows:

Break Area: \_\_\_\_\_ Evacuation Area: \_\_\_\_\_



# 10 North University Boulevard, Mobile, AL to springhill memorial hospital Drive 3.6 miles, 14 min



Map data ©2019 Google 1000 ft

## 10 N University Blvd

Mobile, AL 36608

### Take N University Blvd and Vanderbilt Dr to N University Blvd

3 min (0.1 mi)

- ↑ 1. Head north toward N University Blvd

---

- ➡ 2. Turn right onto N University Blvd

---

- ↶ 3. Turn left at the 1st cross street onto Vanderbilt Dr

### Follow Old Shell Rd to Hillwood Rd

4 min (1.6 mi)

- ↶ 4. Slight left onto N University Blvd  
 ⓘ Pass by Mellow Mushroom (on the left)


---

- ↶ 5. Turn left onto Old Shell Rd  
 ⓘ Pass by Waffle House (on the left)

### Continue on Hillwood Rd to S McGregor Ave

1.5 mi

1 min (0.4 mi)

 6. Turn right onto Hillwood Rd


0.4 mi

 7. Turn left onto Vickers Pl

312 ft

**Continue to Dauphin St**

3 min (1.2 mi)

 8. Turn right onto S McGregor Ave


0.3 mi

 9. Turn left onto Dauphin St


0.9 mi

**Drive to your destination**


2 min (0.2 mi)

 10. Turn right to stay on Dauphin St


23 ft

 11. Slight right

0.1 mi

 12. Turn left

449 ft

 13. Turn left Destination will be on the right

59 ft

**Springhill Medical Center**

3719 Dauphin St, Mobile, AL 36608

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

### 1.0 INTRODUCTION

#### 1.1 COMPANY COMMITMENT

PPM is committed to the safety and wellbeing of its employees and subcontractors. Our mission to exceed client expectations is done under the provision that worker health, safety and security is not compromised in the process. In addition, the company strives to ensure that the environment and its natural resources are preserved and not otherwise negatively impacted as the result of company-related processes. This commitment to our workers and our environment is outlined within our written health, safety, security and environmental (HSSE) program, which establishes the company's expectations through its policies and procedures.

#### 1.2 HASP PURPOSE

The purpose of this health and safety plan (HASP) is to mitigate those hazards associated with routine company-related tasks that could not otherwise be substituted or eliminated. This document outlines the control measures, protective equipment and emergency response procedures necessary to ensure worker safety and wellbeing are maintained. This HASP has been prepared in accordance with the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120 standard for typical conditions encountered during routine field activities.

#### 1.3 APPLICABILITY

All field-related projects and/or tasks require a HASP, unless otherwise exempted by the safety department. The provisions outlined within this plan are applicable to all personnel assigned to the project and subcontracted workers hired by the company to complete the project. PPM will not be responsible for the safety of contracted workers hired directly by the client or partnering companies unless otherwise specified by these entities to do so. Accountability for the health, safety and security of contractors under these circumstances must be pre-established and explicitly outlined within the proposed scope of work and must additionally be approved by a Principal of the company.

#### 1.4 EXCEPTIONS

This general report template has been prepared specifically for common chemicals and tasks associated with routine company-related field processes as outlined within the Project Checklist – HASP and Job Safety Analysis (JSA) form. Any project involving a chemical or field-related task not otherwise specified within this form is considered non-routine and is not covered by the provisions of this written plan. HASP requests and proposed scope-of-work for non-routine chemicals and/or job-related tasks must be sent directly to the Health and Safety Director (HSD) so that a site-specific HASP can be prepared. When possible, please allow five days for preparation.

Common, repetitive field tasks such as groundwater monitoring, operation and maintenance of remediation systems, environmental site assessments, mobile vacuum events and other similar tasks that do not require exposure monitoring will be addressed within a separate HASP prepared specifically for these activities.

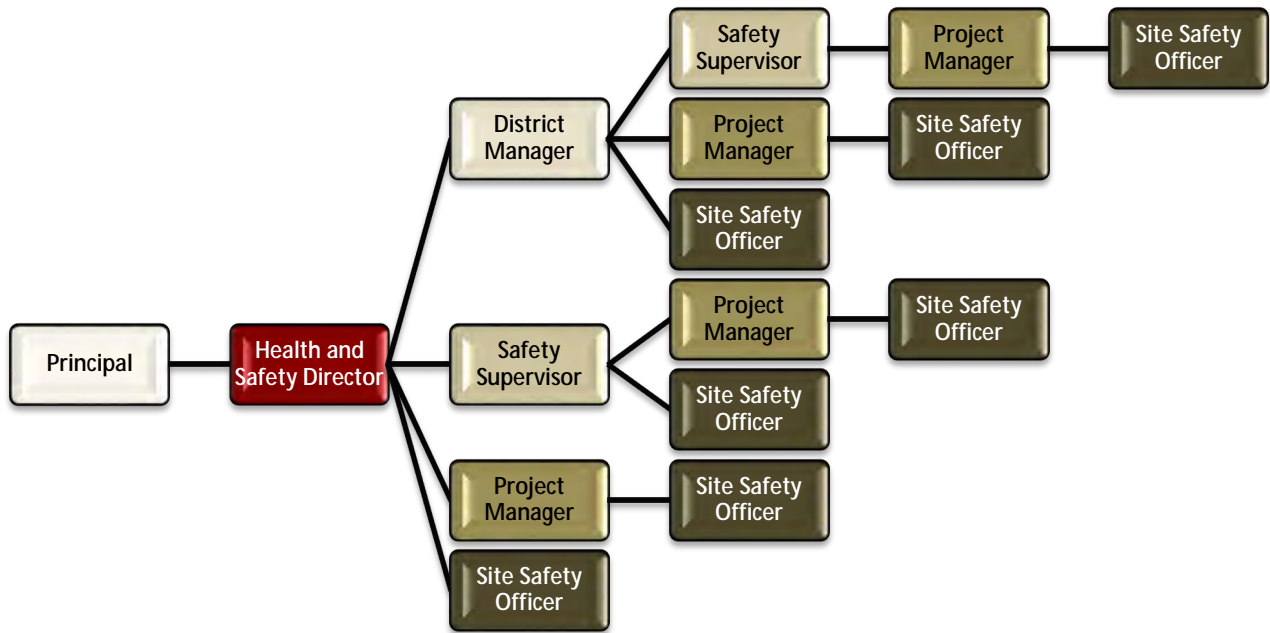
#### 1.5 MANAGEMENT OF CHANGE

Should any unexpected conditions arise that introduces new hazards or eliminates existing hazards, work will cease immediately and this HASP will be amended to accommodate changes in site conditions. Additions or changes to this HASP will be communicated to all affected personnel and subcontractors.

### 2.0 ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

#### 2.1 CHAIN-OF-COMMAND

The hierarchy of command creates a system for accountability and is extremely beneficial to the reporting process. As indicated by the graphic below, PPM has built-in redundancies within its command chain to ensure that all affected parties are notified and accountable as well as to compensate for designated personnel when they are inaccessible. There are various ways in which to notify management; however, when it involves worker safety and health, the HSD and Principal must be notified and cannot be by-passed.



#### 2.2 PERSONNEL ROLES AND RESPONSIBILITIES

Safety is the responsibility of every worker within the company, regardless of position. Workers are accountable for their own personal safety as well as the safety of the co-workers around them. Also, key personnel within the company have additional safety obligations due to their designated leadership roles within the organization. PPM expects its managers to set the tone for safety through their exemplary leadership thereby creating the foundation for a strong safety culture. Positions requiring additional safety responsibilities include the following:

- § **Principal.** Principals are assigned responsibility for different departments within the company. The primary Safety Principal-in-Charge (PIC) is Shawn Ivey [Monroe], and the alternate Safety PIC is Zane Hood [Birmingham]. Each is responsible for authorizing HSSE policies and procedures set forth by the safety department and establishing the final provisions when discrepancies are noted.
- § **Health and Safety Director.** The HSD is responsible for proposing and generating HSSE policy/procedures under the advisement of the Safety PIC, communicating these provisions to all affected workers within the organization, and ensuring uniform implementation of these provisions throughout all branch offices.



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

- § **District Manager.** Each branch office has a designated District Manager who is responsible for ensuring that HSSE policies and procedures are implemented by the workers assigned to his or her office. The District Manager is directly accountable to the Principals for the safety performance of his/her office.
- § **Safety Supervisor.** Each branch office has a designated Safety Supervisor (SS) assigned by the District Manager. The SS is responsible for ensuring HSSE compliance by all within his/her office through consistent toolbox training, unscheduled site safety inspections and any other task delegated by the HSD. The SS is directly accountable to the HSD for his/her supervisory role and is also accountable to his/her District Manager regarding the office's safety performance.
- § **Project Manager.** Project Managers are responsible for all aspects of their assigned projects, including the safety and wellbeing of the workers assigned to their jobsite. Project Managers establish the overall scope-of-work for the project and must consider the appropriate safety provisions (i.e., engineering design, protective equipment, etc.) during the planning phase. Project Managers are directly accountable to their District Managers for the job-related safety aspects.
- § **Site Safety Officer.** A site safety officer (SSO) is assigned to each field project. An alternate SSO is assigned to any field project with more than one PPM employee onsite. The SSO is responsible for jobsite safety, which includes, but is not limited to, the following:
  - Designate break and evacuation areas based on current site conditions
  - Review the provisions outlined within the HASP and JSA with all affected personnel, subcontractors, client, and regulatory officials
  - Ensure site security and preventing unauthorized entry to the work zone
  - Ensure subsurface utilities have been marked and appropriate Principal approval has been obtained for exclusion zone disturbances
  - Locate emergency shut-off devices to pumps and heavy equipment
  - Establish communication system with equipment operators
  - Ensure all workers and contractors wear required protective equipment
  - Prohibit onsite smoking, except when permitted within designated areas
  - Complete required field documentation outlined within the HASP for worker exposure monitoring and other site safety inspections
  - Report to management any incident or near-miss involving worker injury/illness, property damage, contact with overhead or subsurface utilities, chemical/product releases or auto accident

The alternate SSO is responsible for jobsite safety in the absence of the SSO or when under the direction of the SSO.

The following personnel are assigned to this project:

NAME	TITLE/POSITION
Isaac Smith	District Manager
Rodney Kilgore	Project Manager
Jeri F. Thrasher, CSP	Health and Safety Director
Kay Williams	Safety Supervisor (SS)
	Site Safety Officer (SSO)
	Alternate SSO
	Subcontractor



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

### 2.3 SHORT SERVICE EMPLOYEES

Short service employees are defined as any worker employed by PPM for less than six months or workers who have not yet completed required training and certification. Short service employees are assigned a mentor and supervised at all times when in the field - (exception: establishing offices that do not have a mentor may require that short service employees perform field duties unsupervised; however, Principal exemption is required).

### 2.4 TRAINING AND MEDICAL MONITORING

PPM field personnel associated with this project have received company HSSE policy and procedural training as part of their safety orientation. Personnel have additionally received initial 40-Hour HAZWOPER certification, which is updated annually through an 8-Hour refresher. This training course meets the requirements of the OSHA 29 CFR 1910.120 standard. Short-service employees not otherwise HAZWOPER-certified will be provided training after 90-day probationary period.

In accordance with the medical monitoring requirements outlined within 29 CFR 1910.120, workers who are or may potentially be exposed to hazardous materials are provided a medical evaluation paid for by the company. Only those employees who have been medically cleared for duty by a physician are permitted to perform field duties.

## 3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

A hazard is defined as a "situation that poses a level of threat to life, health, property or environment." For purposes of this written plan, hazards have been categorized in four ways – chemical, physical, biological and environmental. Hazards further outlined within the following sections are those that could not otherwise be eliminated or substituted as part of the risk assessment process. The control measures discussed throughout the following sections are required to mitigate the hazards posed to workers in order to ensure that worker safety and health is maintained.

### 3.1 CHEMICAL HAZARDS AND CONTROLS

PPM is an environmental consulting firm that specializes in environmental spill response, remediation and general regulatory compliance. As part of these functions, workers will likely be exposed to chemical hazards through the following routes: site contamination, chemicals used as part of the remediation process, chemicals used for equipment maintenance and calibrations, and chemicals used/stored at client facilities.

#### 3.1.1 Gases and Fumes

##### 3.1.1.1 Acids

Acids have a pH <7, change litmus paper to red, taste sour (most citrus fruits are acidic), are corrosive to metals, and are commonly found in car/forklift batteries, used as sample preservatives and used to prevent algae, calcium and other similar buildups in piping systems. Common acids encountered through company-related processes include but are not limited to: hydrochloric (muriatic), nitric, phosphoric and sulfuric acid. Acids can cause moderate to severe skin and eye burns, and breathing the fumes created by these materials can cause extreme burning of the respiratory system. Materials with a pH <2 must be disposed as a hazardous waste; however, acids can be neutralized with a bases/alkali.

***Control Measures:*** Never pour water into acid! Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

(i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations, itching and burning and prevent accidental ingestion. Prevent contact with metals.

### 3.1.1.2 Bases/Alkali

Commonly referred to as caustics, bases have a  $\text{pH} > 7$ , change litmus paper to blue, have a bitter taste, feel slippery and are commonly used to make soap and textiles, found in common household detergents, cleaners (i.e., Drano, oven cleaners and ammonia products), milk of magnesia and antacids. Common bases encountered through company-related processes include but are not limited to: sodium hydroxide, potassium hydroxide, calcium hydroxide, ammonia, and sodium carbonate. Bases can cause moderate to severe skin and eye burns, and breathing the fumes created by these materials can cause extreme burning of the respiratory system and pulmonary edema. Materials with a  $\text{pH} > 12.5$  must be disposed as a hazardous waste. While bases react violently with acids, they can also be neutralized by acids.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations, itching and burning and prevent accidental ingestion.

### 3.1.1.3 Calibration and Fuel Gases

Calibration gases are used to calibrate air monitoring equipment. Common calibration gases used for equipment calibration include: hexane, isobutylene and methane. Calibration gases are used in small quantities, are highly flammable, and must be stored and handled safely. Gases such as hexane, methane, butane, and propane are used as fuel sources and may be encountered in larger quantities at oil and gas facilities. Workers may also come across methane gas through work in landfills, swamps, and agricultural land associated with raising livestock.

Control Measures: Keep containers upright, lids secured and store in climate-controlled environment away from heat sources. Calibration gases are asphyxiants (displace oxygen) so calibrate equipment in well-ventilated areas. When these gases are anticipated in larger quantities, workers must air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

### 3.1.1.4 Carbon Dioxide (Dry Ice)

Dry ice is carbon dioxide in a solid form. It may be used as a refrigerant and/or to displace vapors and has been used on some PPM jobsites for such purposes. Some hazards associated with the use of dry ice include, but are not limited to: frostbite through direct skin contact, asphyxiation due to displacement of oxygen in the atmosphere, and explosion from release of pressure exerted by the conversion of carbon dioxide solid to gas which could produce projectiles of the dry ice.

Control Measures: Avoid direct contact with solid dry ice to prevent frostbite. Avoid storing in areas with limited air flow (ventilation) such as buildings, vehicles, or other confined areas where gases can accumulate and be inhaled. Store inside a paper bag within a refrigerator, freezer, or cooler with a tight seal.

### 3.1.1.5 Hydrogen Sulfide





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## HEALTH AND SAFETY PLAN

Hydrogen sulfide (H<sub>2</sub>S) is a colorless gas known for its pungent odor (often referred to as a “rotten egg” odor) at low concentrations. It is a highly flammable and toxic substance associated with oil and gas refining, mining, tanning, pulp and paper processing, and rayon manufacturing. It can also occur naturally in sewers, well water, oil and gas wells, manure pits, and volcanoes. Hydrogen sulfide is heavier than air so it settles in low-lying enclosed areas such as manholes, sewers, and underground telephone vaults. Another characteristic of hydrogen sulfide is that it fatigues a worker’s sense of smell so it cannot be relied upon in determining the continuous presence of H<sub>2</sub>S gas. Health effects depend upon the exposure concentration and include, but are not limited to: irritation of eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (tears), photophobia (intolerance to light), corneal vesiculation; dizziness, headache, weakness, exhaustion, irritability, insomnia; gastrointestinal disturbance; as a liquid: frostbite.

*Control Measures:* Air monitor site conditions to ensure assigned action limits are not triggered. Wear personal monitoring badges for H<sub>2</sub>S within the breathing zone. Where applicable, rely upon stationary monitoring devices and when alarms are triggered, evacuate the area upwind immediately. Use escape only respiratory protection when issued by PPM and/or the client facility.

### 3.1.2 Oxidizers

#### 3.1.2.1 Nano Xothermal Technology (NXT)

NXT is process used to treat chemical contamination. It is a system comprised of two compounds: Klozur® (sodium persulfate) and dry caustic potash (potassium hydroxide). This material can either be injected into the subsurface or can be placed inside open excavations as part of in-situ remediation. This material is a white solid with a pH range that is undetermined but anticipated to be on the caustic side. Symptoms of exposure include: skin, eye and respiratory irritation, itching, redness and burning; can cause permanent eye damage.

*Control Measures:* When in powder form, this material is to be treated as a nuisance dust. Avoid creating dusty environments during the mixing process. When dealing with unknown dust concentrations, wear air-purifying respirator with P-100 HEPA filter until product becomes slurry mixture. Wear nitrile, neoprene or rubber gloves for hand protection and safety glasses or goggles for eye protection. Avoid storing oxidizers near combustible materials, other strong oxidizers (including ozone), acids, heavy metals, etc. (see safety data sheet for complete list of incompatibles).

#### 3.1.2.2 Oxygen Release Compound® (ORC) and ORC Advanced®

ORC® and ORC Advanced® are forms of enhanced aerobic bioremediation which supplies oxygen to accelerate the biodegradation of soil and groundwater contaminants. Both materials are a white powder that gets mixed with water and injected in subsurface soils. Once mixed, these materials have a pH of 10 [ORC] and 11-13 [ORC Advanced], making them a significant skin and eye irritant. Symptoms of exposure include: cough, sore throat, nose bleeds (extended exposures), eye watering and redness, eye lesions (extended exposures), nausea and vomiting if ingested and skin irritation.

*Control Measures:* When in powder form, this material is to be treated as a nuisance dust. Avoid creating dusty environments during the mixing process. When dealing with unknown dust concentrations, wear air-purifying respirator with P-100 HEPA filter until product becomes slurry mixture. Wear nitrile, neoprene or rubber gloves for hand protection and safety glasses or goggles for eye protection. Avoid storing oxidizers near combustible materials, other strong oxidizers, strong acids or other strong chemical agents. etc. (see safety data sheet for complete list of incompatibles).



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

### 3.1.2.3 Ozone

Ozone is a pale, blue gas with a distinctive odor similar to that of chlorine bleach and can be smelled at relatively low concentrations. It is a powerful oxidizer injected into subsurface soils for the treatment of contaminants such as MTBE, BTEX, hydrocarbons – aliphatic and polyaromatic, diesel fuel, chlorinated solvents, VOCs, and pesticides. Symptoms of exposure include: dryness of mouth, coughing, irritation to nose, throat and chest; difficult breathing, headache, and fatigue; eye irritation causing pain, lacrimation (tears) and inflammation.

*Control Measures:* Because ozone is injected into subsurface soils, worker exposures will likely result from a release at the monitoring wellhead, sparge point or other similar avenues that will lead the substance to ground surface. Workers must consistently air monitor sparge points and monitoring wells for evidence of ozone leakage. Collections must occur at the wellhead (source) as well as within the breathing zone of the worker. Ozone rapidly converts into O<sub>2</sub>, CO<sub>2</sub> and other less toxic molecules but exposure limits can be triggered at the wellhead so workers must keep face away from the source while collecting the sample until it can be confirmed that the sample is acceptable for worker exposure.

Although this system has built-in safety features which shut down the system if a leak is detected, sometimes ozone concentrations can build up inside the mobile ozone trailer. Workers should use caution when opening door and should keep door open while in use to allow for ventilation.

### 3.1.2.4 RegenOx A and B™

RegenOx™ is an oxidizing compound comprised of two parts (A and B) that is injected into subsurface soils as part of in-situ remediation. Part A is a white, odorless powder with a pH of 10.5 and is the oxidizer/catalyst component of this mixture. Part B is a blue/green, odorless liquid with a pH of 11 and is the activator complex. Both parts are mixed together prior to subsurface injection. The mixing of these materials is a relatively safe process but exposures can result in skin, eye, respiratory and gastrointestinal irritations. Symptoms include: coughing, shortness of breath, irritation to mucous membranes, nose and throat; skin and eye itching/redness; vomiting and diarrhea associated with ingestion [Part A] and irritation to mouth, esophagus and stomach [Part B].

*Control Measures:* When mixing materials, wear protective clothing such as neoprene, rubber or PVC gloves for hand protection and goggles or face-shield for eye protection. Avoid storing oxidizers near combustible materials, other strong oxidizers, acids, bases, salts of heavy metals, reducing agents, etc. (see safety data sheet for complete list of incompatibles).

### 3.1.2.5 Hydrogen Peroxide (30-50%)

Hydrogen peroxide is a colorless liquid with a slightly sharp odor. It is a powerful oxidizer injected into subsurface soils, in conjunction with ozone, for the treatment of contaminants such as MTBE, BTEX, hydrocarbons – aliphatic and polyaromatic, diesel fuel, chlorinated solvents, VOCs, and pesticides. It is generally noncombustible, but upon contact with a combustible material, may result in spontaneous combustion. Direct contact may result in severe skin and eye damage. Symptoms of exposure include: irritation of eyes, nose, and throat; corneal ulcer; burning and redness of skin; and bleaching of hair.

**Control Measures:** Because hydrogen peroxide is injected into subsurface soils, worker exposures will likely result from a release at the monitoring wellhead, sparge point or other similar avenues that will lead the substance to ground surface. Therefore, workers must routinely air monitor around sparge points and monitoring wells for evidence of leakage. Collections must occur at the wellhead (source) as well as within the breathing zone of the worker. Hydrogen peroxide is injected into the subsurface via tubing from storage containers of liquid hydrogen peroxide so workers may have direct contact with these storage containers during initial setup and when replacing empty containers with new containers. Wear face shields, elbow-length gloves, and aprons as necessary to prevent direct contact with substance, and workers must keep face away from the source while collecting ambient air samples to avoid potential inhalation exposures and splash hazards.

### 3.1.3 Particulates and Fibers

Particulates are commonly referred as particulate matter and consist of pieces of solid matter suspended in a gas or liquid. Particulate matter can occur naturally or be man-made. Fibers consist of continuous filaments or elongated pieces like those similar to thread. Fibers are used to produce various materials such as paper, rope, and clothing. The common types of particulates and fibers encountered by personnel are outlined in the following sections.

#### 3.1.3.1 Aluminum Oxide

Aluminum oxide is a byproduct generated by ozone remediation systems. Condensation forms on aluminum metal parts which when combined with oxygen creates a white, odorless, crystalline powder scale which can build up on metal parts of the system and presents a potential contact, inhalation, and/or ingestion exposure to workers. Aluminum oxide is a noncombustible solid, is not considered carcinogenic, and may include symptoms such as irritation of eyes, skin, and respiratory system.

**Control Measures:** To eliminate contact exposures, workers must wear chemical-resistant gloves and aprons to remove powder scale buildup from aluminum piping during routine system maintenance. Workers should avoid creating dust buildup of this substance, and when this cannot otherwise be avoided, workers must upgrade to respiratory equipment with P-100 filter to prevent inhalation of this material.

#### 3.1.3.2 Asbestos

Asbestos is a naturally-occurring fibrous material used in many products due to its attractive features. Asbestos has tensile strength, can easily be woven, and is heat and chemical resistant. It is most commonly found in roofing shingles, floor and ceiling tiles, textiles, coatings, paper and cement products, piping insulation and friction products such as automobile clutch, brake and transmission parts. The three most common forms of asbestos include:

- § **Amosite.** Also called brown asbestos. Amphibole fiber formation (straight, needle-like fibers). Originated in Africa and used industrially as a fire retardant in thermal insulation, used in cement sheeting and is also found in ceiling tiles.



- § **Chrysotile.** Also called white asbestos. Serpentine fiber formation (curled fibers). Is less friable (less-likely to be inhaled) than other types of asbestos and therefore viewed by many to be the safest type of the asbestos, which is why it is the most common form of asbestos used in the U.S. mostly in the form of building materials.
- § **Crocidolite.** Also called blue asbestos. Amphibole fiber formation (straight, needle-like fibers). Originated in South Africa and Australia and used for thermal and chemical insulation as well as construction piping and water casings. Is considered to be the most dangerous type of asbestos.



When asbestos is disturbed through repairs, remodeling or demolition, airborne fibers can be inhaled by workers causing respiratory diseases such as lung cancer, asbestosis and mesothelioma – all of which have a latency period between exposure and onset of symptoms. These respiratory diseases are chronic in nature and generally irreversible. Smokers are more susceptible to the damaging health effects of asbestos exposures. Symptoms of asbestos exposure include: shortness of breath, difficult breathing or swallowing, persistent coughing that progressively worsens, wheezing and hoarseness, coughing up blood, pain or tightening in the chest, swelling of face or neck, loss of appetite, weight loss, fatigue or anemia.

Control Measures: Asbestos-containing areas must be identified by signs, which will likely be found when working at larger industrial and commercial facilities. In these cases, workers must avoid these areas and take all necessary precautions to prevent disturbing any materials within these areas. In most cases, potential asbestos exposures will be in the form of sample collection as part of environmental site assessments performed on commercial properties. Personnel must be certified asbestos inspectors to perform these collections. In some cases, demolition of structures potentially containing asbestos materials may be supervised. At a minimum, the designated PPM-representative must be asbestos certified; however, the demolition and air monitoring requirements will be subcontracted to an appropriately state-certified contractor.

Because the sample collection process disturbs asbestos-containing materials (ACM) or potential asbestos-containing materials (PACM), workers must wear air-purifying respiratory protection in the form of half-mask respirator with P-100 high efficiency particulate air (HEPA) filters and must also wet the sample area with a soap-water mixture to reduce the dispersion of fibers. *Note: asbestos-containing materials will be presumed until otherwise verified through laboratory analysis. Buildings constructed prior to the 1980s have a greater likelihood of containing asbestos. PACMs must be treated as if they contain asbestos, and the greatest level of control should be used when collecting samples.*

### 3.1.3.3 Heavy Metals

Numerous heavy metals bind naturally to soils; therefore, dusty environments can introduce these hazards to workers. Heavy metals are poisonous to humans and can cause severe health effects due to their proven or suspected carcinogenic characteristics. Common heavy metals encountered through company-related processes include:

- § **Aluminum.** A silvery-white, malleable, ductile, and odorless solid (metal); combustible as a solid (although takes effort), but easily ignitable when in fine dust form which can cause explosions; can cause damage to the eyes, skin and respiratory system; symptoms include: skin, eye and respiratory irritation.
- § **Arsenic.** A silver-gray or tin-white metal commonly associated with under-ground storage tanks; noncombustible in solid form but presents slight explosion hazard in dust form when exposed to flame; is considered potential lung and lymphatic system carcinogen and can also affect liver, kidneys and skin through inhalation, skin absorption, skin/eye contact and ingestion exposures; symptoms include: respiratory irritations such as ulceration of nasal septum, dermatitis, gastrointestinal disturbances, hyperpigmentation (darkening) of the skin, and peripheral neuropathy (problem with nerves that carry information to and from the brain and spinal cord which can result in pain, loss of sensation and inability to control muscles).
- § **Barium.** A silvery-white metal that exists naturally in the environment; because it is very reactive in its natural state, it is often combined with other elements such as oxygen, carbon and sulfur; it has many uses, but one likely exposure source is that it is used by the oil and gas industry to make drilling mud, which lubricates the drill and simplifies the process when drilling through rock; barium in its natural state is highly flammable and reacts violently with water; may cause irritation of skin, eye, nose, throat and upper respiratory tract, allergic reactions, and central nervous system damage; symptoms include: corneal damage including blindness, poisoning, dermatitis, and skin, eye and throat burns.
- § **Cadmium.** A soft, bluish-white metal commonly associated with underground storage tanks; noncombustible in solid form but will burn in powder form; is considered potential prostate and lung carcinogen and can also affect respiratory system, kidneys and blood through inhalation and ingestion exposures; symptoms include: pulmonary edema (fluid in air sacs of lungs) which causes difficult breathing, cough, chest tightness, substernal pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, loss of smell, emphysema, proteinuria (protein in urine), and mild anemia.
- § **Chromium.** A hard, steel-gray metal commonly associated with underground storage tanks; noncombustible in solid form but finely dispersed dust particles will rapidly burn when exposed to a flame; chromium is not considered a likely carcinogen, but does affect skin, eyes and respiratory system through inhalation, ingestion and contact exposures; symptoms include: skin and eye irritation and lung fibrosis (scarring of the lungs).
- § **Copper.** A soft, malleable reddish-orange metal commonly associated with underground storage tanks; noncombustible in solid form but may ignite when in powder form; copper is not considered a likely carcinogen, but does affect skin, eyes, respiratory system, liver and kidneys through inhalation, ingestion and contact exposures; symptoms include: skin, eye and pharynx irritation, nasal septum perforation, metallic taste, and dermatitis.
- § **Iron.** A lustrous metal with a grayish tinge commonly used in industry in the construction of machinery, tools, automobiles, ships and building components; it is the most commonly used of all metals and can also be found in numerous dietary sources; elevated iron in the blood can react with peroxides to produce free radicals that can damage DNA, proteins, lipids and other cellular components; upon exposure, iron can cause skin, eye, mucous and respiratory irritations; it is also flammable as a fine dust.

- § **Lead.** A soft, gray metal commonly associated with underground storage tanks, paints and coatings; noncombustible in solid form; lead is not considered a likely carcinogen, but does affect eyes, gastrointestinal tract, central nervous system, kidneys, blood and gingival tissue (soft tissue of the mouth surrounding the teeth) through inhalation, ingestion and contact exposures; symptoms include: eye irritation, weakness, exhaustion, insomnia, facial pallor (paleness), weight loss/anorexia, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis of wrist and ankles, encephalopathy (various brain disorders), kidney disease, and hypertension.
- § **Magnesium.** A strong, silvery-white, light-weight metal that exists naturally in the environment; because it is very reactive in its natural state, it is often combined with other elements to form magnesium oxide, various salts, and other industrially-important compounds; magnesium is the third most commonly used metal; because it is light-weight, it is widely used in manufacturing numerous electronics; upon exposure, magnesium can cause skin and eye irritations; it is also flammable as a fine dust.
- § **Mercury.** A silver-white, liquid metal associated with underground storage tanks, batteries, fluorescent bulbs, thermometers and thermostats; noncombustible liquid; mercury is not considered a likely carcinogen but does affect skin, eyes, respiratory system, central nervous system and kidneys through inhalation, skin absorption, ingestion and contact exposures; symptoms include: skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumonia (lung inflammation), tremor, insomnia, irritability, indecision, headache, weakness, exhaustion, stomatitis (inflammation of lining within the mouth), salivation, gastrointestinal disturbance, weight loss/anorexia, and proteinuria (protein in urine).
- § **Selenium.** Crystalline, red to gray solid that is considered to be combustible when in fine dust form; elemental selenium is rare – it is most commonly produced as a byproduct of refining copper or producing sulfuric acid; selenium can cause damage to the skin, eyes, respiratory system, liver, kidneys, blood and spleen; symptoms include: skin, eye, nose, and throat irritations, visual disturbance, headache, chills, fever, difficulty breathing, bronchitis, metallic taste, garlic breath, gastrointestinal disturbance, dermatitis, and skin and eye burns.
- § **Silver.** A white, lustrous metal that is noncombustible in solid form but can become flammable when in dust form. Silver can cause damage to the nasal septum, skin and eyes. Symptoms include: blue-gray eyes, nasal septum, throat and skin, ulceration of skin, and gastrointestinal disturbance.
- § **Zinc.** A bluish-white metal commonly associated with underground storage tanks and used as an anti-corrosion agent; zinc is commonly found in common cold lozenges and over-the-counter cold remedies, as a dietary supplement and also within common foods such as beans, nuts, whole grains and pumpkin/sunflower seeds; zinc is commonly considered non-toxic but in abundance can result in gastrointestinal irritation through ingestion exposures; symptoms include: loss of appetite, nausea, vomiting, stomach cramps, diarrhea and headaches.

***Control Measures:*** Soils should be wet and kept moist to reduce the amount of airborne dust concentrations generated. Providing sufficient ventilation, wearing safety glasses with side-shield protection and wearing dust masks or respiratory equipment with P100 filter are other alternatives for working in dusty environments. Most PPM jobsites can be mitigated using wet methods only. Workers should use additional precautions when using both wet methods and power tools or corded equipment to avoid electrical shock.

#### 3.1.3.4 Nuisance and Concrete Dust



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Dust generation is a common occurrence when working with contaminated soils and when mixing or dismantling concrete. In most cases, activities that result in dust accumulation are subcontracted making them more susceptible to these respiratory hazards than PPM personnel. Generally, dust accumulation is minimal, but the SSO must ensure that subcontractors are using effective controls to minimize dust accumulation, and that they are also equipped and wearing the appropriate protective equipment when performing these tasks. Contaminants associated with common job-related dusty environments include:

- § **Total and respirable dust.** Dust found in the air that can cause breathing difficulties if inhaled. OSHA has established permissible exposure limits (PELs) for both total and respirable dusts to regulate worker exposures. Respirable dust is defined as dust particles less than 10 micrometers in diameter, which is too small to be visible. Symptoms of exposure can include coughing, wheezing and breathing difficulties.
- § **Concrete dust.** Commonly generated through core drilling and jack-hammering through concrete. Also, small areas of concrete can be replaced by workers who may generate dusts from bags of cement as part of the mixing process. Trace amounts of crystalline silica, alkaline compounds and hexavalent chromium are found within cement. OSHA has established PELs for Portland cement to regulate worker exposures. Symptoms of exposure can include coughing, wheezing, eye irritations and in severe cases silicosis. Wet cement can also cause skin burns so workers should wear goggles and aprons or long-sleeved clothing when mixing cement.

Control Measures: Soils should be wet and kept moist to reduce the amount of airborne dust concentrations generated. Providing sufficient ventilation, wearing safety glasses with side-shield protection and wearing dust masks or respiratory equipment with P100 filter are other alternatives for working in dusty environments. Most PPM jobsites can be mitigated using wet methods only. Workers should use additional precautions when using both wet methods and power tools or corded equipment to avoid electrical shock.

### 3.1.4 Volatile and Semi-Volatile Organic Compounds

Volatile organic compounds (VOCs) are a broad group of materials that have the ability to vaporize (change from a solid or liquid into a gas) with an increase in ambient temperature. Some example VOCs include: paints and lacquers, paint thinners, pesticides, solvents and degreasers, glues/adhesives and petroleum fuels. Semi-volatile organic compounds (SVOCs) include phenols and polycyclic aromatic hydrocarbons (PAHs), which have a higher boiling point than water and may vaporize with an increase in ambient temperature. VOC/SVOCs are not known for acute toxicity but have significant chronic health effects because concentrations are often low and symptoms are slow to develop, which is why several VOC/SVOCs are suspected or known carcinogens. Common VOC/SVOCs are outlined in the following sections.

#### 3.1.4.1 Chlorinated Compounds

A chlorinated solvent is a type of organochlorine, which is an organic compound (contains carbon) that also contains chlorine. They are found in a variety of products and used as part of the dry cleaning process due to its ability to dissolve materials such as fats and greases. Workers are most likely to be exposed to these chemicals as part of soil and groundwater assessment and remediation associated with dry cleaning contaminants. Chlorinated solvents can be environmentally persistent and tend to evaporate easily making inhalation the primary route of worker exposure. However, workers may additionally be exposed to chlorinated solvents through ingestion, absorption and skin/eye contact. Common chlorinated solvents encountered through company-related processes include:

- § **Carbon tetrachloride.** A noncombustible, colorless liquid with ether-like odor; considered a potential carcinogen with damaging effects to the central nervous system, eyes, lungs, liver, kidneys, and skin; symptoms include: skin and eye irritation, central nervous system depression, nausea, vomiting, drowsiness, dizziness, and incoordination.
- § **Chloroform.** A noncombustible, colorless liquid with pleasant odor; considered a potential carcinogen with damaging effects to the liver, kidneys, heart, eyes, skin, and central nervous system; symptoms include: skin and eye irritation, dizziness, mental dullness, nausea, confusion, headache, weakness, exhaustion, anesthesia, and enlarged liver.
- § **Methylene chloride.** A combustible, colorless liquid with chloroform-like odor; considered a potential carcinogen with damaging effects to the eyes, skin, cardiovascular system, and central nervous system; symptoms include: skin and eye irritation, weakness, exhaustion, drowsiness, dizziness, numb and tingling limbs, and nausea.
- § **Perchloroethylene (Tetrachloroethylene).** A noncombustible, colorless liquid with mild chloroform-like odor; when in a fire, it decomposes to hydrogen chloride and phosgene; considered a potential carcinogen with damaging effects to the eyes, skin, respiratory system, liver, kidneys and central nervous system; symptoms include: skin, eye, nose, throat and respiratory irritation, nausea, flushed face and neck, dizziness, incoordination, headache, drowsiness, skin redness, and liver damage.
- § **Trichloroethylene.** A combustible, colorless liquid with chloroform-like odor; will burn when exposed to flame, but is difficult to burn; considered a potential carcinogen with damaging effects to the eyes, skin, respiratory system, heart, liver, kidneys, and central nervous system; symptoms include: skin and eye irritation, headache, visual disturbance, weakness, exhaustion, dizziness, tremor, drowsiness, nausea, vomiting, dermatitis, cardiac arrhythmias, parasthesia (tingling or numbness of the skin), and liver injury.
- § **Vinyl chloride.** A combustible, colorless gas or liquid (below 7° F) with pleasant odor at high concentrations; considered a potential carcinogen with damaging effects to the liver, central nervous system, blood, respiratory system, and lymphatic system; symptoms include: weakness, exhaustion, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities, and frostbite (as a liquid).

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

#### 3.1.4.2 Isopropyl Alcohol

After bailers and reusable sampling equipment is decontaminated withalconox® solution, it is then sprayed with isopropyl alcohol. Also referred to as isopropanol, isopropyl alcohol is a colorless, flammable liquid commonly known as rubbing alcohol. It is considered a skin, eye and respiratory system irritant that causes damage through inhalation, ingestion and skin/eye contact exposures. Symptoms of overexposure include: irritation of eyes, nose and throat, drowsiness, dizziness, headache and dry, cracking skin.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of





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concentrations) or upgrade protective equipment. Increase frequency of air monitoring if action limits are triggered and remove or isolate all ignition sources if flammability limits are triggered. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations.

### 3.1.4.3 Methyl-Tertiary Butyl Ether (MTBE)

MTBE is a colorless, flammable liquid with an ether-like odor used as a fuel additive to reduce emission gases such as ozone and carbon monoxide. At one point gasoline could consist of as much as 10-15% MTBE but has since been replaced with ethanol and other additions less harmful to humans and the environment. MTBE poses a concern because it is considered a potential human carcinogen, can easily travel through soils, and is very soluble in water creating larger contaminant plumes than other gasoline constituents. It is also more resistant to biodegradation making it more environmentally persistent. MTBE is considered a skin, eye, respiratory and central nervous system irritant with symptoms that include: skin, eye and mucous membrane irritation, dizziness, nausea, headache, intoxication, loss of balance and coordination, unconsciousness, coma, respiratory failure and death.

*Control Measures:* Avoid prolonged exposures to oil mist, liquid or vapor. Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations.

### 3.1.4.4 Organic Hydrocarbons

Total petroleum hydrocarbon (TPH) is a broadly used term referring to a large family of compounds that originate from crude oil. Crude oil is a naturally-occurring, flammable liquid comprised of a complex mixture of various hydrocarbons. It is recovered through oil drilling, but can be refined and separated into other substances such as gasoline, kerosene, diesel and lubricating oils. TPH is generally comprised of hydrogen and carbon; hence the term "hydrocarbon". Because there are so many different mixtures, TPH is divided into groups or fractions, and each fraction consists of hydrocarbons that exhibit similar soil and groundwater traits. Fractioning TPH is beneficial in the risk assessment process because certain fractions may be eliminated as contaminants of concern. Common petroleum-based chemicals encountered through company-related processes include:

- § **Gasoline.** Gasoline is extracted from crude oil through a distillation process. It is comprised primarily of aliphatic hydrocarbons, but also includes some aromatic hydrocarbons such as benzene and toluene to increase octane ratings. Additional additives such as tetraethyl lead and methyl-tertiary butyl ether (MTBE) were added to gasoline to enhance performance and reduce harmful carbon monoxide exhaust emissions and reduce smog. Due its harmful effects to human health and the environment, neither additive is currently used and has been replaced instead with alcohols such as ethanol or methanol.

Gasoline is used primarily as a fuel source but can also be used as a solvent. Components of gasoline are considered to be carcinogenic, and because gasoline is highly volatile, inhalation of vapors is always a concern for workers. Gasoline is also a skin and eye irritant, its vapors are highly flammable, and it is a major source of pollution gas (i.e., 1 U.S. gallon of gasoline produces 19.4 pounds of carbon dioxide, a greenhouse gas). Gasoline is comprised of the following four constituents:

- Benzene – a colorless, flammable liquid with a sweet odor; makes up on average 0.62% to 1% of gasoline; is considered a known carcinogen with damaging effects to skin, eyes, respiratory system, blood, central nervous system and bone marrow, which can result in anemia (decreased red blood cell count making one weak and tired), decreased white blood cell count (difficult to fight off infections), and low blood platelet count (excessive bleeding); benzene causes damage through inhalation, skin absorption, ingestion and contact exposures; symptoms include: drowsiness, dizziness, headaches, confusion, tremors, skin/eye irritations, redness and blistering of the skin, vomiting, stomach irritation, convulsions, rapid heart rate, unconsciousness, leukemia (long-term) and death (large doses).
- Toluene – a colorless, flammable liquid with benzene-like odor (smells like paint thinner); can produce damaging effects to skin, eyes, respiratory and central nervous systems, liver and kidneys; toluene causes damage through inhalation, skin absorption, ingestion, and contact exposures; symptoms include: eye and nose irritation, weakness, exhaustion, confusion, euphoria, dizziness, headaches, dilated pupils, lacrimation (tears), anxiety, muscle fatigue, insomnia, parathesia (tingling or numbness of the skin), dermatitis, and liver/kidney damage.
- Ethylbenzene – a colorless, flammable liquid with aromatic odor (smells like gasoline); is considered a potential human carcinogen that can produce damaging effects to skin, eyes, respiratory and central nervous systems; ethylbenzene causes damage through inhalation, skin/eye contact and ingestion exposures; symptoms include: irritation of the eyes, skin and mucuous membranes, headaches, dizziness, dermatitis, narcosis (unconsciousness) and coma.
- Xylene – colorless, flammable liquid with sweet, balsam-like odor; is a mixture of ortho-, meta- and para-xylene isomers that releases carbon monoxide gas when burned; can produce damaging effects to skin, eyes, respiratory and central nervous systems, gastrointestinal tract, blood, liver and kidneys; xylene causes damage through inhalation, skin absorption, ingestion and skin/eye contact exposures; symptoms include: irritation of skin, eyes, nose and throat, dizziness, excitement, drowsiness, incoordination, staggering gait, corneal vacuolization, anorexia, nausea, vomiting, abdominal pain and dermatitis.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Increase frequency of air monitoring once action limits are triggered to ensure that all ignition sources are removed or isolated when flammability limits are triggered.

- § **Kerosene.** Kerosene is a source of fuel refined from crude oil that is heavier than gasoline but lighter than diesel. It is a colorless to yellowish oily liquid used in households as a lamp oil and used industrially as jet fuel for aircraft and rocket engines. Kerosene has a strong odor, is highly flammable, and causes damage to the eyes, skin, respiratory system, and central nervous system. Workers may be exposed to liquid kerosene and its vapors through inhalation, ingestion, skin and/or eye contact. Symptoms include: irritation of eyes, skin, nose and throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination,

confusion, drowsiness; vomiting, diarrhea; dermatitis; and chemical pneumonitis (aspiration liquid). Kerosene is commonly referred to as paraffin in other countries.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Increase frequency of air monitoring once action limits are triggered to ensure that all ignition sources are removed or isolated when flammability limits are triggered.

§ **Diesel/polycyclic aromatic hydrocarbons (PAHs).** Diesel is a source of fuel refined from crude oil and used in diesel trucks, boats, school and city buses, trains, cranes, farming equipment, emergency response vehicles and power generators. Diesel is an attractive fuel source because it is less volatile and emits smaller amounts of greenhouse gases (CO and CO<sub>2</sub>); however, during combustion it does release large amounts of soot which can lead to acid rain, smog and poor health conditions. PAHs are found in crude oil and soot and are also a by-product of petroleum processing or combustion, specifically the incomplete burning of oil and gas. Common PAH constituents include: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h) anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene. The regulated PAH constituents are outlined below:

- Coal tar pitch volatiles - PAH components anthracene, benzo(a)pyrene, chrysene, phenanthrene, and pyrene, all of which have the same chemical description, target organs, and regulatory threshold limits are not addressed by NIOSH as individual components. Instead, they are classified and regulated as coal tar pitch volatiles. Coal tar pitch volatiles may vary slightly but are described as combustible, black or brown amorphous residues and are considered a potential human carcinogen with damaging effects to respiratory system, skin, bladder, and kidneys. Symptoms include: dermatitis and bronchitis.
- Naphthalene – Naphthalene is a combustible, colorless to brown solid with an odor or mothballs that causes damaging effects to eyes, skin, blood, liver, kidneys, and central nervous system. Symptoms include: eye irritation, headache, confusion, excitement, discomfort, nausea, vomiting, abdominal pain, bladder irritation, profuse sweating, jaundice, blood in urine, renal failure, dermatitis, optic and cornea damage.

Control Measures: Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Increase frequency of air monitoring once action limits are triggered to ensure that all ignition sources are removed or isolated when flammability limits are triggered.

§ **Hydraulic and lubrication oils.** Oils used for internal combustion engines to lubricate moving parts, prevent corrosion and to cool the engine. Lubricating oils are made from crude oil but also include additives to improve certain properties. Lubricating oils can be highly flammable and can cause irritation of nose, throat and lungs, headaches, dizziness, nausea, vomiting and diarrhea.

Control Measures: Avoid prolonged exposures to oil mist, liquid or vapor. Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report

any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment. Thoroughly wash exposed skin and hands upon completion of handling to avoid skin/eye irritations.

### 3.1.4.5 Pesticides

A pesticide is another type of organochlorine commonly used for crop dusting agricultural farmland not only to kill insects, rodents and germs, but is also used for weed and mildew control. The term "pesticide" includes a broad category of chemicals that can be further broken down into insecticides, rodenticides and fungicides. Some older and more recently banned pesticides (such as DDT) tend to be environmentally persistent. Workers are potentially exposed to pesticides as part of the assessment or remediation of impacted farmland as well as commercial pesticide manufacturing and/or storage facilities. Similarly to chlorinated solvents, pesticides can be volatile making inhalation the primary route of worker exposures. However, workers may additionally be exposed to pesticides through ingestion, absorption and skin/eye contact. There are numerous pesticides tested as part of assessment and remediation of impacted sites; however, the following pesticides are OSHA-regulated materials that pose a potential health risk to workers:

- § **Aldrin.** A noncombustible, colorless to dark-brown crystalline solid with mild chemical odor; may dissolve in flammable liquids; formerly used as an insecticide and is considered a potential carcinogen with damaging effects to the central nervous system, kidneys, liver, and skin; symptoms include: headache, dizziness, nausea, vomiting, vague feeling of discomfort, jerking of limbs, convulsions, coma, hematuria (blood in urine), and azotemia (blood containing high levels of urea, creatinine and other nitrogen-rich compounds).
- § **Dichlorodiphenyltrichloroethane (DDT).** A combustible, colorless crystals or off-white powder with a slight aromatic odor; considered a potential carcinogen with damaging effects to the eyes, skin, central nervous system, liver, kidneys, and peripheral nervous system; symptoms include: skin and eye irritation, tingling and numbness of tongue, lips and face, tremor, anxiety, dizziness, confusion, vague feeling of discomfort, headache, weakness, exhaustion, convulsions, partial loss or impaired movement of hands, and vomiting.
- § **Dieldrin.** A noncombustible, colorless to light-tan crystals with a mild chemical odor; used as an insecticide and is considered a potential carcinogen with damaging effects to the central nervous system, liver, kidneys, and skin; symptoms include: headache, dizziness, nausea, vomiting, vague feeling of discomfort, sweating, jerking of limbs, convulsions, and coma.
- § **Endrin.** A noncombustible, colorless to tan, crystalline solid with a mild chemical odor; may dissolve in flammable liquids; used as an insecticide with damaging effects to the central nervous system and liver; symptoms include: epileptic-like convulsions, stupor, headache, dizziness, abdominal discomfort, nausea, vomiting, anorexia, insomnia, aggressiveness, confusion, drowsiness, weakness, and exhaustion.
- § **Heptachlor.** A noncombustible, white to light-tan crystals with a camphor-like odor; may dissolve in flammable liquids; used as an insecticide and is considered a potential carcinogen with damaging effects to the central nervous system and liver; symptoms provided for animals only and include: tremor, convulsions, and liver damage.
- § **Lindane.** A noncombustible, white to yellow crystalline powder with slight, musty odor; may dissolve in flammable liquids; causes damaging effects to skin, eyes, respiratory system, central nervous system, blood, liver, and kidneys; symptoms include: skin, eye,



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nose and throat irritation, headache, nausea, convulsions, respiratory difficulty, cyanosis, aplastic anemia, and muscle spasm.

*Control Measures:* Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

### 3.1.4.6 Polychlorinated Biphenyls (PCB)

Polychlorinated biphenyls (PCBs) are a mixture of numerous chlorinated compounds and are commercially sold under the trade name Aroclor® 1242 (contains 42% Cl<sup>-</sup>) and Aroclor® 1254 (contains 54% Cl<sup>-</sup>). It is a colorless to light-yellow, oily solid or liquid with no known taste or smell and can volatilize to a vapor with a slight increase in temperature. PCBs were used as coolants and lubricants in transformers, capacitors and electrical equipment because they do not burn easily and are good insulators. Production in the U.S. was discontinued in 1977 due to its environmental persistence and damaging health effects. PCBs do not easily break down, bind strongly to soil, accumulate in fish and marine life, and can travel far distances in air.

Workers are likely to be exposed to PCBs through damaged or burning transformers, known/suspected site contamination, or ingestion of contaminated fish. PCBs can also be found in pre-1977 fluorescent light fixtures, electrical devices (TVs and appliances), and hydraulic oils. Worker exposures are likely to occur through inhalation, absorption, ingestion and contact causing damaging effects to the skin, eyes, liver and reproductive system. Symptoms include: eye irritation, chloracne (acne-like skin condition in adults), liver damage, and reproductive effects.

*Control Measures:* Air monitor site conditions to ensure assigned action limits are not triggered. Immediately report any triggered action limit to the safety department and be prepared to temporarily shut down jobsite to incorporate control measures (i.e., stand upwind of concentrations) or upgrade protective equipment.

### 3.1.5 Other/Unknown Chemicals

#### 3.1.5.1 Activated Carbon

Also referred to as activated charcoal, this material comes in various forms but is most often purchased by PPM in granular form (occasionally purchased in pellet form). Activated carbon is a porous material that is effective in the adsorption of gases/vapors and is commonly used as part of the groundwater treatment process. This material is non-toxic but can be irritating to the skin and eyes. Loose granules can also present a slip hazard and dusts can accumulate when replacing spent carbon with unspent carbon.

*Control Measures:* Keep granules inside storage bag or carbon vessel and immediately remove spilled granules from the work area to prevent slipping. Wear appropriate protective clothing such as gloves and safety glasses when working with/near this material to prevent skin and eye contact. Keep dust generation to a minimum using a porta vac and be prepared to wear a dust mask or half mask with P-100 HEPA cartridge when dusts cannot otherwise be mitigated.



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### 3.1.5.2 Alconox®/Liquinox®

Alconox® (powder) and Liquinox® (liquid) are detergents used to decontaminate bailers and equipment to prevent cross-contamination of samples. Detergents generally can be skin or eye irritants that can cause itching, pain, redness or burning.

*Control Measures:* Keep face away from solution when mixing and wear safety glasses with side-shield protection or goggles depending upon the degree of splashing.

### 3.1.5.3 Descaling Agents (Analytix AN-754GH)

Various chemicals may be used to prevent the accumulations of scaling along monitoring well walls. These descalers may vary by office location; however, most of these chemicals exhibit similar characteristics. They are typically acidic in nature and may be extremely corrosive to skin, eyes, and respiratory system.

*Control Measures:* Keep face away from solution when handling and wear safety glasses with side-shield protection or goggles depending upon the degree of splashing. Use safe precautions when handling material and make every effort to avoid direct contact with this material through the use of protective clothing and equipment such as chemical-resistant gloves, goggles and aprons. Avoid inhaling any fumes that may arise from these chemicals.

### 3.1.5.4 Unknown Chemicals and/or Concentrations

Workers do not often come into contact with unknown chemicals and/or chemical concentrations. Although rare, workers may potentially encounter unknowns during drum characterizations as requested by a particular client. When the client cannot identify the material(s) inside a drum or other container, this material(s) is to be treated as an extremely hazardous substance using the highest level of safety precautions including, but not limited to, personal protective clothing/equipment. When working with known chemicals at unknown concentrations, the same level of safety precautions must be implemented to preserve worker safety and wellbeing. These situations are considered an immediately dangerous to life and/or health (IDLH) environment.

*Control Measures:* When this type of work is proposed by a client, it must be presented and approved by Shawn Ivey or Zane Hood, Regional Principals. Due to the increase in safety precautions, a site-specific HASP must be generated by the Health and Safety Director, which may require additional time to prepare. Never open a site drum/container that does not belong to PPM if the contents or concentrations are unknown.

### 3.1.6 Chemical/Physical Properties

The following table outlines the chemical and physical properties associated with the most common volatile or semi-volatile constituents encountered by PPM.

Chemical Name	VP <sup>1</sup>	VD <sup>2</sup>	SG <sup>3</sup>	Sol <sup>4</sup>	FP <sup>5</sup>	LEL <sup>6</sup>	UEL <sup>7</sup>
Diesel	0.009 psia	>1	0.83-0.88	Negligible	125	0.6	7.5
Gasoline	38-300	3-4	0.72-0.76	Insoluble	45	1.4	7.6
Benzene	75	2.8	0.88	<1	12	1.2	7.8
Toluene	21	4	0.87	<1	40	1.1	7.1
Ethylbenzene	7	4	0.87	<1	55	0.8	6.7
Xylene	9	4	0.86	<1	81	1.1	7.0
MTBE	245-256	3.1	0.74	4.8	-17	1.6	8.4
Ozone	>1 atm	1.7	2.14	<1	N/A	N/A	N/A



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- 1 – Vapor Pressure (mmHg) – the higher the VP, the more likely it is to change from a liquid to a vapor with an increase in temperature.
  - 2 – Vapor Density – how heavy the material is in air; anything >1 will sink into worker breathing zone; anything <1 will rise.
  - 3 – Specific Gravity – how heavy the material is in water; anything >1 will sink in water; anything <1 will float on water.
  - 4 – Solubility (%) – how likely the material is to be dissolved in water.
  - 5 – Flash Point (°F) – lowest temp that material vapors will ignite/burn.
  - 6 – Lower Explosive Limit (%) – lowest concentration in which vapors will ignite.
  - 7 – Upper Explosive Limit (%) – highest concentration in which vapors will ignite.
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### 3.2 PHYSICAL HAZARDS AND CONTROLS

#### 3.2.1 Combustion/Flammability

The three elements needed to produce a fire are: combustible material, oxygen, and ignition source (heat). As part of most projects, the presence of gasoline (flammable contaminant) within an outdoor environment (sufficient oxygen content) when combined with the use of heavy equipment (electrical source) provides all three elements necessary to produce a flammable setting. Fires can also be the result of overloading circuitry and improper chemical storage.

Control Measures: Monitor ambient site concentrations to ensure flammable action limits are not triggered. Oxidizers are capable of releasing oxygen and generating heat so store them away from combustible materials. Do not overload power outlets. Remove foot heaters or other electrical devices if they trip ground fault circuit interrupters (GFCI) or produce burnt smell and/or smoke. Use ABC-rated fire extinguisher to extinguish fire or follow company evacuation procedures when warranted.

#### 3.2.2 Contaminated Water/Splash Hazards

Beware of splash hazards posed by purging and/or development of groundwater monitoring wells. Chemical splash hazards may also be encountered during drum sampling of known contaminants. Contaminants are likely to vary; therefore, the chemical hazards section of this plan should be referenced to address the hazards posed by the contaminant.

Control Measures: Workers must wear safety glasses with side-shield protection. Goggles may be necessary depending upon the degree of splashing. Goggles are required when moving containers of or working with severe eye irritants, acids or caustics.

#### 3.2.3 Compressed Gas

Compressed gases such as acetylene and oxygen may be used to operate cutting torches. Cylinders can become projectiles if they are not secured and/or stored properly. Improper handling of cylinders can also result in muscular sprains/strains, falls, bruising, or broken bones. Other hazards may include chemical burns, explosion fire, poisoning, and cold burns due to container mishandling. In addition, utility gas lines are often buried onsite nearby areas where drilling, trenching or other similar surface disturbances are likely to occur. Contact with a subsurface gas line could result in an explosion, fire, and other significant physical bodily injury.

Control Measures: Only qualified workers appropriately trained in compressed gas safety are permitted to work with compressed gases. Keep compressed gas cylinders upright and secured when in storage, transit or use. The valve protection cap must remain in place when not in use and during storage and should only be removed when the cylinder is secured and/or ready for use. Never drag or slide a compressed gas cylinder, drop a cylinder, or subject cylinders to strikes from other objects as this may cause damage to the valves. Store in a climate-controlled environment away from heat sources, heavily traveled paths, and emergency exits and store other combustible materials in a separate location away from compressed gas cylinders. Smoking is prohibited near compressed gases. Keep empty and full cylinders segregated and replace empty cylinders promptly. Restrict unauthorized access to compressed gases and visually inspect containers weekly.

### 3.2.4 Concrete Coring and Cutting

The use of jackhammers and coring equipment is necessary to cut through concrete when conducting subsurface work. The use of this equipment is extremely loud, creates dusty environments and can create projectiles out of broken pieces of concrete.

*Control Measures:* Wet affected areas of concrete to reduce amount of dust generated; however, avoid creating large puddles of water as some equipment being used is corded and can create electrical hazards. If dust continues to be a problem, workers must wear air-purifying respirator with P-100 HEPA filter. Use vacuum-based core drills or secure the base of the core drill to concrete when working on uneven surfaces. Know where the manual shut-off switch is located and if not within reaching distance of worker, someone must be present at electrical outlet to unplug equipment should it be necessary. Operator and any worker required to be within 10 feet of coring/cutting process must wear face shield over safety glasses with side-shield protection to protect against flying particles.

### 3.2.5 Cuts and Lacerations

Acetate liners used for soil collections must be cut to collect the sample. Also, tubing materials used when groundwater sampling or used for air monitoring must be cut in various lengths. Shears or tube cutters are alternatives to using knives or other blades; however, there may be instances in which the use of knives or blades cannot be avoided.

*Control Measures:* Always use sharpened blades as dull blades can require more applied force. Wear leather or Kevlar® gloves to protect hands. Secure the object being cut keeping free hand out of the way and always cut away from the body. If cut must be made towards the body, cut the object at an angle away from the body. Utility knives must have a self-retracting blade and should not be stored in pockets of clothing.

When collecting soil samples, workers should rely upon the subcontractor to cut the sample liners whenever possible. When workers must cut the liners, the following specific instructions are required:

- § Secure the liner to a stable structure (i.e., the truck tailgate or portable table).
- § Use the proper cutting tool for the job (see photo); subcontractors often have this tool.
- § Cut the liner perpendicular to the body – avoid cutting towards the body.



### 3.2.6 Driving Safety

Most company-related field activities occur offsite and require personnel to drive from the office to the jobsite. Collision with another vehicle or into a structure can result in property damage, worker injury or even a fatality.

*Control Measures:* Drivers must have valid state license to drive and must be classified appropriate to the type of vehicle he/she will be required to operate (i.e., vehicles with gross vehicle weight rating [GVWR] >10,000 lbs or any vehicle/trailer combination GVWR >10,000 lbs requires a commercial drivers license). Additional safety precautions for driver safety include, but are not limited to, the following:





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- § Obey all federal and state traffic laws (i.e., speed limits, yielding, etc.)
- § Plan route to site in advance to avoid traffic congestion, construction, road closures, inclement weather or other similar forms of delay
- § Perform pre-use inspection to ensure vehicle is fueled and in good working order
- § Ensure all materials are secured
- § Avoid distractions such as changing radio stations, reading texts or emails, eating, drinking, or other similar functions
- § Pull over to take or make a phone call even when using hands-free devices
- § Texting while driving is strictly prohibited by PPM and is a law in several states
- § Drive defensively - yield to aggressive drivers, slow down when driving through adverse weather conditions or when driving through school zones

### 3.2.7 Drowning

Water bodies where the potential for drowning exists includes: oceans, rivers, lakes, seas, gulfs, bays, ponds, wetlands, bayous, streams or other similar water sources. Work over or near these types of water bodies is rarely encountered, and routine company job tasks do not usually result in the use of a boat. However, when they arise, jobs of this nature do pose a risk of drowning. When sample collections are anticipated to occur from within a boat, this will likely take place in various locations of the water body with varying or unknown depths, currents, floating and subsurface debris, and/or other similar hazards.

Control Measures: Tasks requiring work over or near water where the potential for drowning could occur requires a minimum of two workers. Use a boat with a flat, stable surface to reduce the potential for rollover. In addition, workers must wear a U.S. Coast Guard-approved life preserver at all times when inside the boat or when otherwise performing a task where the potential for drowning still exists. Once over water, movement within the boat should be minimized, and workers must use caution when collecting the sample. Workers must be equipped with buoys or other similar means to extract any individual that should fall into the water.

### 3.2.8 Electrical

#### 3.2.8.1 Subsurface and Overhead Utilities

Typical jobsites will pose both subsurface and overhead utility hazards. Also, remediation systems are electrically operated and pose similar electrical hazards. Contact with power lines or exposed electrical wires can result in electric shock, severe skin burns and electrocution. Electrical wires are generally insulated as a first line of defense; however, tears or damage to the insulated material can directly expose workers to the wire. Other utility lines may be present at common jobsites and include water, sewer, natural gas, telephone and fiber optic. A punctured natural gas line can spontaneously combust and cause a massive explosion. In addition, active retail gas stations contain subsurface product lines running from the tank pit to the dispenser islands and the layout of these lines can often be difficult to determine. Damage to some utilities may not necessarily pose a safety risk but damage to these structures can disrupt normal business functions and be very costly.

Control Measures: Treat all electrical lines and wires as active and avoid contact. Keep all equipment at least 10 feet away from all overhead power lines unless they have been isolated or shielded by the local energy company. Add an additional 0.4 inches to this distance for every 1 kV in excess of 50 kV. Follow all clearance procedures outlined within the company's written Subsurface Clearance program, which includes but is not limited to the following measures:



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### Pre-Work Clearance (Offsite and Onsite Preparations)

- § Request as-built drawings and/or obtain specialized knowledge of subsurface utility/structural locations from the client or property owner
- § Pre-plan borehole locations and visually review with client or property owner
- § Contact state one-call 48-72 hours (state-specific time requirements vary) to mark utility locations prior to field work; make secondary notices if site not marked
- § Contact additional local utility providers that do not subscribe to one-call to mark utility locations prior to field work; make secondary notices if site not marked
- § Hire private utility locators to identify presence of subsurface structures in addition to or in the absence of other clearance methods
- § Perform visual site observations for indicators of subsurface utilities/structures
- § Locate all emergency shut-off devices and isolate the work area
- § Identify and avoid exclusion zones (*any area within 10-foot circumference of UST pit*) or obtain principal approval when there are no other alternatives to avoidance
- § Follow clearance procedures for exclusion zones, critical zones (*any area within 10 feet of furthest edge of any fuel dispenser, product distribution lines, or aboveground electrical utility; entire area between UST pit and dispenser islands; and/or any area within 10 feet of suspected subsurface utilities/structures*), and non-exclusion zones (*any area not otherwise defined as exclusion or critical*).

### Subsurface Clearance Procedures

- § Clear all boreholes horizontally to 110% of the diameter of the widest digging instrument intended for use starting in all four cardinal directions (NSEW) then fully covering the entire circumference of the area
- § Clear all boreholes vertically to minimum 4-foot depth BGS unless greater depths are specified by the Office Manager/Principal
- § Use company-approved clearance methods (for drilling/probing) in order of preference outlined as follows:
  - 1) Blunt-tip push probe
  - 2) Tiered approach – use push probe for vertical clearance, then use digging tools (i.e., hand auger or post-hole diggers) to clear horizontally to same depth previously cleared vertically; then use push probe to further advance vertically; continue until depth-requirement is achieved
  - 3) Hand auger and/or post-hole digger – used only when push probe cannot otherwise be advanced vertically due to soil type(s)
- § Use flat-edge shovel to clear for trenches/excavations when in areas of marked or suspected subsurface utilities/structures; clear area until utility/structure is located; if not located within depth-requirement, proceed with trenching/excavating

#### 3.2.8.2 Electrical Tools and Power Cords

Assorted power tools may be required for certain tasks. Power tools can be battery operated or otherwise have an electrical power cord, which can be plugged into an electrical outlet. Due to this factor, energy can be controlled by plugging or unplugging the cord and does not require energy isolation. The electrical wires are typically insulated; however, kinks or cuts made to the power cord jacket can expose workers to these electrical wires resulting in electric shock or electrocution.

Control Measures: Perform an initial inspection to ensure tools and cords are in good working order and immediately discard or label damaged tools/cords to prevent use until repairs or replacements can be made. Additional safety precautions for electrical protection include, but are not limited to, the following:



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- § Only use electrical outlets and matching cords with grounding wire (3-prong)
- § Never remove grounding prong to accommodate a 2-prong electrical outlet
- § Electrical cords should be rated for hard or extra hard use
- § Insulated jackets should show no evidence of kinks, cuts or tears; any sign of wear (frayed insulation or exposed wires) requires immediate labeling of the cord as "damaged" and must be immediately removed from the work area
- § Avoid placing electrical cords or tools in pools of water or other wet areas
- § All portable or temporary wiring must be protected by GFCI
- § Avoid using tools or cords that trip the GFCI
- § Do not run over cords or place them through doors, windows or other pinch points

### 3.2.8.3 Lockout/Tagout

Remediation systems are electrically-operated systems that may require energy isolation as part of operation, maintenance or repairs. According to 29 CFR 1910.147(a)(2)(ii), energy must be isolated when 1) a worker must remove or by-pass safety guards or devices; or 2) a worker must place a body part at the point of operation or where a danger zone exists in the operating cycle. These requirements do not apply to corded equipment as this power source can be isolated by unplugging the equipment. It also does not apply to other pressurized systems for gas or steam if it can be proven that continuity of service is essential or that shut down of the system is impractical.

Routine operations and maintenance procedures typically do not trigger the requirements for energy isolation. However, it should be noted that during certain system or component repairs, these criteria may be triggered and the locking and tagging of the system and/or its components is necessary to prevent the unintentional startup of the system.

Control Measures: Locking and tagging of the system must be conducted in accordance with company requirements outlined within its written Lockout/Tagout program. An itemized procedure list for system deactivation and reactivation are posted at all remediation systems.

### 3.2.9 Hand and Power Tools

The electrical hazards posed by the use of power tools have previously been addressed. However, other hazards are posed by the use of hand or power tools. Removing or by-passing safety guards can expose a worker to the piercing, cutting, crushing or rotating hazards of mechanical equipment. Improper posture or repetition of hand tools can lead to musculoskeletal disorders as outlined within the previous section.

Control Measures: Use equipment in accordance with manufacturer guidelines and according to its intended purpose. Always select the appropriate tool for the job and refrain from making adjustments. Never remove or bypass safety guards. Perform an initial inspection to ensure tools are in good working order and immediately discard or label damaged tools to prevent use until repairs or replacements can be made. Keep tools stored appropriately to prevent rust or other signs of weathering. Wear appropriate head, eye, hand, and foot protection at all times. Avoid wearing jewelry or loose-fitting protective gloves/clothing that could become entangled in moving parts of the tool.

### 3.2.10 Illumination

Most company-related tasks will be conducted during normal, daylight hours; however, some tasks may be required to be conducted at night. When these instances occur, visibility will be decreased making the jobsite and the task more dangerous. In addition, the overall visibility of workers to drivers, equipment operators, etc. may be decreased.



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**Control Measures:** The National Cooperative Highway Research Program (NCHRP) Report 498: Illumination Guidelines for Nighttime Highway Work outlines a set of guidelines for adequate lighting when working at night. Workers should adhere to these requirements to ensure appropriate visibility during all phases of the project. The three categories outlined by the NCHRP include the following:

- § Level I illuminance is necessary in areas where the work crew is in motion, moving from spot to spot. Required for low accuracy tasks that may involve the use of slow-moving equipment, and where large objects must be visible.
- § Level II illuminance is necessary in areas on or around construction equipment. A higher degree of lighting in this area will provide a safer environment for equipment operators allowing them to perform tasks that require a moderate level of accuracy.
- § Level III illuminance is necessary for tasks that require a higher level of visual acuity or difficulty.

Sample tasks and the illumination requirements for those tasks are outlined below:

SAMPLE TASKS (NOT ALL-INCLUSIVE)	ILLUMINATION LEVELS	AVERAGE MINIMUM MAINTAINED ILLUMINANCE
All work operation areas; setup of lane or road closures, lane closure tapes, and flagging stations	Level I	54 lux (5 foot-candles)
Areas on or around construction equipment; asphalt paving, milling and concrete placement and/or removal	Level II	108 lux (10 foot-candles)
Pavement or structural crack/ pothole filling; joint repair, pavement patching/repairs; installation of signal/electrical/ mechanical equipment	Level III	215 lux (20 foot-candles)

*Note: A foot-candle (fc) is defined as a unit of illumination that is equal to one lumen per square foot, or 10.764 lux.*

Increased lighting can be provided using portable light plant towers, balloon lighting, roadway luminaires mounted on temporary poles, and factory-installed lights on equipment. Workers should select a light source and position it in a manner that reduces the amount of glare. When conducting night tasks on or near road system right-of-ways, workers must additionally adhere to appropriate state DOT roadway and traffic control requirements. Reflective clothing/vests are required when working at night or decreased illumination.

### 3.2.11 Ladder Safety

#### 3.2.11.1 Portable Ladder Safety

Portable ladders are commonly used when replacing spent carbon with inactivated granular carbon or to access stationary aboveground storage tanks for inspections and/or maintenance. Carbon vessels consist of 55-gallon drums or other vessels that commonly range from 8-30 feet in height. It should be noted that carbon vessels can exceed 30 feet but these vessels are not common to current company processes. As part of this change-out process, workers must climb portable ladders at heights greater than 4 feet and they must do so carrying 50-lb sacks of granular carbon or other materials.

**Control Measures:** Falls from ladder use are exempted from the fall protection standards (29 CFR 1926 Subpart M). Instead falls from ladders are outlined within Subpart X of 29 CFR 1926.1053, which does not require the use of personal fall arrest system when working at elevations in excess of 4 feet. Use buddy system when able or check in periodically with the office to relay status. Use a portable A-frame ladder and ensure that it is locked in place. Place ladder on level, compact



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ground surfaces and avoid wet areas. Never place ladder near entrance/exit or other pathway that could interfere with ladder usage. Use ladder for its intended purpose and in accordance with manufacturer's guidelines. Use two hands when ascending or descending. *\*Note: PPM purposely chooses to reference the most stringent safety measures under construction industry standards, while additionally enforcing the more stringent general industry height requirement of 4 feet. This is an overlap of standards but provides the greatest level of worker protection.*

### 3.2.11.2 Fixed Ladder Safety

Fixed ladders may be used at client facilities to access rooftops or other similar elevated walking/working surface. This is often necessary with asbestos and/or lead sample collections, vacuum events, and industrial compliance; specifically air compliance.

*Control Measures:* Falls from ladder use are exempted from the fall protection standards (29 CFR 1926 Subpart M). Instead falls from ladders are outlined within Subpart X of 29 CFR 1926.1053, which does not require the use of personal fall arrest system when working at elevations in excess of 4 feet (general industry). According to OSHA requirements, fixed ladders must have cages, wells, ladder safety devices, or self-retracting lifelines when the climb is less than 24 feet but the top of the ladder is greater than 24 feet above lower levels. When a fixed ladder is greater than 24 feet, it must be equipped with one of the following: ladder safety devices or self-retracting lifelines with rest platforms at intervals not to exceed 150 feet. When able and it does not otherwise introduce additional safety hazards, personnel may be required to use personal fall arrest system. This will be determined on a case-by-case basis. *\*Note: PPM purposely chooses to reference the most stringent safety measures under construction industry standards, while additionally enforcing the more stringent general industry height requirement of 4 feet. This is an overlap of standards but provides the greatest level of worker protection.*

### 3.2.12 Material Handling and Back Safety

It is common for workers to transport materials such as hand or power tools, bailers, sampling containers and monitoring equipment from the office to various site locations. Workers are also likely to relocate drums or other chemical storage containers. Materials may be heavy putting strain on the back, or they may be large or bulky and obstruct vision during transport.

*Control Measures:* When lifting or relocating heavy or large items, mechanical devices should be used as a first line of defense. When mechanical means are not available, workers should use the buddy system to lift and transport loads in excess of 50 lbs or load that obstruct view of travel. When lifting an object, workers should bend at the knees and lift with the legs – avoid applied pressure to the back as muscle strain will likely occur. Keep loads close to the body and avoid twisting while carrying loads. Ensure travel paths are free of obstructions prior to lift and relocating materials.

### 3.2.13 Mobile Equipment

#### 3.2.13.1 Heavy Equipment and Machinery

Various types of heavy equipment are necessary to perform routine tasks such as drilling, geoprobing (direct push), mobile vacuum, trenching, excavating, remediation system installations and removals, underground storage tank removals, and other similar tasks. The use of this type of equipment is mostly subcontracted, and PPM requires its subcontractors be adequately trained to safely operate these types of heavy machinery. Other forms of heavy equipment such as forklifts, knuckle-boom truck-mounted crane, skid steers, and core drills can be operated by company personnel. PPM requires that operators of these types of equipment be deemed competent by the company through safety, instructional and observational training and/or operator experience. Also, equipment must be inspected by a competent prior to use,

documented and returned to the safety department for recordkeeping. Hazards associated with the use of heavy equipment include, but are not limited to, the following:

- § Pinching, rolling, crushing, rotating hazards
- § Contact with overhead or underground utilities gas lines, power lines, etc.)
- § Falling loads
- § Hydraulic or pressurized equipment parts
- § Swing radius of equipment
- § Operator blind spots
- § Hot equipment parts



**Control Measures:** Use equipment in accordance with its intended purpose. Machinery must be grounded prior to use and equipped with emergency stop devices. Workers must locate and test these devices prior to using the equipment. When the equipment is in use, one worker must be readily available to engage emergency stop devices unless other workers remain away from the equipment while in operation. Equipment must remain at least 10 feet away from any overhead utility line unless the line has been otherwise isolated or shielded from accidental contact. Derricks/masts of mobile equipment must be lowered prior to relocating equipment from one location to another while onsite. Personnel who work with or near rotating or other moving parts are prohibited from wearing jewelry, loose clothing or other similar means that could become entangled within the equipment. Long hair should be tied back and protective clothing should fit securely. Workers should not collect samples or otherwise place hands in or near augers when it is rotating, and workers must also avoid climbing mast of equipment when it is in operation. Wheels should be chocked and hand brakes set to secure equipment when at rest.

Contact with hot parts must be avoided and it should be noted that metal parts become extremely hot with sun exposure, which can cause significant skin burns. Workers are prohibited from working beneath elevated loads and must avoid any area impacted by the swing radius of operating equipment unless a spotter is used. Additionally, workers must be aware of operator blind spots which may also require the use of a spotter.

### 3.2.13.2 Aerial and Scissor Lifts

Use of aerial and scissor lifts is strictly prohibited. Company personnel are not appropriately trained for working with aerial and scissor lifts and are therefore not authorized on these machines without additional safety training and approval from the safety department. Workers should be aware that aerial and scissor lifts are not synonymous and are covered under two separate OSHA regulations. Regulatory requirements for aerial lifts can be found in §1926.453, while requirements for scissor lifts (defined by OSHA as a mobile scaffolding system) can be found in §1926.452(w). This equipment can reach elevations in excess of 4 feet triggering fall protection. It should be noted that per OSHA guidelines, aerial lifts require the use of personal fall arrest systems in conjunction with the use of a guardrail system, while scissor lifts require the use of personal fall arrest systems only in the absence of a guardrail system.

### 3.2.14 Noise

OSHA regulates worker exposures to noise. The established action limit for an 8-hour workday is 85 decibels (dB), a time-weighted average (TWA). Levels at or in excess of this limit can cause hearing loss, which depending upon exposure can be a temporary or permanent loss. Noisy environments can also interfere with worker communication and comprehension, which poses additional safety risks.

Noise exposures can be measured using sound level meters or noise dosimeters. Certain work-related processes considered to be noisy include but are not limited to the following:



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- § Remediation systems – systems vary, but noise levels have been measured  $\geq 90$  dB
- § Heavy equipment operation (including vac trucks) – have been measured  $\geq 120$  dB
- § Use of power tools – sound levels vary (electric drill – 95 dB, power saw 110 dB, power drill – 130 dB, pneumatic drill – 120 dB)
- § Work conducted nearby high traffic roadways – typical freeway traffic is 70 dB; however, large 18-wheelers have been measured  $\geq 90$  dB
- § Coring and cutting of concrete – use of jackhammers or coring equipment have been measured  $\geq 130$  dB

Control Measures: When available, workers should carry sound level meters to assess noise levels. In the absence of monitoring equipment, workers who must shout at a co-worker 5 feet away are likely triggering regulatory threshold limits for noise exposures. Those environments  $\geq 85$  dB require the use of administrative controls or protective equipment. Administrative measures such as limiting work hours within noisy environments should be the first line of defense used to control worker exposures to noise levels in excess of 85 dB. When this cannot be achieved use hearing protectors such as earplugs, canal caps or ear muffs to protect worker hearing.

### 3.2.15 Repetitive Motion

Some tasks require a degree of repetition that may put strain on muscles and joints of the body. Poor posture can also put a similar degree of strain on the body. Typical symptoms of repetitive motion strain do not necessarily occur immediately (i.e., they can appear at rest during sleep) and include but are not limited to the following:

- § Tingling, swelling or numbness of wrists, knees, elbow or other joints
- § Sharp, piercing pain
- § Loss of flexibility or muscle strength

Control Measures: Avoid performing repetitive tasks that target specific parts of the body for extended periods of time. Recognize symptoms promptly and vary job task for a while. Stretching and flexibility exercises can strengthen muscles over time. Report any signs or symptoms of repetitive motion strain to the HSD immediately. These injuries progressively worsen so prevention is imperative.

### 3.2.16 Scaffolding

Use of scaffolding systems, which includes walking, working, assembling, disassembling, and/or other similar uses, is strictly prohibited. Company personnel are not appropriately trained for working with scaffolding systems and are therefore not authorized on these systems without additional safety training and approval from the safety department. Work requiring the use of a scaffolding system will be subcontracted to appropriately qualified contractors.

### 3.2.17 Slips, Trips, and Falls

Open boreholes generated through drilling or direct push as well as improper materials storage can pose tripping hazards. In addition, typical groundwater monitoring activities can result in open monitoring wells producing the same results. Trenching and excavating jobs can result in large, open earth depressions of varied depths and widths in which workers, tools or equipment could potentially fall. Carbon change-outs, asbestos/lead sampling, aboveground storage tank inspections and/or maintenance, and use of catwalks may require work at elevations  $\geq 4$  feet, which may require additional safety measures such as the use of fall protective equipment (i.e. full-body harness and lanyard). Only personnel who have received additional fall protection training are considered competent for performing these tasks – all other workers are prohibited from working at elevations  $\geq 4$  feet without additional training and certification.



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Control Measures: Store all materials away from work areas until ready for use and keep all travel paths unobstructed. Walk around materials – never walk over them. Use secured, steel sheet plates or wood to cover open boreholes. Use company truck and cones to isolate traffic from open monitoring wells. Heavy equipment, barricades and caution tape must be used to isolate open excavations from vehicular traffic and unauthorized personnel. Use full-body harness and lanyard to tie-off to stable structure when working on walking/working surfaces at elevations  $\geq 4$  feet (refer to Section 3.2.19). Refer to Section 3.2.11 for fall hazards associated with the use of ladders.

### 3.2.18 Traffic and Secluded Areas

Most petroleum remediation activities occur at active retail gasoline facilities, which expose workers to vehicular traffic. In some cases, work may be required within roadway right-of-ways or workers may be required to cross highways to perform work on an adjoining property or within a median. Secluded areas are not typical of most field-related projects; however, they do exist on occasion. Workers required to perform tasks at remote locations should be aware that these locations may be unlawfully inhabited and/or have the potential for illegal activities.

Control Measures: Use buddy system when working in high traffic areas as first line of defense, especially on spill bucket closures, groundwater sampling, or other similar tasks that require workers to bend, kneel or sit at or slightly above ground level which greatly decreases worker visibility. When these conditions are triggered, the buddy system will require one worker to stand nearby the other worker to create a unit whereby the observer has the primary responsibility of ensuring the safety of the worker with decreased visibility. When working upright, the buddy system will permit workers to separate only to distances that are clearly visible to both workers in a manner that ensures both can continuously monitor the other during all phases of the task. For example, during the sample collection, workers must fill vials or other containers at the vehicle so that they remain in an upright position during collection. Collections at the well are prohibited unless workers are together as a unit because when workers are separated, this process generally requires the worker to bend or kneel, which decreases the visibility of that individual. In addition, the worker is no longer in a position to observe his/her co-worker voiding the effectiveness of the buddy system. If operating as a unit, one worker may observe while the other collects the sample at the well.

When the buddy system cannot be implemented, use the company vehicle and cones to clearly define and block traffic from your work area. Relocate vehicle and cones when work area changes. Workers must wear high visibility safety shirts or ANSI Class II vests to increase visibility even when using additional safety precautions. Reflective clothing/vests are required when working at night or decreased illumination. Additional illumination requirements for night work can be found in Section 3.2.10. When conducting night tasks on or near road system right-of-ways, workers must additionally adhere to appropriate state DOT roadway and traffic control requirements. When working in secluded or unsafe areas, the following measures are required:

- § Schedule work during daylight hours
- § Contact local police department and inquire about security
- § Never go to site alone; use buddy system
- § Notify manager or co-worker regarding your location, estimated time to perform duties and anticipated time of return; make intermittent calls throughout the day
- § Have cell phone readily available and pre-set to 911
- § Carry whistle and pepper spray as alternate methods of defense
- § Wear work clothes and protective equipment to identify you are there in a professional capacity
- § Park vehicle nearby and never exit the vehicle if anyone or anything appears suspicious





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*Note: The use of the buddy system as outlined above applies to traffic hazards only and should not be incorporated universally without additional discussion and management approval. For instance, the use of the buddy system as required when conducting emergency response is clearly specified by OSHA §1910.120 in a manner that opposes the previously outlined requirements. In the absence of regulatory direction, PPM will adhere to this definition of the buddy system.*

### 3.2.19 Walking/Working Surfaces

#### 3.2.19.1 Elevated Walking/Working Surfaces

Carbon change-outs, asbestos/lead sampling, and aboveground storage tank inspections and/or maintenance may require work at elevations  $\geq 4$  feet. In addition, use of catwalks may exist at heights  $\geq 4$  feet. According to §1910.21, a catwalk is considered a runway which is defined as a passageway for persons, elevated above the surrounding floor or ground level, such as a footwalk along shafting or a walkway between buildings. When working on multilevel surfaces, any floor deteriorations or openings must be obstructed to prevent inadvertent falls from an elevated surface. Working at elevated heights can create fall hazards that can result in a fatality or serious physical impairment. Due to these risks, tasks such as these may require additional safety measures such as the use of fall protective equipment (i.e. full-body harness and lanyard). Only personnel who have received additional fall protection training are considered competent for performing these tasks - all other workers are prohibited from working at elevations  $\geq 4$  feet without additional training and certification.

Control Measures: Walking/working surfaces located greater than 4 feet (general industry) above ground surface requires fall protection in the form of a guardrail system to protect against inadvertent falls from elevated heights. Use barriers to isolate floor openings to prevent inadvertent trips and/or falls through such openings. Holes and openings must always be covered when not otherwise needed to perform a task. To protect workers from falling objects, runways must include toeboards, screens, guardrail system, debris nets, catch platforms, canopy structures, or barricades. Workers on lower levels must also wear hard hats at all times. Runways should consist of a nonskid surface material or grating, handrail supports for 200 pounds of force, and means of egress that is permanent and stationary (ex. fixed ladders or stairs). Workers should wear laced footwear with rubber soles to give better foot and ankle support and to reduce the likelihood of slips.

#### 3.2.19.2 Uneven Walking/Working Surfaces

Uneven walking and/or working surfaces are not uncommon. Sites with minimal grounds-keeping can disguise potholes, which could result in trips/falls or foot injuries. Dense vegetation can also disguise dips and potholes. Using limbs, branches, or other similar debris to cross over streams creates an unstable ground surface that can become structurally unsafe after repeated use.

Control Measures: When work is to be performed at an inactive facility, bring weed eaters and sprayer to address overgrown vegetation. When grounds keeping is the responsibility of the client, the Project Manager should call in advance and request site maintenance be performed prior to PPM's arrival onsite. Workers should also wear laced, steel-toed boots which gives better ankle support than slip-on safety footwear. When working in highly vegetative areas that must be accessed, workers should use mechanical equipment to clear cut access paths or use other hand tools. Avoid walking over vegetation or other debris that may become unstable after repeated use.

#### 3.2.19.3 Unstable Soils and Cave-Ins



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Soil is an extremely heavy material, and may weigh more than 100 pounds per cubic foot. A cubic yard of soil may weigh more than 2,700 pounds. That is nearly one and a half tons, the equivalent weight of a car. Furthermore, wet soil or rocky soil is usually heavier. The human body cannot support such heavy loads without being injured. The primary hazard associated with a trench or excavation is a cave-in. Common excavations consist of an average depth of 10-15 feet, and when soils cave-in on or around a worker, it will generally result in death.

Control Measures: Any trench or excavation  $\geq 4$  feet in depth must have the following protective measures implemented:

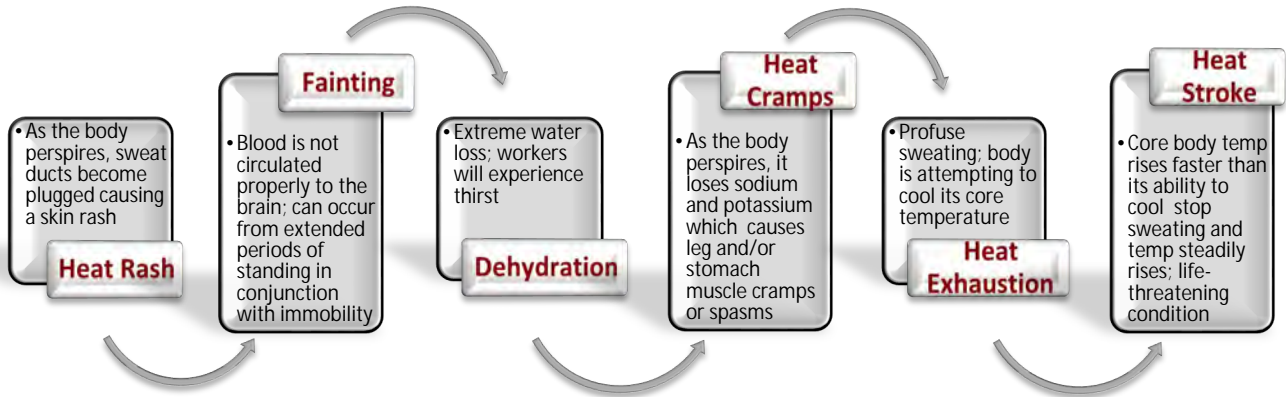
- § Perform visual inspections prior to start of work daily and conduct additional inspections warranted by changes in site conditions.
- § Provide onsite competent person with the knowledge and authority to correct any noted hazards derived from daily visual inspections.
- § Keep all tools, materials, equipment and workers at least 2 feet away from edge of trench/excavation.
- § Ladder or other means of egress in accordance with 29 CFR 1926.651(c)(2) must be provided by the subcontractor and be present onsite at all times – PPM requires a ladder be present onsite under these conditions regardless of whether a worker enters the trench/excavation.
- § When controls are used and workers are required to enter a trench/excavation, ladders must be placed so that workers are not required to travel lateral distances greater than 25 feet.

OSHA requires that any trench/excavation with a depth  $\geq 4$  feet use engineering controls to prevent cave-ins. In addition, OSHA also requires that any trench/excavation with a depth  $\geq 20$  feet use a qualified engineer to determine the appropriate engineering control. *When PPM does not incorporate these engineering controls, under no circumstances must any individual enter a trench/excavation with a depth of 4 feet or greater. In addition, no equipment requiring an individual to be placed on or inside the equipment during its operation is permitted inside the trenched/excavated area. Soil packing and obtaining samples must be conducted through alternative methods.*

### 3.2.20 Weather

#### 3.2.20.1 Heat Stress

Heat is a common concern for states in the southern U.S. and the use of personal protective clothing only adds to this stress. Heat stress can occur in as little as 15 minutes. Symptoms are generally progressive but some exceptions do apply. Some symptoms of heat stress may not arise, may go unnoticed or may occur simultaneously depending on the degree of progression and the awareness level of the worker. The following symptoms are associated with heat stress:



**Control Measures:** Heat stress can occur very rapidly; therefore, workers must be alert to the signs and symptoms and should be additionally aware of sluggishness or behavioral changes in their co-workers. Workers should be acclimated to their environment and breaks should be taken as necessary to replenish fluids and cool down core body temperature. Alternate workers as necessary to keep work going. Remove excess protective clothing and break in a shaded, cool area. Any worker exhibiting symptoms of heat stress will be prohibited from performing additional duties for the remainder of the day.

### 3.2.20.2 Cold Stress

The degree of coldness depends upon temperature, wind and wetness. When exposed to colder climates, the body loses heat faster than it can be generated. Prolonged exposures can rapidly use up the body's stored energy resulting in frostbite, trench foot, chilblains and hypothermia.

COLD STRESS	DEFINITION	SYMPTOMS OF EXPOSURE
Trench foot	Injury to the feet when immersed in water for prolonged period of time; wet feet lose heat and blood vessels constrict causing cells to die due to lack of oxygen	Reddening of skin, numbness, leg cramps, swelling, tingling pain, blisters or ulcers, bleeding under skin, gangrene (foot turns dark purple, blue or gray)
Chilblain	Exposures to temperature slightly above freezing to 60°F causing damage to capillary blood vessels in skin; damage is permanent and returns with additional exposures	Redness and itching mostly on cheeks, ears, fingers and toes, possible blistering, inflammation, possible ulceration (severe cases)
Frostbite	Injury caused by freezing of the skin (nose, ears, cheeks, chin, fingers or toes); can lead to amputation	Reduced blood flow to hands/feet numbness, tingling or stinging, aching, bluish or pale, waxy skin
Hypothermia	Body is losing heat faster than it can be generated producing an abnormally low body temperature, which impairs the brain and makes a person unable to think clearly or move well; is extremely dangerous because a person may not realize it is happening	Early symptoms - shivering, fatigue, loss of coordination, confusion and disorientation; Late symptoms – no shivering, blue skin, dilated pupils, slowed pulse and breathing and loss of consciousness



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*Control Measures:* Workers should be acclimated to their environment, wear multiple layers of clothing, remove wet or damp clothing promptly and breaks should be taken as necessary to drink warm fluids and warm core body temperature. Alternate workers as necessary to keep work going. Any worker exhibiting symptoms of cold stress will be prohibited from performing additional duties for the remainder of the day.

### 3.2.20.3 Adverse Weather Conditions

Adverse weather conditions can include heavy rainfall, thunderstorm, lightning, hail, snow, tornado watch/warning, tropical storm or hurricane advisory to name a few. These types of weather conditions interfere with travel and field work. Workers who attempt to drive under these conditions put themselves at risk.

*Control Measures:* Follow local weather advisories and postpone work as necessary. Weather conditions can change rapidly while onsite. Carry NOAA weather radios when in the field to monitor changes in weather. Be prepared to use stop-work authority as necessary to address changes in weather. Plan your escape route in advance and be prepared to move to higher ground and/or evacuate. Never drive through flooded roads.

## 3.3 BIOLOGICAL HAZARDS AND CONTROLS

### 3.3.1 Insects and Mosquitoes

Insects and mosquitoes are prominent in just about any work location. Large ant beds as well as other insect nests such as hornets, wasps, yellow jackets and bees can be found as early as spring. They can reside in trees, high vegetative areas, holes within the ground or within piles of trash and debris.

Mosquitoes can carry infectious diseases such as West Nile virus and Zika virus, which can cause long-term debilitating illnesses, birth defects, or fatality. They are most active at dusk or dawn. Symptoms vary and can appear between 3-14 days after a bite.

- § West Nile (mild symptoms): fever, headache, body aches, nausea, vomiting, and swollen lymph glands or skin rash on chest, stomach and back; symptoms may last for several days to a few weeks; occurs in up to 20% of people infected.
- § West Nile (severe symptoms): high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis; symptoms may last for several weeks and neurological symptoms may be permanent; occurs in 1 out of 250 people infected.
- § Zika: mild fever, skin rashes, muscle and joint pain, and conjunctivitis (pink eye) that usually last between 2-7 days; can cause severe birth defects in offspring of pregnant women.

*Control Measures:* PPM contracts a professional spraying company to spray for insect nests; however, workers should carry pest-control materials as necessary and keep extra cans of wasp, hornet, bee and ant spray as a secondary precaution. Workers required to carry allergy treatments such as an epinephrine injection (epipen) must keep this nearby at all times, and co-workers must know the location of this treatment should it be needed. To prevent mosquito bites, use insect repellent containing DEET, wear long-sleeved shirts and long pants and remove any standing water from buckets or barrels where mosquitoes can lay their eggs.

### 3.3.2 Ticks and Spiders

Spiders can be found in highly vegetative areas, in and around remediation systems and in other similar areas. Black widow spiders are commonly found inside well vaults, beneath a system in dark crevices and other similar dark spaces.



Black Widow

Brown Widow

Brown Recluse

Ticks can be encountered in highly vegetative areas with limited grounds keeping. Ticks are external parasites and there are more than 800 different species. Deer ticks carry Lyme disease, but <5% of all tick bites result in Lyme infection. Symptoms of Lyme infection include: flu-like illness with red skin rash that occurs within 3 weeks of bite. Rash should be circular and can increase daily. Symptoms of exposure should be reported immediately to the safety department and medical attention should be sought as necessary.

**Control Measures:** PPM contracts a professional spraying company to spray for spiders when also spraying for insects. Avoid placing hands and arms in dark spaces that cannot be seen. Use caution when opening well vaults or when working in other dark places. Do post-job body inspection and remove ticks immediately.

### 3.3.3 Rodents, Reptiles and Roaming Animals

The southeast U.S. is home to various species of venomous snakes. Venomous snakes will likely be found beneath piles of debris, near bodies of water or in high or heavily vegetative areas. They generally have a triangular-shaped head, elliptical pupils, and some have rattlers. A few common species of venomous snakes are identified below.



Southern Copperhead



Water Moccasin



E. Diamondback Rattler



Coral Snake

Facilities located nearby lakes, rivers, bayous, streams or that otherwise have ponds may have alligators present. Alligators will come out of the water and onto land surface to build nests for their eggs or to sunbathe. They are also known to lie beneath the water's surface in wait when they are preparing to attack and they may not be visible to workers.

Highly vegetative areas and areas with trash or debris can be home to rodents such as rats or mice. Remediation systems provide warmth in colder climates and it is not uncommon to find rodents and other animals within or around the unit.

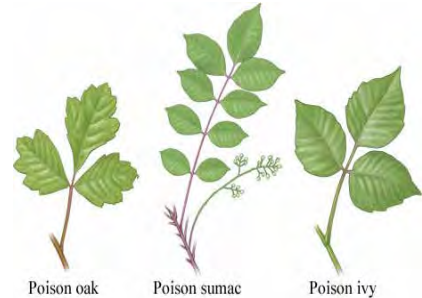
Sites located in populated areas may have wandering animals. Pets may be trained to attack when approached, may have mange (parasitic skin diseases) or may carry other diseases.

**Control Measures:** When working in or around bodies of water, workers must be aware of any indicators of alligator presence, which require that workers immediately evacuate the area. General awareness and caution must be used when working in highly vegetative areas and workers must never place hands or other parts of body in an area that is not clearly visible. Snake guards/chaps should be worn when working in suspected snake-infested areas. Workers must

avoid wandering animals – they may appear to be a pet; however, they can carry diseases and they may bite or scratch.

### 3.3.4 Poison Plants

Heavily vegetative areas may have poisonous plants such as poison ivy, oak or sumac, which produce a poisonous sap called urushiol. Typically the first exposure to these plants may not result in any symptoms as this is classified as a “sensitization period”. Future exposures to these plants will then produce bumps often mistaken for mosquito bites until they begin to ooze. This is spread by scratching affected areas and touching other unaffected areas.



**Control Measures:** First line of defense is to be able to identify and avoid these plants. Weed killers should be used to minimize mowing and to eliminate exposure to poison ivy, oak or sumac. It should be noted that poisonous plants still thrive throughout the winter and they are more difficult to locate without their leaves. Workers should wear long-sleeved shirts and long pants tucked into boots when working in highly vegetative areas. Pre-medicated towelettes or lotions form a barrier on the skin and prevent adverse reactions. Rubbing alcohol can remove the oil resin up to 30 minutes after exposure, and antihistamines (non-drowsy) can also be taken post-exposure to minimize the reaction.

### 3.3.5 Bloodborne Pathogens

Sharps hazards come in various forms and may include hypodermic needles, cutting tools or equipment/machinery with sharp edges like box cutters, scissors, machinery blades, etc. Hypodermic needles are occasionally encountered at some jobsites. Needles may be used for insulin injections or drug use. Other sharps may become contaminated upon contact with infected sources. Life-threatening illnesses such as hepatitis or human immunodeficiency virus [HIV] (also referred to as bloodborne pathogens) may be transmitted via contaminated sharps so workers should be extremely cautious at all field locations. Also, bloodborne pathogens can be transmitted from an infected individual to another when providing first aid. All individuals and sharps must be treated as other potentially infectious materials (OPIM).

**Control Measures:** Never reach beneath the remediation system or stick hands in areas not clearly visible. Do a visual inspection before reaching for any component or item. Never recap a needle! Remove needles carefully using puncture-resistant gloves. Place them in plastic containers with a closed lid. Duct tape the lid before discarding. Drop off at community drop sites (where available). This type of waste is considered biohazardous waste; however, only healthcare facilities and medical waste industries are regulated. Be aware that the state of Florida requires disposal of this waste at established drop off locations, but all other states in which PPM has an office only recommend using these locations where available. Avoid contact with sharp edges of equipment/machinery, use cutting tools in accordance with manufacturer’s guidelines, and always cut away from or perpendicular to the body. Use the concept of universal precautions for infection control. This concept is to treat all human blood and certain human body fluids as if known to be infectious for HIV, hepatitis B, and other bloodborne pathogens.



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### 4.0 EXPOSURE MONITORING

As part of company-related processes, employees will or have the potential to be exposed to various chemical hazards. Chemicals that pose an inhalation hazard may not be considered a threat to worker health until a regulatory limit or more stringent company-imposed action limit is triggered. In addition, some chemicals can become flammable at certain limits. To ensure workers are not working within hazardous or flammable atmospheres, ambient air monitoring will be performed for any work-related process in which chemicals pose an inhalation hazard and have assigned regulatory limits for permissible worker exposures or are otherwise considered a potential fire hazard. Air monitoring will not be required when working with or near materials considered to be non-hazardous in nature or do not otherwise pose an inhalation or fire hazard to workers.

#### 4.1 TERMINOLOGY/DEFINITIONS

In order to determine existing or potential worker overexposures to hazardous or flammable substances, workers must first understand common exposure terminology. Some commonly used exposure terms are defined in the following table:

TERM	DEFINITION
Action Limit	Company-assigned exposure limit assigned to a chemical that is more stringent than the regulatory or recommended exposure limit.
Ceiling Limit	Maximum concentration of a chemical a worker can be exposed to at any point during a work shift. This is an instantaneous reading.
Flammability/Explosive Range	The concentration range (LEL-UFL) of a combustible or flammable material (gas/vapor) that will burn or explode when introduced to an ignition source.
Immediately Dangerous to Life and/or Health (IDLH)	Concentration of a chemical beyond which a worker will be capable of escaping death or permanent injury without help in less than 30 minutes.
Lower Flammability/ Explosive Limit (LFL/LEL)	The lowest concentration of a gas/vapor needed to produce a fire or explosion when exposed to an ignition source.
Permissible Exposure Limit (PEL)/Threshold Limit Value (TLV)	OSHA's regulatory exposure limit is the PEL, whereas the TLV is used to represent other published recommended exposure limits (NIOSH or ACGIH).
Short-Term Exposure Limit (STEL)	Maximum concentration of a chemical a worker can be exposed to without adverse effects over a 15-minute period (unless otherwise noted) not to exceed 4 times per work shift with 1-hr rest intervals between exposures.
Time-Weighted Average (TWA)	Maximum concentration of a chemical a worker can be exposed to without any adverse effect. Based on an 8-hr day/40-hr week.
Upper Flammability/ Explosive Limit (UFL/UEL)	The highest concentration of a gas/vapor needed to produce a fire or explosion when exposed to an ignition source.

#### 4.2 ESTABLISHING EXPOSURE AND FLAMMABILITY LIMITS

##### 4.2.1 Exposure Limits

For any material that has an established regulatory or recommended exposure limit, PPM has established a more conservative action limit. It is the company's intention to take some form of action before a worker is exposed at regulatory or recommended levels. The exception to this concept applies only to contaminants with very low exposure limits and also to the detection capabilities of air monitoring equipment.



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Action limits are established on a case-by-case basis and in accordance with general industry practice. When ambient air concentrations trigger action limits, engineering, administrative or work practice controls should be incorporated to eliminate the exposure or reduce worker exposures to an acceptable limit. When this cannot be achieved, workers will be required to upgrade personal protective equipment.

### 4.2.2 Flammability Limits

PPM has adopted general industry practice by setting its flammability action limits to be 10% of the regulatory limit. Since lower and upper explosive limits are provided as a percentage, PPM has additionally converted the flammability ranges of commonly encountered combustible and flammable materials into parts per million (ppm). Regardless of the volatile monitoring equipment used, workers will be able to determine when a given work environment is or becomes a flammable environment. Workers must also recognize that when working in environments in which chemical concentrations >UEL, as effective control measures are introduced the chemical concentration will again fall back into the flammability range and ignition sources must be eliminated until concentrations once again fall below the material's assigned LEL.

### 4.3 REGULATORY EXPOSURE LIMITS

Whenever an action, regulatory or recommended exposure limit is triggered, workers must be prepared to immediately report site conditions to management, to develop and implement alternative control measures, to evacuate the site when warranted and/or be prepared to upgrade personal protective equipment (i.e., wear respiratory protection). Workers must be aware that in order to wear respiratory protection, they must first be medically cleared by a physician, be fit-tested to a specific respirator and have received training in accordance with the procedures outlined within the company's Respiratory Protection program. To ascertain eligibility, workers must receive authorization from the safety department prior to using a respirator.

Action, regulatory, and/or recommended exposure limits assigned to routine chemicals commonly encountered by workers are outlined within the following table:

CONSTITUENT	TOXICITY					FIRE
	ACTION	PEL/TLV	STEL	CEILING	IDLH	LEL-UEL
Activated carbon	--	--	--	--	--	--
Alconox <sup>®</sup> [nuisance dust]	5	5	--	--	--	--
Aldrin [pesticide]	0.25	0.25	--	--	25	--
Aluminum [metal]	5	5	--	--	--	--
Aluminum oxide [nuisance dust]	5	5	--	--	--	--
Ammonia [base]	50	50	35†	--	300	15,000-28,000
Arsenic [metal]	0.01	0.01	--	--	5	--
Analytix AN-754GH	--	--	--	--	--	--
Asbestos	0.1	0.1	1	--	--	--
Barium [metal]	0.5	0.5	--	--	--	--
Benzene	1	1	5	--	500	1,200-7,800
n-Butane	400	800	--	--	--	1,600-8,400
Cadmium [metal]	0.005	0.005	--	--	9	--
Calcium hydroxide [base]	5	5	--	--	--	--
Carbon dioxide [dry ice]	2,500	5,000†	30,000	--	40,000	--





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CONSTITUENT	TOXICITY					FIRE
	ACTION	PEL/TLV	STEL	CEILING	IDLH	LEL-UEL
Carbon tetrachloride	2	2†	--	25	200	--
Chloroform	2	2†	2 [60-min]	50	500	--
Chromium[metal]	0.5	0.5	--	--	250	--
Coal tar pitch volatiles[PAH]	0.2	0.2	--	--	80	--
Copper[metal]	1	1	--	--	100	--
DDT[pesticide]	1	1	--	--	500	--
Dieldrin[pesticide]	0.25	0.25	--	--	50	--
Diesel	100[skin]	100[skin]	--	--	--	600-7,500
Dust [Total]	15	15	--	--	--	--
Dust [Respirable]	5	5	--	--	--	--
Dust [Portland Cement]	50	50	--	--	--	--
Endrin[pesticide]	0.1	0.1	--	--	2	--
Ethylbenzene	100	100†	125†	--	800	800-6,700
Gasoline	100	300†	500†	--	--	1,400-7,600
Heptachlor[pesticide]	0.5	0.5	--	--	35	--
Hexane	50	50†	--	--	1,100	1,100-7,500
Hydrochloric acid[HCl]	--	--	--	5	50	--
Hydrogen peroxide[30-50%]	1	1	--	--	75	--
Hydrogen Sulfide[H <sub>2</sub> S]	1	1	--	10	100	4,000-44,000
Iron[metal]	--	--	--	--	--	--
Isobutylene	--	--	--	--	--	1,800-9,600
Isopropyl alcohol	200	400†	500†	--	2,000	2,000-12,700
Kerosene	50	100	--	--	--	700-5,000
Klozur[sodium persulfate]	5	5	--	--	--	--
Lead[metal]	0.05	0.05	--	--	100	--
Lindane[pesticide]	0.5	0.5	--	--	50	--
Liquinox®	--	--	--	--	--	--
Lubricating oils[motor oil]	--	--	--	--	--	--
Magnesium[metal]	--	--	--	--	--	--
Mercury[metal/vapor]	0.1[skin]	0.1†[skin]	--	0.1†[skin]	10[skin]	--
Methane	--	--	--	--	--	5,000-15,000
Methylene chloride	25	25	125	--	2,300	13,000-23,000
MTBE	50	50	--	--	--	1,000-8,000
Muriatic acid[HCl]	--	--	--	5	50	--
Naphthalene[PAH]	10	10†	15†	--	250	900-5,900
Nitric acid	2	2†	4†	--	25	--
NXT[Klozur – sodium persulfate]	5	5	--	--	--	--
Oil[crude]	0.2[mg/m <sup>3</sup> ]	0.2[mg/m <sup>3</sup> ]	--	--	--	1,000-8,000
ORC®/ORC Advanced®	5	5	--	--	--	--
Ozone	0.05	0.1†	0.3†	0.1	5	--
PCB	0.5[skin]	0.5[skin]	--	--	5	--
Perchloroethylene[PERC]	25	25†	--	150[cap]	150	--
Phosphoric acid[H <sub>3</sub> PO <sub>4</sub> ]	1	1†	3†	--	1,000	--
Potassium hydroxide[base]	2	2†	--	2	--	--
Propane	500	1,000	--	--	2,100	2,100-9,500
RegenOx A or B™	--	--	--	--	--	--
Selenium[metal]	0.2	0.2	--	--	1	--
Silver[metal]	0.01	0.01	--	--	10	--

CONSTITUENT	TOXICITY					FIRE
	ACTION	PEL/TLV	STEL	CEILING	IDLH	LEL-UEL
Sodium carbonate <sub>[base]</sub>	--	--	--	--	--	--
Sodium hydroxide <sub>[base]</sub>	2	2	--	2†	10	--
Sulfuric acid <sub>[H<sub>2</sub>SO<sub>4</sub>]</sub>	1	1	15†	--	15	--
Tetrachloroethylene <sub>[PERC]</sub>	25	25†	100	150 <sub>[cap]</sub>	150	--
Toluene	100	100†	150†	300	500	1,100-7,100
Trichloroethylene	50	50†	200†	200	1,000	8,000-10,500*
Vinyl chloride	1	1	--	5 <sub>[15-min]</sub>	--	3,600-33,000
Xylene	100	100†	150†	--	900	1,100-7,000
Zinc <sub>[metal]</sub>	--	--	--	--	--	--

**NOTES:**

† - More protective OSHA PELs vacated by the 11<sup>th</sup> Circuit Court of Appeals in July 1992; however, OSHA can enforce under the General Duty Clause. PPM will adhere to these exposure limits to ensure worker health and wellbeing is maintained.  
 Diesel, dusts, heavy metals, bases/alkalis, Trap & Treat BOS-200, and PCBs are all measured as mg/m<sup>3</sup> – not ppm!  
 Asbestos is measured as number of fibers per unit air (f/cc); Portland cement is measured as million parts per cubic feet (mppcf).  
 Action limit and PEL are time-weighted averages over 8-hour work period. STEL is TWA over 4 15-min periods, with the exception of asbestos, which has a 30-minute excursion limit. Others are instantaneous readings.  
 PAHs - coal tar pitch volatile components of TPH-D include anthracene, benzo(a)pyrene, chrysene, phenanthrene and pyrene, all of which have the same permissible exposure and IDLH limits; therefore, all components lumped into one group. The only other regulated component of PAH is naphthalene which is a component of crude or refined oil and is listed separately from other PAHs.  
 Only the regulated pesticide components of EPA SWA-846 Methods 8080/8081 are included above.  
 Perchloroethylene (PCE) has a ceiling limit of 200 ppm for 5 minutes within any 3-hr period not to exceed 300 ppm but this has been capped at 150 ppm to match IDLH concentrations for this material. Trichloroethylene's flammability range is effective ≥77°F.

Any constituent not otherwise specified above that is anticipated as part of company-related processes in which workers have the potential to be exposed must be immediately reported to the safety department and will require a site-specific HASP. This HASP will be generated and issued by the safety department and requires a 1-week advanced notice.

#### 4.4 MONITORING EQUIPMENT AND CALIBRATION

Because PPM works with a variety of chemicals, not all constituents can be detected with one universal monitoring device. Some monitoring equipment can provide instantaneous readings, while others require laboratory analysis (wet method analysis). In addition, each monitoring device has its advantages and disadvantages. Some commonly used monitoring devices used by PPM include the following:

- § **Organic vapor analyzers (OVA).** This monitoring device is used to detect volatile and semi-volatile substances. Some OVAs used by the company include MiniRAE 2000 PGM 7600, GasTech®, RKI Eagle® photoionization detector (PID), and Micro FID® flame ionization detector (FID). The advantage of this monitoring device is that it is a direct-read instrument and provides instantaneous readings. Some disadvantages of this equipment are that it generally does not provide readings less than 1 ppm, it does not give percent LEL or provide oxygen content. OVAs generally detect a group of chemicals and do not indicate which compound is being detected.
- § **Ozone meters.** This monitoring device is used to detect ozone gas and is also a direct-read instrument. The ozone meter used by some offices within the company is the EcoSensor Ozone Sensor A-21ZX. It is chemical-specific but has some interference from other oxidizing gases.



§ **PortaSens II gas detector.** The monitoring device is a portable, direct-read gas leak detector that has the ability to measure a variety of different gases by simply inserting a gas-specific sensor. This instrument is lightweight and can measure gases such as acetylene, ammonia, carbon monoxide, fluorine, formaldehyde, hydrogen, hydrogen chloride, hydrogen cyanide, hydrogen peroxide, hydrogen sulfide, oxygen, ozone, phosgene, and sulfur dioxide. For a composite list of gases, refer to the manufacturer’s website.



§ **Portable air monitoring pumps.** These monitoring devices are used to assess continuous personnel and background exposures and are commonly used for sampling heavy metals, asbestos, silica or nuisance/respirable dusts. A common portable air monitoring pump used by the company is the SKC AirChek52®. Pumps are set to a specific flow rate of air (can be low volume or high volume) and contaminants are captured using a filter, which is later sent for laboratory analysis. Some advantages of this monitoring equipment are that these pumps are small, light-weight and portable. Some disadvantages of this monitoring equipment are that they do not provide instantaneous readings; exposures are unknown until laboratory results are received.



§ **Personal monitoring badges.** These monitoring devices are used to assess continuous personnel exposures. They are light-weight, easy to use and can target specific constituents as opposed to a group of compounds. Badges must be sent to lab for analysis so they do not provide instantaneous readings. In addition, other constituents with similar chemical make-up can cause interference giving inaccurate exposures so samplers must be able to identify potential cross-interference prior to sampling.



§ **Colorimetric indicator tubes.** These monitoring devices are used to assess continuous personnel exposures. Passive diffusion tubes are used when determining longer term exposures and workers need only break off the tip of the tube to initiate sampling. Pumps can also be used to draw in air and generally give a short-term exposure assessment during the period of time the air is extracted. Tubes are contaminant-specific and change color when in contact with the constituent giving an instantaneous reading.



Colorimetric tubes have a +/-25% degree of error and chemicals with similar make-up can cause interference giving inaccurate exposures so samplers must be able to identify potential cross-interference prior to sampling.

To ensure it is in good working order, air monitoring equipment must be calibrated in accordance with manufacturer recommendations for each monitoring device. Workers must be aware that each office utilizes different monitoring equipment; therefore, readings from instruments calibrated with methane may not be the same as readings from instruments calibrated with hexane. Be sure to use the instrument’s conversion tables as provided by the manufacturer when warranted. In addition, some metals can produce toxic gases when burned or exposed to open flames; therefore, the safety data sheet should be referenced when working with metal-contaminated soils.

#### 4.5 SAMPLE COLLECTION



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To appropriately determine exposures, samples must be collected within the breathing zone (shoulder level) of the worker, subcontractor or other affected pedestrian when relevant to site concentrations and location of these concentrations in relation to the general public. It should be noted that there may be times in which samples must be collected at the source (i.e., inside manhole) for technical purposes. These concentrations must be identified and reported as separate readings not indicative of worker exposures. Additional precautions must be taken to prevent impact to worker breathing zone during the sample collection when at or near the contaminant source. Depending on the concentrations in this given area or when impact to worker breathing zone cannot otherwise be avoided, respiratory protection may be required.

### 4.6 MONITORING FREQUENCY AND DOCUMENTATION

Ambient air monitoring is required prior to field work to establish a baseline and intermittently throughout the course of a project to compensate for changes in site conditions. Samples must be collected every two hours so long as concentrations are well below established action limits. Areas selected for monitoring must compensate for worker/subcontractor exposures, general public exposures, residential areas, potential nearby business exposures, etc. and may warrant numerous collection locations.

When there is a noted increase in ambient site concentrations, the sampling frequency must be increased to every 30 minutes until site conditions indicate a decreasing trend. If site concentrations are elevating at a rapid pace, continuous air monitoring must be conducted to ensure no threshold limits are triggered. This may require temporary postponement of site activities until concentrations can be reduced to an acceptable limit. Whenever any threshold limit is triggered, site activities must be halted and the safety department notified.

All monitoring areas, concentrations, sample collection times and/or notations (i.e., change in site conditions, contaminant source readings, etc.) must be documented using the company's Ambient Air Monitoring Report form. Forms must be completed fully and returned to the safety department for review upon completion of the project.

## 5.0 PERSONAL PROTECTIVE EQUIPMENT




While the use of protective clothing/equipment provides protection against chemical and physical hazards, there are additional disadvantages associated with its usage. Personal protective equipment can be heavy, bulky and uncomfortable, slow down the work process and/or increase the degree of heat stress put on a worker. Therefore, the use of personal protective equipment is always a last resort. Only when other alternatives such as engineering, administrative or work practice controls fail to eliminate or reduce a hazard to an acceptable level will the use of protective clothing and/or equipment become a consideration.

### 5.1 PROTECTIVE CLOTHING AND EQUIPMENT

#### 5.1.1 Head Protection

In accordance with 29 CFR 1910.135, the company provides head protection from impact and penetration hazards posed by falling objects, projectiles, and shock/burn hazards posed by contact with electricity. While OSHA requires that head protection be provided, it is the American National Standards Institute (ANSI) that sets criteria for head protection. ANSI Z89.1-2014 separates protective helmets into different types and categories as follows:

**HARD HAT TYPES**

Type I – hard hat that provides protection from impact to the top of the head only	Type II – hard hat that provides protection from impact to the top and sides of the head	
CLASSIFICATION	PROTECTION PROVIDED	
Class G [Formerly Class A]	G – General; intended to reduce the force of impact of falling objects and reduce the danger of contact with exposed low-voltage electrical conductors; proof-tested at 2,200 volts of electrical charge	
Class E [Formerly Class B]	E – Electrical; intended to reduce the force of impact of falling objects and reduce the danger of contact with exposed high-voltage electrical conductors; proof-tested at 20,000 volts	
Class C [Formerly Class C]	C – Conductive; intended to reduce the force of impact of falling objects, but offer no electrical protection	

PPM’s preference for hard hat selection is ANSI Z89.1-2014 approved Type II, Class E hard hat with ratchet suspension; however, Type I and Class G hard hats are permitted for use. PPM prohibits the use of Class C hard hats because they provide no protection against electrical hazards.

### 5.1.2 Eye and Face Protection

In accordance with 29 CFR 1910.133, the company requires each affected employee to use appropriate eye and/or face protection when exposed to hazards from particulates, flying particles (projectiles), molten metal, liquid chemicals, chemical gases, vapors, or fumes, metal shavings, and/or potentially injurious light radiation. PPM requires the use of safety glasses with side-shield protection for all outdoors field activities. Workers are permitted to use prescriptive lenses so long as side-shield protectors are used. Safety glasses may be upgraded to goggles or face shields when mixing chemicals, when dealing with chemical splash hazards, or when working in extremely dusty environments that cannot otherwise be addressed through the use of controls. Face shields may also be required when working with projectiles. Eye and face protection must be ANSI Z87.1-2010 approved.

### 5.1.3 Hand Protection

In accordance with 29 CFR 1910.138, the company requires workers to use appropriate hand protection when their hands are exposed to hazards such as those from skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes. PPM bases this selection on an evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards/potential hazards identified. The following gloves are recommended for typical company tasks:

- § Nitrile gloves – good for working with oil and grease and can also protect against some dry chemicals; they are disposable and easy to use; this is the most commonly used glove provided by the company



- § Neoprene, vinyl [PVC] and rubber gloves – also good for working with chemicals such as janitorial or cleaning products, fuels, oils and grease; can be purchased as disposable or reusable; neoprene is preferred when working with acids or bases
- § Butyl or laminate gloves – good for working with ketones
- § Latex gloves – good for working with bloodborne pathogens such as viral and bacterial agents; nitrile gloves will work as well so latex is not commonly provided by the company
- § Cotton or leather gloves – good for material handling of heavy and abrasive objects; leather is sturdy and can resist splinters from wood products and provides some protection against heat
- § Cut-resistant gloves – good when working with sharp or cutting objects; there are various brands of cut-resistant gloves including Kevlar®, Magid® and Ansell®



Hand protection must be ANSI/ISEA 105-2011 approved. *Note: ISEA is the International Safety Equipment Association.*

### 5.1.4 Foot Protection

In accordance with 29 CFR 1910.136, the company requires workers to use protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, sharp edges, slippery surfaces, and unlevel walking/working surfaces. PPM requires ASTM F2412/F2413-approved steel-toed footwear for all field sites. *Exception: Rubber boots or other footwear may be used when workers collect samples within body of water or when workers are required to enter a boat.* Composite-toed shoes are permitted when they meet the ASTM testing requirements for compressive strength.

### 5.1.5 Skin Protection and Visibility

Typical PPM jobsites warrant level D protective clothing, which consists of long pants and short or long-sleeved shirt. Other clothing may be required based on the hazard exposure and is outlined below:

- § Fire-retardant clothing – required by clients within the oil and gas industry to access their facility
- § High visibility clothing – reflective, high visibility company-provided t-shirts or DOT Class II/III reflective high visibility safety vests are required when working in/nearby active traffic and when working on/nearby roadway right-of-way

Special considerations may require that full-body protective suits such as Tyvek®, Saranex™, or Tychem® be worn. The need for this type of equipment requires pre-planning by the safety department and management and must be discussed during the proposal phase of a project. Skin protection must be ANSI 103-2010 approved.

### 5.1.6 Hearing Protection

Preservation of hearing is of utmost importance. Most of the hearing lost cannot ever be recovered. Through the aging process, workers will be prone to natural hearing loss. Therefore, it is the company's responsibility to distinguish between natural and work-related hearing loss and to ensure that workers exposed to noise levels  $\geq 85$  dB are provided with hearing protection. The most common form of hearing protection provided to workers is the earplug. Earplugs come in various shapes and sizes and are relatively inexpensive so they can be tailored to the comfort



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preferences of the individual. Workers who do not respond well to the use of earplugs will be provided canal caps or ear muffs upon verbal request to the safety department. Hearing protection must be ANSI S12.68-2007 approved.

### 5.1.7 Respiratory Protection

In accordance with 29 CFR 1910.134, the company provides respiratory protection when workers are exposed to hazardous materials at triggered regulatory threshold limits. Only those workers who have been medically cleared by a physician are permitted to wear respiratory equipment. Workers that have been medically cleared must also be fit-tested prior to respirator use. Documentation must be received by the safety department before a worker is approved for respiratory use.

Because workers are not required to work with extremely hazardous materials, with unknowns or within oxygen-deficient environments, supplied-air respiratory equipment is not applicable to current company processes. PPM purchases a variety of National Institute for Occupational Safety and Health (NIOSH)-approved air-purifying half-mask and full-face respirators to be worn when ambient chemical concentrations trigger company-assigned action limits. It should be noted that because most field work is conducted in outdoor, open environments, respiratory protection is generally not required.

### 5.1.8 Electrical Protective Equipment

Insulating equipment such as rubber insulating blankets, rubber insulating matting, rubber insulating covers, rubber insulating line hose, rubber insulating gloves, and rubber insulating sleeves is required when working on or near energized equipment and/or devices. Insulating equipment must be capable of withstanding, without failure, the voltages that may be imposed upon it. Insulating equipment must be proof-tested and inspected in accordance with the provisions outlined within 29 CFR 1910.137. Use of damage or defective insulating equipment is strictly prohibited!

### 5.1.9 Life Saving Equipment

In accordance with 29 CFR 1926.106, employees working over or near water, where the danger of drowning exists, must be provided a U.S. Coast-Guard-approved life jacket or buoyant work vest. Where applicable, ring buoys with at least 90 feet of line must be provided and readily available for emergency rescue operations. The distance between ring buoys cannot exceed 200 feet. In addition, at least one life-saving skiff must be immediately available at locations where employees are working over or adjacent to water.

## 5.2 OTHER PROTECTIVE AIDS

Protective equipment can be used in a number of ways to draw attention to the worker or work area, to isolate the work area from unauthorized persons and/or traffic, or to identify the hazard(s) posed by the activity. Common examples of protective equipment used by PPM include, but are not limited to the following:

- § Signs, posters, labels
- § Cones, barricades, caution tape
- § Heavy equipment/machinery or company vehicles
- § Steel plate covers or wood for monitoring wells and/or holes
- § First aid kit
- § Flashing lights
- § Flag extensions on cones for greater visibility
- § Portable 10 or 20-lb ABC fire extinguishers



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- § Lockout/tagout devices
- § Handheld eyewash bottles

### 5.3 PROJECT-SPECIFIC PPE REQUIREMENTS

Depending on the degree of the hazard(s) posed by field tasks, various levels of protective clothing and equipment may be required. Protective clothing and/or equipment required by routine tasks covered by this HASP are outlined further in the table below. Protective clothing and/or equipment not otherwise covered by this plan will require a site-specific HASP. Contact the HSD for further instructions.

FIELD TASK	PROTECTIVE CLOTHING/EQUIPMENT										
	STEEL-TOED SHOES <sup>1</sup>	SAFETY GLASSES <sup>2</sup>	HIGH VISIBILITY SHIRT/VEST <sup>3</sup>	GLOVES <sup>4</sup>	HEARING PROTECTOR <sup>5</sup>	HARD HAT (CLASSE) <sup>6</sup>	GOGGLES/FACE SHIELD <sup>7</sup>	RESPIRATOR (APR) <sup>8</sup>	HARNES/LANYARD	FLOTATION DEVICES/BUOYS	FIRE RETARDANT CLOTHING <sup>9</sup>
Asbestos inspections or sampling	X	X	X	X				X			
Carbon change-out	X		X	X	X	X	X	X	X		
Chemical injection	X	X	X	X	X	X	X				
§ Working with dry powder	X		X	X	X	X	X	X			
§ Working with liquid/mixing w/H <sub>2</sub> O	X		X	X	X	X	X				
Compliance audits/visual inspections[Phase 1]	X	X	X								
DPT - drilling, geoprobing[Hand Auger]	X	X	X	X							
DPT - drilling, geoprobing[Heavy Equipment]	X	X	X	X	X	X					
Groundwater sampling	X	X	X	X							
Mobile vacuum event	X	X	X	X	X						
Mobile ozone	X	X	X	X	X						
Monitoring well plugging and abandonment	X	X	X	X	X	X					
Operation and maintenance of system	X	X	X	X	X						
Remediation system install/demobilization	X	X	X	X	X	X					
Spill bucket replacement/closure	X	X	X	X	X	X					
Trenching and excavating	X	X	X	X	X	X					
UST pull/closure	X	X	X	X	X	X					
Any work over or near water body		X		X			X			X	
Any work performed at oil and gas facility, terminals, or other similar property	X	X		X	X	X					X

- 1 – Steel-toed boots/shoes or equivalent ANSI-approved composite-toe footwear
- 2 – Safety glasses must be equipped with side-shield protection; prescription lenses are permitted if equipped with side-shield protection
- 3 – DOT Class II or III high visibility clothing or safety vests with exposure to traffic and/or mobile equipment
- 4 – Nitrile gloves for petroleum contamination; Kevlar®/leather gloves for cutting hazards; other chemical-resistant gloves needed for more stringent chemical hazards
- 5 – Ear plugs, canal caps or ear muffs when noise levels ≥85 dB
- 6 – Class E hard hats required for protection against electrical hazards
- 7 – Safety glasses must be upgraded to goggles or face shield when working with/mixing powders or when working with liquids that present splash hazard
- 8 – Air-purifying respirator (half-mask or full-face) required for all asbestos sample collections and when chemical threshold limits are triggered and control measures are ineffective
- 9 – Fire-retardant clothing is a client-specific requirement; clients within the oil/gas industry generally require fire-retardant clothing



### 5.4 REDUCTION OF PROTECTIVE CLOTHING AND EQUIPMENT

The use of protective clothing and equipment is mandatory at all times during the course of a project except when inside a designated break area. A break area will be assigned by the Site Safety Officer during the pre-entry safety briefing. The break area must be:

- § Located a minimum of 50 feet away from the work zone
- § Located where ambient concentrations are not > chemical detection limit
- § Located out of the way of vehicular traffic and must not hinder any functions of other businesses

The break area must be clearly designated by posting cones, barricades, or caution tape. Affected personnel and subcontractors must be informed of the break area during the pre-work safety briefing. Only when inside the break area may protective clothing and/or equipment be removed. If the conditions noted above cannot be met, the safety department must be contacted. Variances may be granted based on certain site conditions.

## 6.0 SITE ACCESS, CONTROL, AND DECONTAMINATION

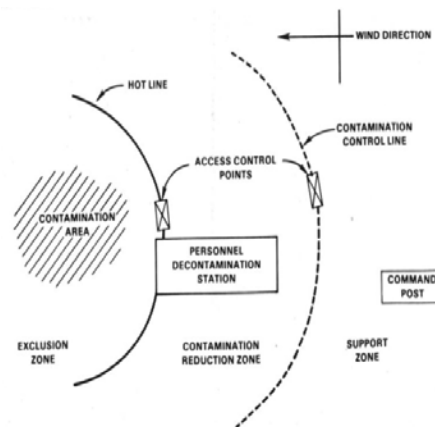
### 6.1 SITE ACCESS

Typical PPM jobsites occur in areas open and accessible to the general public. However, when working at unguarded gated facilities, workers must secure appropriate means of site access from the client. This can include a coordinated effort to meet the client at a designated date and time, or acquiring keys to the facility from the client. *Note: Personnel and/or subcontractors are prohibited from climbing over or crawling beneath site fencing to secure site access.*

### 6.2 DESIGNATED WORK ZONES

Each jobsite must be assigned designated work areas to isolate hazardous work areas from unprotected persons, to prevent the migration of contamination, and to prevent the transfer of contamination through impacted protective clothing as well as monitoring and sampling equipment. Designated work areas include the following:

- § Exclusion zone – the area denoting site contamination where heavy equipment operation and sample collection is likely to occur
- § Contamination reduction zone – the area surrounding the exclusion zone where clothing and equipment is decontaminated to prevent the transfer of contaminants
- § Support zone – any area not otherwise considered the exclusion or contamination reduction zone



### 6.3 AUTHORIZED PERSONNEL

Only authorized personnel are permitted within the exclusion zone. An authorized person is considered to be any individual who has a relevant role or function in relation to the project, participates in onsite safety briefings, and signs the HASP acknowledgement form. Facility managers, client, agency representatives, and law enforcement or regulatory officials may refuse to participate in planned safety meetings or HASP review. As this situation arises, all equipment and job tasks should be temporarily halted to allow for onsite inspection and monitoring by these individuals. When unauthorized persons exit the exclusion zone, all site activities may resume.



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### 6.4 STOP-WORK AUTHORITY

The SSO has full stop-work authority and should use this authority under the following conditions:

- § When a hazardous condition, unsafe behavior or other safety concern is noted
- § When a near-miss or incident is reported
- § When an unauthorized individual enters the designated work zone
- § When lightning or other signs of inclement weather is noted within the area
- § When a contaminant action limit is triggered
- § When unexpected conditions arise that could warrant changes to safety procedures and/or scope of work

### 6.5 GENERAL SITE CONTROL AND SAFETY PRECAUTIONS

The following denotes simple procedures for maintaining site control and worker safety:

- § Designated parking and pedestrian walkways in areas a reasonable distance away from active investigation
- § Use buddy system whenever feasible
- § Perform pre-job inspection to establish appropriate baselines and to visually inspect for obstacles, clearances, etc.
- § Avoid smoking on the jobsite unless within authorized areas (i.e., break areas when deemed appropriate by the SSO for smoking)
- § Use appropriate safety devices (i.e., cones, barricades, etc.) to clearly identify work zones and break areas
- § Prevent unauthorized entry and use stop-work authority as necessary
- § Perform post-job inspection to ensure all materials have been removed from the site; pay close attention to the vehicles to ensure animals or person(s) are not located beneath the vehicle and that all cab and toolbox doors have been secured

### 6.6 DECONTAMINATION PROCEDURES

In order to prevent the spread of contamination from impacted work zones, monitoring equipment, sampling equipment, and/or workers, decontamination must take place. Decontamination is defined as the removal or reduction of contaminants. Decontamination procedures vary based on the degree of site contamination as well as the contaminant(s) involved, and this process must take place within the contamination reduction zone. As impacted workers and equipment exit the exclusion zone, they must be decontaminated using appropriate detergent solutions. Disposal protective clothing must be discarded in garbage bags or lined containers for proper disposal.

Typical company functions require a low level of decontamination which involves the cleaning of bailers, purge materials and/or other similar equipment as samples are collected in various areas of a jobsite. Most chemicals in which workers are exposed are classified as skin and eye irritants; therefore, it is important for workers to remove contaminated clothing as soon as possible, flush eyes for a minimum of 20 minutes and usealconox®/liquinox® solution to wash impacted skin.



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### 7.0 EMERGENCY RESPONSE

#### 7.1 ALARMS AND ONSITE NOTIFICATIONS

To compensate for unexpected conditions and/or changes in existing site conditions, each jobsite must have an effective communication system in place. Workers are notified of emergencies through various forms of effective communication consisting of the following:

- § Verbal communication – is generally the most effective form of communication for the majority of all job-related tasks associated with a project
- § Hand communication – hand signals are used in place of verbal communication under the following conditions:
  - ® When noise levels become elevated due to heavy equipment operation or other similar measures that prevent workers from hearing verbal communications
  - ® When equipment operator's line of vision is obstructed
  - ® Under any situation deemed necessary by the SSO
- § Continuous horn blast of vehicle or air horn – used in lieu of verbal and hand communications due to:
  - ® Large, dispersed work zones or multiple work areas that prevent overall effectiveness of other forms of communication
  - ® Multiple site distractions that inhibit immediate worker attention
  - ® Elevated noise levels that inhibit immediate worker attention

One continuous blast is to be used so as not to confuse workers with other equipment sounds.

#### 7.2 PERSONNEL ASSESSMENT AND EVACUATION

Once an alarm has been triggered, workers must be evacuate the work zone and meet in the designated area assigned during the pre-entry safety briefing. This location is determined by the SSO based on distance from existing hazards and verification that it is upwind of any chemical hazard source. Site evacuation is warranted under the following conditions:

- § When ambient air concentrations meet or exceed an established action limit assigned for a constituent
- § When new hazards not otherwise addressed within this safety plan are encountered
- § When subcontractor, field personnel, clients, or regulatory officials violate the safety provisions outlined within this plan
- § Upon client or regulatory agency request
- § Under any condition the SSO deems unsafe

When evacuation is warranted, all field personnel and subcontractors will meet at the designated area for a preliminary head count, which is conducted by the SSO. Further provisions will be discussed at that time.

#### 7.3 INCIDENT, NEAR-MISS, AND HAZARD RECOGNITION REPORTING

Incidents, near-misses or other noted hazards must be reported promptly to the safety department so that each case can be further investigated to determine the root-cause of the event in order to prevent future recurrences. An incident is defined as an occurrence that results in worker injury or property damage. Examples of an incident include but are not limited to the following:



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## HEALTH AND SAFETY PLAN

- § Underground storage tank (UST) puncture
- § Auto-related accident regardless of fault
- § Contact with overhead or subsurface utilities (i.e., water, sewer, telephone, fiber optic, power, transfer product lines, etc.)
- § Chemical spill or release
- § Slips, trips, or falls

A near miss is defined as an unplanned event that did not result in injury, illness or damage but had the potential to do so. Unexpected hazards may arise from unsafe acts or conditions or changes in site conditions. Incidents, near-misses and hazards must be reported to the safety department immediately once the site has been secured. The site is considered secured once all leaks have been properly contained, and the area has been evacuated and further isolated to prevent unauthorized entry. All reports must be made to the District Manager or can be made to the safety department directly. In addition, all reports must be documented using the Incident, Near-Miss and Hazard Recognition Report.

### 7.4 INJURY REPORTING AND CASE MANAGEMENT

Any incident that results in injury must be reported immediately to the HSD. Reported injuries or illnesses that warrant medical care must be managed by the safety department. In order to achieve this, all cases are evaluated for medical necessity. Whenever possible, workers are sent to the company's pre-established occupational medicine clinics that specialize in work-related injury care. Workers are permitted to seek medical attention (911) without prior company consent only when the injury appears to be life-threatening or when the injury requires immediate medical attention and contact with designated company officials cannot be achieved.

Workers who seek medical attention without company consent will be required to pay for their own medical care out-of-pocket. This provision also applies to follow up care when an injury/illness does not get better. Workers must additionally report changes in medical condition to the HSD, and additional medical evaluations must be coordinated by the company.

### 7.5 GENERAL MEDICAL CARE AND FIRST AID

It is company policy that all field workers be trained in adult CPR and first aid. Workers who have received this level of training should be prepared to administer care for minor injuries. Certified workers may additionally be called upon to provide care to more seriously injured persons while waiting for additional medical attention. If the victim is conscious, workers must indicate that they are certified and they must additionally obtain consent prior to administering care. Consent is implied when the victim is unconscious.

Some general emergency care provisions are outlined below (not all-inclusive):

HAZARD CATEGORY	HAZARD	RESPONSE
Chemical	Inhalation	Move worker to fresh air. If vomiting, dizzy or groggy, seek medical attention immediately. Administer CPR if certified.
	Dermal/Contact	Remove contaminated clothing and flush affected area with soap/water for ~20 minutes. Seek medical care if pain persists.
	Ingestion	Seek immediate medical attention. Do not give fluids to an unconscious person. Do not induce vomiting.
	Eye	Flush with copious amounts of water for ~20 minutes. Seek medical attention if pain persists.



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HAZARD CATEGORY	HAZARD	RESPONSE
Physical	Heat stress	Apply warm, moist heat and pressure to reduce pain in legs/abdomen. Give electrolyte drinks by mouth, if conscious. Remove excess clothing and attempt to cool core body temperature promptly using cold water. Medical attention is warranted for extreme heat stress.
	Cold stress	Remove any wet clothing immediately and bundle in extra clothing and/or blankets. Drink warm fluids, if conscious. Attempt to warm core body temperature using heater or other methods. Medical attention is warranted for extreme cold stress.
	Sprain/strain	Use combination heat/cold therapies to reduce swelling and apply pain relief. Take an over-the-counter naproxen sodium (Aleve) or ibuprofen (Advil) for pain and inflammation. Seek medical attention if pain persists for more than a few days.
	Tingling/numbness	Generally an indication of swelling but can lead to permanent nerve damage. Take an over-the-counter naproxen sodium (Aleve) or ibuprofen (Advil) for pain and inflammation. Seek medical attention if symptoms persist.
	Cuts/lacerations	Apply pressure to wound for blood to clot and use bandages to cover wound. Antibiotic creams can prevent infection. Seek medical attention for deep cuts that require stitches.
	Ringing in ears	Symptom of hearing loss, which will require medical testing to determine if this is a temporary or permanent hearing loss.
Biological	Needle stick	Immediately remove needle. Squeeze the area to extract blood from the wound. Seek immediate medical care and carry the needle with you to the medical clinic.
	Insect/spider/tick/animal bite	Immediately remove insect or tick and pay close attention over the next few days for symptoms of delayed illness. Seek medical attention if noted. Seek medical attention for black/brown widow and brown recluse spider bites as well as animal bites.
	Poison plants	Pay attention for evidence of allergic reaction (itching, redness and irritation) and seek medical attention if over-the-counter remedies prove ineffective or if affected area spreads.

*Caution: Individuals with heart problems, on a "low sodium" diet, or who otherwise have blood pressure issues and work in hot environments should consult a physician for proper alternative care when working under these conditions.*

### 7.6 HAZARDOUS SUBSTANCE RELEASE

In the event that hazardous substances migrate from the work zone and potentially endanger unprotected personnel or the community, the area will be isolated and the spill contained and cleaned by authorized personnel. On-site activities will cease until the release is brought under control and the site is returned to its previous condition or otherwise poses no additional harm to site personnel. All hazardous materials must be containerized and labeled until it can be profiled and disposed in accordance with regulatory requirements at an approved landfill. Workers should reference the SDS for additional information.

### 7.7 REGULATORY, CLIENT, OR OTHER AGENCY NOTIFICATIONS

In the event of an emergency, all reporting must be made to your direct project or office manager and/or safety department. Other required client, regulatory or other agency notifications will be made by management within appropriate reporting deadlines.

### 8.0 WASTE MANAGEMENT

Under normal conditions associated with the remediation process, groundwater monitoring wells are purged of impacted groundwater and as part of the investigation process, impacted soils are stored within containers until these wastes can be profiled and disposed at an approved landfill. Other chemicals may be ordered for maintenance or to otherwise facilitate the remediation process. It is the company's objective to ensure all containers are in good condition and labeled appropriately so as to prevent any release of contaminated materials from these containers until it can be appropriately disposed.

#### 8.1 CONTAINER LABELING

All containers used by the company must be appropriately labeled – even when a waste is in accumulation or a material is still in use. Containers are defined by the company as any bucket, bottle, barrel, drum, jar, tote, can, box, crate, tank, or other similar means used to contain, store, and/or transport materials. Containers may be movable or stationary and can vary in weight and dimension; however, common containers used by the company include drums, totes, buckets, soil bags or super sacks.

##### 8.1.1 Hazardous Material/Waste Labeling

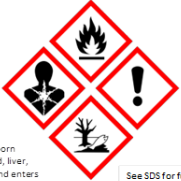
Any hazardous material or waste container(s) must be labeled in accordance with 29 CFR 1910.1200 using a globally harmonized system (GHS) for chemical classification and labeling. Tags using the same GHS-format should be used for soil bags and super sacks. Each label must contain six required elements, which include the following:

- § Product identifier – should match the product name on the safety data sheet
- § Signal word – “danger” (severe) or “warning” (less severe)
- § Hazard statements – phrase assigned to a hazard class used to describe the nature of the product’s hazards
- § Precautionary statements – a measure to minimize or prevent adverse effects that results from exposure
- § Supplier identification – name, address, and telephone number of the supplier or manufacturer\*

**PETROLEUM-IMPACTED GROUNDWATER [Gasoline]**

UN No. 1203  
CAS No. 86290-81-5

**DANGER**



Extremely flammable liquid and vapor. Causes skin irritation. May cause genetic defects. May cause cancer. Suspected of damaging fertility or the unborn child. May cause drowsiness or dizziness. May cause damage to organs (blood, liver, kidney) through prolonged or repeated exposure. May be fatal if swallowed and enters airways. Toxic to aquatic life with long lasting effects.

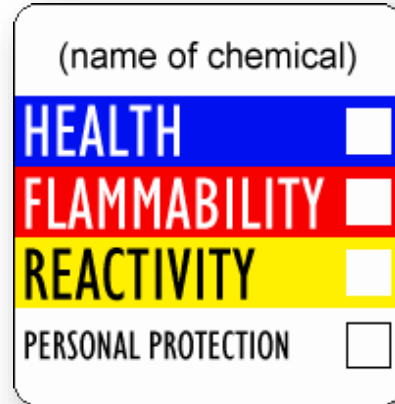
See SDS for further information.

Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container(s) tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe gas/mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye and face protection. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Seek medical attention as warranted. If inhaled, remove person to fresh air and keep comfortable for breathing. If swallowed, immediately call poison control doctor. Do NOT induce vomiting. If on skin or hair, take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs, seek medical attention. In case of fire, use alcohol-resistant foam, carbon dioxide, dry powder or water fog for extinction. Collect spillage. Store in well-ventilated, cool place and keep container tightly closed.

This material collected as part of remediation. For emergencies, contact:  
PPM Consultants, Inc. | 1600 Lamy Lane, Monroe, LA 71201 | 800-945-4834

§ Pictograms – graphical symbols used to convey specific hazard information visually

*\*Note: Hazardous materials ordered by PPM must have the manufacturer or supplier information posted on the containers; however, materials generated as part of the remediation process must identify PPM as the emergency contact.*



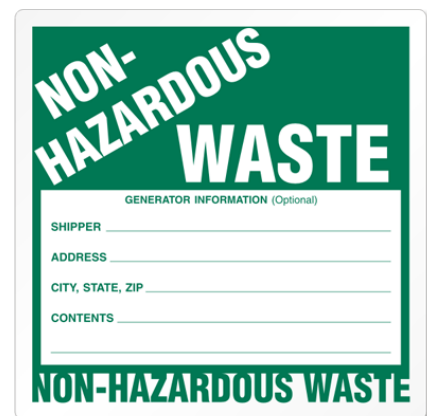
The GHS labeling system will replace the HMIS labeling system previously used by the company. In general, HMIS labels may still be used in conjunction with, or as a component of, the GHS labeling system. The international requirements for HMIS labeling are similar to those developed by the American Coatings Association with the exception that the degree of hazard severity as indicated by the numbering system is reversed (example: under the old system the higher the number, the higher the hazard severity; under international GHS requirements, the lower the number, the higher the hazard severity). Therefore, workers may continue to see HMIS labels as part of the GHS labeling system when used by other companies; however, PPM will discontinue the use of HMIS labels moving forward.

### 8.1.2 Nonhazardous Material/Waste Labeling

Containers of nonhazardous materials and/or wastes must also be labeled. They will be labeled using the same labeling system as addressed within the previous section; however, workers should expect these labels to be less detailed since these materials are not likely to pose hazards. Continued use of this labeling system will permit workers to identify the contents of any container used by the company.

Once materials have been deemed as a waste, then non-hazardous waste labels must additionally be affixed to the container(s) so long as the material is truly considered to be a nonhazardous substance. Verbiage for this label template has been modified to meet the needs of the company, and workers are required to complete the label in accordance with the following requirements:

- § Generator – PPM must never be identified as the generator; wastes are generated on behalf of the client and therefore, must have the client’s name.
- § Contact – PPM will be considered the contact; this will enable clients with multiple subcontractors to identify which of their contractors is generating the waste.
- § Phone – Provide PPM’s phone number in case of emergency (800-945-4834).
- § Contents – Identify the material being stored within the container.
- § Start date – Indicate the date that the material is first placed inside the container; if the container will be accumulating, worker must still provide a date and must also indicate that it is in accumulation.



## 8.2 CONTAINER STORAGE AND DISPOSAL



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

In accordance with company policy, all wastes must be stored within fenced remediation systems, behind buildings or in other inconspicuous areas so as not to be disturbed by unauthorized individuals. Wastes must also be profiled and disposed within 90 days of task completion. Drums that are in accumulation may reside onsite for a period no greater than 365 days. Materials in accumulation must be profiled and disposed at least once per calendar year to ensure container integrity. Variances to this policy must be approved by the District Manager or safety department in advance.

### 8.3 CONTAINER INSPECTIONS

Containers stored at sites with a remediation system undergo routine visual inspections. Inspections occur on a quarterly basis to ensure that container integrity is maintained and that there is no evidence of leakage, excessive rusting, bulging or other forms of container damage that could result in a release. Inspections are documented and retained by the safety department. Evidence of container damage is promptly addressed.





# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

### 9.0 PERSONNEL/CONTRACTOR SAFETY REVIEW

This HASP and any corresponding JSA(s) must be outlined during a safety briefing that is to be held by the SSO. This safety briefing shall occur prior to the start of the project and consists of an entire review of all relevant sections of this safety plan as it relates to all phases of the project. Affected company personnel, subcontractors, clients, and/or regulators assigned to the project must participate in the safety briefing to gain access to the work zone. Changes or additions in site personnel will require an additional safety briefing be conducted with all affected person(s) to permit site access. Participants of the safety briefing will be required to sign a form to acknowledge they have received safety instructions and agree to abide by the provisions outlined within the HASP and JSA.

Additional tailgate meetings shall occur on a daily basis prior to the initiation of work activities. All authorized persons must attend the tailgate meeting held by the SSO to discuss the safety provisions affected by the task(s) to be performed for that day. Each participant will be required to sign the tailgate meeting log to acknowledge they have received safety instructions and agree to abide by those provisions reviewed during the tailgate meeting. ***No one should be permitted to participate in the tailgate meetings until a complete review of the HASP and corresponding JSA(s) has been completed!***

### 10.0 CONTRACTOR RESPONSIBILITY AND SUPERVISION

Subcontractors must abide by all safety procedures outlined within this plan, or they will be required to leave the premises until these procedures are implemented. Subcontractors will be permitted to operate under a separate safety plan as long as it meets the minimum requirements established by this HASP, has been reviewed and approved by the HSD in advance of the project's start date, and does not otherwise conflict with the provisions of this HASP.

Subcontractors may not initiate work without the authorization of PPM, and all subcontracted work must be performed under the supervision of a PPM representative. Managers and field workers must coordinate schedules with the subcontractor(s) in advance of the project. All field processes must be shut down when a PPM representative leaves the jobsite unless otherwise approved by the District Manager; however, notations must be made within the HASP when this exception is granted.

Subcontractors must provide advanced notification when bringing additional chemicals not otherwise covered by this safety plan onto the jobsite. A safety data sheet must be provided to the HSD for review/approval before any chemical will be permitted onsite. If approved, any additional hazards, preventive measures, and emergency response procedures associated with the introduction of these substances must be incorporated into this HASP prior to the start of the project.

### 11.0 CONFINED SPACE

Confined space is defined by OSHA as any space that is "large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy." In accordance with this definition, PPM will not be conducting any field-related task that can be defined as confined space entry. PPM personnel have not been adequately trained for confined space entry; therefore, in the event site conditions warrant this type of work, a qualified contractor will be hired for this task.



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## HEALTH AND SAFETY PLAN

### 12.0 LIST OF ABBREVIATIONS

ACM	asbestos-containing material	MTBE	methyl-tertiary butyl ether
ANSI	American National Standards Institute	NCHRP	National Cooperative Highway Research Program
BGS	below ground surface	NIOSH	National Institute for Occupational Safety and Health
BTEX	benzene, toluene, ethylbenzene, and xylene	NOAA	National Oceanic and Atmospheric Administration
CFR	Code of Federal Regulations	O <sub>2</sub> /O <sub>3</sub>	oxygen/ozone
CHMM	Certified Hazardous Materials Manager	ORC	oxygen release compound
CO/CO <sub>2</sub>	carbon monoxide/dioxide	OSHA	Occupational Safety and Health Administration
CSP	Certified Safety Professional	OVA	organic vapor analyzer
dB	decibel	PACM	presumed asbestos-containing material
DEET	N,N-diethyl-meta-toluamide	PAH	polycyclic aromatic hydrocarbon
DOT	Department of Transportation	PCB	polychlorinated biphenyl
fc	foot-candle	P.E.	Professional Engineer
FID	flame ionization detector	PEL	permissible exposure limit
GFCI	ground fault circuit interrupter	P.G.	Professional Geologist
GHS	Globally Harmonized System of Chemical Classification and Labeling	PIC	Principal-in-Charge
GVWR	gross vehicle weight rating	PID	photo-ionization detector
HASP	health and safety plan	PPM	PPM Consultants, Inc.
HEPA	high efficiency particulate air	ppm	parts per million
HIV	human immunodeficiency virus	SDS	safety data sheet
HMIS	hazardous materials information system	SS	Safety Supervisor
HSD	Health and Safety Director	SSO	Site Safety Officer
HSSE	health, safety, security and environmental	STEL	short-term exposure limit
IDLH	immediately dangerous to life and/or health	SVOC	semi-volatile organic compound
JSA	job safety analysis	TPH	total petroleum hydrocarbon
KV	kilo volt	TLV	threshold limit value
LEL	lower explosive limit	TWA	time-weighted average
LFL	lower flammability limit	UEL	upper explosive limit
		UFL	upper flammability limit
		VOC	volatile organic compound
		UST	underground storage tank

## FIELD FORMS

## SUBSURFACE CLEARANCE CHECKLIST



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## SUBSURFACE CLEARANCE CHECKLIST

2019

Site Name: \_\_\_\_\_ Project No.: \_\_\_\_\_ Date: \_\_\_\_\_

Subsurface clearance measures are required for any ground surface disturbances that include, but are not limited to: digging, shoveling, trenching/excavating, subsurface injection, horizontal drilling, or other tasks similar in nature. The following preliminary checks are to be performed and documented by management and then turned over to the Safety Supervisor for inclusion in the health and safety plan [HASP] for further field documentation.

1.0 PREPARATION TASKS AND MARK-OUTS			
ACTIVITY	Yes	No	N/A
Manager and field worker meeting held to discuss site objectives and establish procedures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worker and subcontractor preliminary safety briefing conducted [PPM conference room].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HASP request issued to Safety Supervisor or Health and Safety Director to initiate field work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All applicable local, state and federal permits have been obtained.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Site access/permission has been secured.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Most recent as-built drawings and/or site plans requested from client, owner, or site manager.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Most recent as-built drawings and/or site plans received from client, owner, or site manager.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction and/or installation photos requested from client, owner, or site manager.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction and/or installation photos received from client, owner, or site manager.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed site information to identify subsurface structures relevant to planned site activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State One Call notified within required time-frame [i.e., 48/72-hr requirement].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- If yes, complete following information and/or attach online reporting form.
  - Date | Time called: \_\_\_\_\_ | \_\_\_\_\_  AM  PM
  - Site address: \_\_\_\_\_ City, State: \_\_\_\_\_ Zip: \_\_\_\_\_
  - Parish/County: \_\_\_\_\_ Nearest intersection: \_\_\_\_\_
  - Date to be marked: \_\_\_\_\_ Call made by: \_\_\_\_\_ Ticket No: \_\_\_\_\_
  - Ticket expiration date: \_\_\_\_\_ One Call contact: \_\_\_\_\_
  - Companies notified by One Call: \_\_\_\_\_

Private utility companies not subscribing to One Call have been notified. If yes, document below.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private mark-out company(s) will be used for this project.	<input type="checkbox"/>	<input type="checkbox"/>	--

State One Call Phone Numbers:  
 AL: 1-800-292-8525  
 AR: 1-800-482-8998  
 FL: 1-800-432-4770  
 GA: 1-800-282-7411  
 LA: 1-800-272-3020; ID#29890  
 MS: 1-800-227-6477  
 SC: 1-800-922-0983  
 TN: 1-800-351-1111

Additional notes/comments:

Person Completing Section 1 [Print]: \_\_\_\_\_ Signature: \_\_\_\_\_



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## SUBSURFACE CLEARANCE CHECKLIST

2019

Site Name: \_\_\_\_\_ Project No.: \_\_\_\_\_ Date: \_\_\_\_\_

The following section(s) are to be performed and documented by [or under the supervision of] the designated Site Safety Officer and retained within the HASP throughout the course of the project.

2.0 INITIAL SITE VISIT AND SELECTION OF GROUND DISTURBANCE LOCATIONS			
ACTIVITY	Yes	No	N/A
Location of all aboveground indicators of subsurface utilities/services has been identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of utility mark-outs by all private utility companies has been identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of area lights/signs and associated subsurface lines [electrical poles, etc.] identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of all phones, fiber optic and associated subsurface lines identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of all drains and associated interconnecting lines [sewer lines, etc.] identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of all electrical junction boxes and associated interconnecting lines identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of all natural gas meters or connectors and all interconnecting lines identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of all other utilities/services [transformers, pipeline markers, etc.] identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of tank pit/vent stack/fill port/dispenser/observation wells/shut-offs identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Orientation, arrangement, location, size of tanks, STP and extractor covers identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of paving scars indicative of product lines or other subsurface structures identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Existing aboveground components that may indicate subsurface piping/structures identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presence and tracing of process/storm sewers identified and understood.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Location of other pertinent features that may be of relevance to work scope identified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clearance methods approved by Project Manager prior to start of the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.0 SUBSURFACE STRUCTURE DELINEATION			
ACTIVITY	Yes	No	N/A
HASP reviewed with all site personnel and subcontractors assigned to this project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subsurface clearance reviewed with all site personnel/subcontractors assigned to this project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work area is isolated using cones, barricades, caution tape, equipment, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warning signs and other safety equipment is present onsite.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All emergency shut-off switches [product dispensers, utilities, etc.] have been located.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.0 TRENCHING/EXCAVATION PRECAUTIONS			
ACTIVITY	Yes	No	N/A
Trench/excavation checklist completed daily prior to conducting field activities [≥4 ft BGS]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personnel prohibited from entering trench/excavation [≥4 ft BGS]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At least one ladder present onsite for emergency egress [regardless of depth].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tools/materials stored and personnel kept at least 2 feet away from edge of excavation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If subsurface structures exposed, extra precautions are taken to ensure structural integrity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Person Completing Section 2-4 [Print]: \_\_\_\_\_ Signature: \_\_\_\_\_



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## SUBSURFACE CLEARANCE CHECKLIST

2019

Site Name: \_\_\_\_\_ Project No.: \_\_\_\_\_ Date: \_\_\_\_\_

The following section(s) are to be performed and documented by [or under the supervision of] the designated Site Safety Officer and retained within the HASP throughout the course of the project.

5.0 VISUAL INSPECTION AND DOCUMENTATION						
TYPE OF DISTURBANCE	BORE-HOLE / WELL ID	BOREHOLE / TRENCH LOCATION	CLEARANCE METHOD USED	VISUALLY WITNESSED		CHECK ALL THAT APPLY
				INITIAL	TIME	
<input type="checkbox"/> Drilling <input type="checkbox"/> Excavation <input type="checkbox"/> Geoprobe <input type="checkbox"/> Hand Auger <input type="checkbox"/> MIP/LIF <input type="checkbox"/> Trenching <input type="checkbox"/> Other*	_____ <input type="checkbox"/> N/A	<input type="checkbox"/> Critical <input type="checkbox"/> Exclusion <input type="checkbox"/> Non-Critical  <input type="checkbox"/> Principal Variance Obtained for Excl. Zone	<input type="checkbox"/> Air Knife <input type="checkbox"/> Electromagnetic <input type="checkbox"/> GPR <input type="checkbox"/> Hand Auger <input type="checkbox"/> Post-Hole <input type="checkbox"/> Push Probe <input type="checkbox"/> Shovel <input type="checkbox"/> Other*	<input type="checkbox"/> Yes <input type="checkbox"/> No*  _____	_____	<input type="checkbox"/> Push probe effective for clearance <u>HARD SOIL TYPE(S)</u> <input type="checkbox"/> Tiered-approach effective for clearance <input type="checkbox"/> Hand auger effective for clearance <input type="checkbox"/> Post-hole digger effective for clearance <input type="checkbox"/> Shovel effective for clearance  <input type="checkbox"/> Water used and effective <input type="checkbox"/> Water used and ineffective <input type="checkbox"/> Water not used due to sample interference  <input type="checkbox"/> Operating under variance*
<input type="checkbox"/> Drilling <input type="checkbox"/> Excavation <input type="checkbox"/> Geoprobe <input type="checkbox"/> Hand Auger <input type="checkbox"/> MIP/LIF <input type="checkbox"/> Trenching <input type="checkbox"/> Other*	_____ <input type="checkbox"/> N/A	<input type="checkbox"/> Critical <input type="checkbox"/> Exclusion <input type="checkbox"/> Non-Critical  <input type="checkbox"/> Principal Variance Obtained for Excl. Zone	<input type="checkbox"/> Air Knife <input type="checkbox"/> Electromagnetic <input type="checkbox"/> GPR <input type="checkbox"/> Hand Auger <input type="checkbox"/> Post-Hole <input type="checkbox"/> Push Probe <input type="checkbox"/> Shovel <input type="checkbox"/> Other*	<input type="checkbox"/> Yes <input type="checkbox"/> No*  _____	_____	<input type="checkbox"/> Push probe effective for clearance <u>HARD SOIL TYPE(S)</u> <input type="checkbox"/> Tiered-approach effective for clearance <input type="checkbox"/> Hand auger effective for clearance <input type="checkbox"/> Post-hole digger effective for clearance <input type="checkbox"/> Shovel effective for clearance  <input type="checkbox"/> Water used and effective <input type="checkbox"/> Water used and ineffective <input type="checkbox"/> Water not used due to sample interference  <input type="checkbox"/> Operating under variance*
<input type="checkbox"/> Drilling <input type="checkbox"/> Excavation <input type="checkbox"/> Geoprobe <input type="checkbox"/> Hand Auger <input type="checkbox"/> MIP/LIF <input type="checkbox"/> Trenching <input type="checkbox"/> Other*	_____ <input type="checkbox"/> N/A	<input type="checkbox"/> Critical <input type="checkbox"/> Exclusion <input type="checkbox"/> Non-Critical  <input type="checkbox"/> Principal Variance Obtained for Excl. Zone	<input type="checkbox"/> Air Knife <input type="checkbox"/> Electromagnetic <input type="checkbox"/> GPR <input type="checkbox"/> Hand Auger <input type="checkbox"/> Post-Hole <input type="checkbox"/> Push Probe <input type="checkbox"/> Shovel <input type="checkbox"/> Other*	<input type="checkbox"/> Yes <input type="checkbox"/> No*  _____	_____	<input type="checkbox"/> Push probe effective for clearance <u>HARD SOIL TYPE(S)</u> <input type="checkbox"/> Tiered-approach effective for clearance <input type="checkbox"/> Hand auger effective for clearance <input type="checkbox"/> Post-hole digger effective for clearance <input type="checkbox"/> Shovel effective for clearance  <input type="checkbox"/> Water used and effective <input type="checkbox"/> Water used and ineffective <input type="checkbox"/> Water not used due to sample interference  <input type="checkbox"/> Operating under variance*

**NOTES/COMMENTS: (ANY ITEM WITH \* REQUIRE ADDITIONAL COMMENTS)**



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## SUBSURFACE CLEARANCE CHECKLIST

2019

Site Name: \_\_\_\_\_ Project No.: \_\_\_\_\_ Date: \_\_\_\_\_

The following section(s) are to be performed and documented by [or under the supervision of] the designated Site Safety Officer and retained within the HASP throughout the course of the project.

**5.0 VISUAL INSPECTION AND DOCUMENTATION (CONTINUED)**

TYPE OF DISTURBANCE	BORE-HOLE / WELL ID	BOREHOLE / TRENCH LOCATION	CLEARANCE METHOD USED	VISUALLY WITNESSED		CHECK ALL THAT APPLY
				INITIAL	TIME	
<input type="checkbox"/> Drilling <input type="checkbox"/> Excavation <input type="checkbox"/> Geoprobe <input type="checkbox"/> Hand Auger <input type="checkbox"/> MIP/LIF <input type="checkbox"/> Trenching <input type="checkbox"/> Other*	_____ <input type="checkbox"/> N/A	<input type="checkbox"/> Critical <input type="checkbox"/> Exclusion <input type="checkbox"/> Non-Critical  <input type="checkbox"/> Principal Variance Obtained for Excl. Zone	<input type="checkbox"/> Air Knife <input type="checkbox"/> Electromagnetic <input type="checkbox"/> GPR <input type="checkbox"/> Hand Auger <input type="checkbox"/> Post-Hole <input type="checkbox"/> Push Probe <input type="checkbox"/> Shovel <input type="checkbox"/> Other*	<input type="checkbox"/> Yes <input type="checkbox"/> No*  _____	_____	<input type="checkbox"/> Push probe effective for clearance <u>HARD SOIL TYPE(S)</u> <input type="checkbox"/> Tiered-approach effective for clearance <input type="checkbox"/> Hand auger effective for clearance <input type="checkbox"/> Post-hole digger effective for clearance <input type="checkbox"/> Shovel effective for clearance  <input type="checkbox"/> Water used and effective <input type="checkbox"/> Water used and ineffective <input type="checkbox"/> Water not used due to sample interference <input type="checkbox"/> Operating under variance*
<input type="checkbox"/> Drilling <input type="checkbox"/> Excavation <input type="checkbox"/> Geoprobe <input type="checkbox"/> Hand Auger <input type="checkbox"/> MIP/LIF <input type="checkbox"/> Trenching <input type="checkbox"/> Other*	_____ <input type="checkbox"/> N/A	<input type="checkbox"/> Critical <input type="checkbox"/> Exclusion <input type="checkbox"/> Non-Critical  <input type="checkbox"/> Principal Variance Obtained for Excl. Zone	<input type="checkbox"/> Air Knife <input type="checkbox"/> Electromagnetic <input type="checkbox"/> GPR <input type="checkbox"/> Hand Auger <input type="checkbox"/> Post-Hole <input type="checkbox"/> Push Probe <input type="checkbox"/> Shovel <input type="checkbox"/> Other*	<input type="checkbox"/> Yes <input type="checkbox"/> No*  _____	_____	<input type="checkbox"/> Push probe effective for clearance <u>HARD SOIL TYPE(S)</u> <input type="checkbox"/> Tiered-approach effective for clearance <input type="checkbox"/> Hand auger effective for clearance <input type="checkbox"/> Post-hole digger effective for clearance <input type="checkbox"/> Shovel effective for clearance  <input type="checkbox"/> Water used and effective <input type="checkbox"/> Water used and ineffective <input type="checkbox"/> Water not used due to sample interference <input type="checkbox"/> Operating under variance*
<input type="checkbox"/> Drilling <input type="checkbox"/> Excavation <input type="checkbox"/> Geoprobe <input type="checkbox"/> Hand Auger <input type="checkbox"/> MIP/LIF <input type="checkbox"/> Trenching <input type="checkbox"/> Other*	_____ <input type="checkbox"/> N/A	<input type="checkbox"/> Critical <input type="checkbox"/> Exclusion <input type="checkbox"/> Non-Critical  <input type="checkbox"/> Principal Variance Obtained for Excl. Zone	<input type="checkbox"/> Air Knife <input type="checkbox"/> Electromagnetic <input type="checkbox"/> GPR <input type="checkbox"/> Hand Auger <input type="checkbox"/> Post-Hole <input type="checkbox"/> Push Probe <input type="checkbox"/> Shovel <input type="checkbox"/> Other*	<input type="checkbox"/> Yes <input type="checkbox"/> No*  _____	_____	<input type="checkbox"/> Push probe effective for clearance <u>HARD SOIL TYPE(S)</u> <input type="checkbox"/> Tiered-approach effective for clearance <input type="checkbox"/> Hand auger effective for clearance <input type="checkbox"/> Post-hole digger effective for clearance <input type="checkbox"/> Shovel effective for clearance  <input type="checkbox"/> Water used and effective <input type="checkbox"/> Water used and ineffective <input type="checkbox"/> Water not used due to sample interference <input type="checkbox"/> Operating under variance*

**NOTES/COMMENTS: (ANY ITEM WITH \* REQUIRE ADDITIONAL COMMENTS)**



## CRANE OPERATOR INSPECTION



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## CRANE OPERATOR INSPECTION

2019

Crane: Ford F-350 (Truck 109)      Date of inspection: \_\_\_\_\_      Inspection Type:  Monthly  Pre-Use

Inspector Name [Print]: \_\_\_\_\_ [Signature]: \_\_\_\_\_

**Instructions:** Check all items indicated. Inspect and indicate as satisfactory = S, unsatisfactory = U, or not applicable = N/A. Any noted deficiencies must be outlined further under the Comment section.

Walk-Around Inspection	U	S	N/A	Walk-Around Inspection	U	S	N/A
Battery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hook/capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Belts/hoses/lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydraulic filters/oil level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coolant level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydraulic pump/tank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Levers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil filter/level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lift cylinders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brakes/brake lights	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Load rating charts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drive line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lubrication/grease fittings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gauges – oil/fuel/amp/temp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Master cylinder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hand throttle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No load test	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outrigger beams/jacks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lights – backup/dash/dome	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outrigger pads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lights – warning/indicator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Safety guards/plates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operator manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Swing gear/motor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tires – axle/chocks/pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Telescopic/main sections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Turntable/frame	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boom pivot pin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Housekeeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Leaks – fuel/lube/oil/water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crane stability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sling – capacity/integrity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire extinguisher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Unusual noises	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gantry/pendant/boom stops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Warning tags	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Comments:**

- Findings:**
- Crane is functioning properly and in good working condition
  - Damages/defects noted and crane is in need of repair
  - Damages/defects noted and truck crane should be taken out of service

Note: The knuckle-boom truck-mounted crane is not operated on a daily basis; therefore, inspections are not required daily but must be completed prior to each use and at least monthly. Inspections must be documented using this form and completed forms must be returned to the Health and Safety Director for recordkeeping.

## FORKLIFT SAFETY INSPECTION



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## FORKLIFT SAFETY INSPECTION

2019

Forklift Make/Model: \_\_\_\_\_ Date of inspection: \_\_\_\_\_

Forklift Type:      D/DS/DY – Diesel-powered                                      G/GS – Gasoline-powered  
                           E/ES/EE/EX – Electrically-powered                                      LP/LPS – Liquefied petroleum gas-powered

Inspector Name [Print]: \_\_\_\_\_ [Signature]: \_\_\_\_\_

**Instructions:** Check all items indicated. Inspect and indicate as satisfactory = S, unsatisfactory = U, or not applicable = N/A. Any noted deficiencies must be outlined further under Comment section.

Walk-Around Inspection	U	S	N/A	Walk-Around Inspection	U	S	N/A
Mast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Oil level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carriage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Coolant level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Forks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fuel level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Backrest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hydraulic fluid level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seatbelt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Starting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lift operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Axles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tilt operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hydraulic hoses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Horn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Belts, pulleys	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Steering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overhead guard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Parking brake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gauges and indicators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Operational brake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire extinguisher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Batter connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Fuel tank damage/leaks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Warning/operational lights	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

**Comments:**

**Findings:**

- Forklift is functioning properly and in good working condition
- Damages/defects noted and forklift is in need of repair
- Damages/defects noted and forklift should be taken out of service

PPM does not currently own a forklift. Forklifts are rented on an as-needed basis and are therefore not operated on a daily basis. Inspections must be completed by a competent person (forklift-certified operators only) and prior to each use. Inspections must be documented using this form and completed forms must be returned to the Health and Safety Director for recordkeeping.

**INCIDENT/NEAR-MISS AND HAZARD RECOGNITION REPORT**



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## INCIDENT/NEAR-MISS AND HAZARD RECOGNITION REPORT

A near-miss is a potential hazard or incident that has not resulted any personal injury or property damage. Unsafe working conditions, short-cuts or unsafe worker behaviors, improper use of equipment, use of malfunctioning equipment, or failure to implement HSSE protocols (to name a few) can lead to work-related incidents or injuries. It is the responsibility of all workers to report unsafe acts/conditions or incidents as they occur. All incidents, near-misses, or other recognized hazards must be reported to the Health and Safety Director using this form.

### 1. GENERAL INFORMATION

Name of person reporting [print]: \_\_\_\_\_ Date reported: \_\_\_\_\_  
Title/position of person reporting: \_\_\_\_\_ Office location: \_\_\_\_\_  
Office manager: \_\_\_\_\_ Type of event:  Incident  Near-miss  Hazard report

### 2. DESCRIPTION OF INCIDENT, NEAR-MISS, OR HAZARD REPORTED

Type of hazard:  Chemical hazard  Physical hazard  Biological hazard  Other hazard  
If an incident, indicate all that apply:  Injury/illness  Property damage  Neither  Other [describe below]

Describe the incident, near-miss or hazard in detail. Be descriptive when reporting incidents and near-misses outlining the actions leading up to and including the event. Attach photos, sketches, etc. when possible.

Describe all actions taken to bring the event to full closure.

Provide recommendations for corrective action/improvement.

## INCIDENT LOG





**TRENCH/EXCAVATION INSPECTION**



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## TRENCH/EXCAVATION INSPECTION

2019

### GENERAL INFORMATION AND SITE CONDITIONS

Site Name: \_\_\_\_\_ Project No.: \_\_\_\_\_ Date: \_\_\_\_\_

Inspector [Print Name]: \_\_\_\_\_ Inspector [Signature]: \_\_\_\_\_

Weather Conditions:     Rain             Sleet/Hail/Snow             Sunny/Clear             Overcast             Other

Soil Class/Type:         Sand             Silt             Clay             Combination             Other \_\_\_\_\_

Trench/Excavation Depth:     0-3 feet BGS             4-12 feet BGS             13-20 feet BGS             >20 feet BGS

*\*NOTE: Complete top portion of form only if trench/excavation is 0-3 ft BGS; complete entire form if trench/excavation is ≥ 4 ft BGS. If ≥4 feet BGS, workers are prohibited from entering a trench/excavation without the use of engineering controls approved by P.E.*

OSHA 29 CFR 1926.650-652 requires that any open trench/excavation ≥4 feet BGS be inspected on a daily basis to ensure structural integrity is maintained. Should adverse weather conditions (i.e., rain or snow) arise during the course of a project or any other scenario that could possibly alter the stability of the trench/excavation, multiple inspections throughout the day must be conducted to ensure structural integrity is maintained. These inspections must be documented using this form and must be returned to the Health and Safety Director for recordkeeping upon completion of the project.

### GENERAL TRENCH/EXCAVATION INSPECTION

	Y	N	NA
Trench/excavation, adjacent areas, and protective systems inspected by Competent Person prior to start.	<input type="checkbox"/>	<input type="checkbox"/>	--
Surface encumbrances supported or removed.	<input type="checkbox"/>	<input type="checkbox"/>	--
Equipment, tools and other materials kept a minimum of 2 ft from edge of trench/excavation.	<input type="checkbox"/>	<input type="checkbox"/>	--
Employees, contractors and regulatory officials kept a minimum of 2 ft from edge of trench/excavation.	<input type="checkbox"/>	<input type="checkbox"/>	--
Appropriate personal protective equipment worn by all employees and subcontractors.	<input type="checkbox"/>	<input type="checkbox"/>	--
Barriers provided at all remote trenches/excavations.	<input type="checkbox"/>	<input type="checkbox"/>	--
Everyone onsite prohibited from working or walking under suspended loads.	<input type="checkbox"/>	<input type="checkbox"/>	--
Everyone onsite maintains 10-ft distance from operating equipment or spotter used to determine location.	<input type="checkbox"/>	<input type="checkbox"/>	--

### UTILITY CLEARANCE AND ACCESS/EGRESS

	Y	N	NA
State One Call contacted 48-72 hours prior to trenching/excavating.	<input type="checkbox"/>	<input type="checkbox"/>	--
Local utility companies not subscribed to One Call have been contacted by PPM 48-72 hours prior to start.	<input type="checkbox"/>	<input type="checkbox"/>	--
Onsite evidence that utilities have been marked.	<input type="checkbox"/>	<input type="checkbox"/>	--
If no to previous question, One Call/local utility companies have been contacted again to mark utilities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If no to previous question, Office Manager has approved authorization to proceed without utility marking.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Underground installations protected, supported or removed while trench/excavation is open.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At least one ladder is present onsite in case of emergency access/egress.	<input type="checkbox"/>	<input type="checkbox"/>	--
Work zone barricaded/coned or otherwise isolated to prevent unauthorized entry.	<input type="checkbox"/>	<input type="checkbox"/>	--
Unauthorized personnel denied access to work zone.	<input type="checkbox"/>	<input type="checkbox"/>	--

### WATER ACCUMULATION/WET CONDITIONS

	Y	N	NA
Precautions taken to protect workers from accumulation of water and potential cave-in.	<input type="checkbox"/>	<input type="checkbox"/>	--
Additional inspection made after change in weather or site conditions and prior to continuation of work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water removal equipment monitored by a Competent Person.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surface water controlled or diverted to prevent impact to structural stability of trench/excavation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trench/excavation determined to be stable subsequent to change in weather or site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If no to previous question, work is ceased and limited access granted until trench/excavation is stabilized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adjacent structures determined to be stable subsequent to change in weather or site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If no to previous question, work is ceased and limited access granted until structures are stabilized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### HAZARDOUS ATMOSPHERE(S)

	Y	N	NA
Oxygen content between 19.5% and 21%.	<input type="checkbox"/>	<input type="checkbox"/>	--
Atmospheric testing conducted when reasonable possibility of oxygen deficiency or hazardous atmosphere.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ventilation provided to prevent flammable gas from building >10% LEL of the gas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermittent air monitoring conducted to ensure site conditions remain unchanged and acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	--
Workers informed of warning signals and evacuation location in the event the site becomes unsafe.	<input type="checkbox"/>	<input type="checkbox"/>	--
Workers trained in proper use of personal protective and emergency response equipment.	<input type="checkbox"/>	<input type="checkbox"/>	--

### NOTES/COMMENTS:

## AMBIENT AIR MONITORING REPORT



# HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM

## AMBIENT AIR MONITORING REPORT

2019

Site Name: \_\_\_\_\_ Project No.: \_\_\_\_\_ Date: \_\_\_\_\_  
 Instrument Make: \_\_\_\_\_ Model: \_\_\_\_\_ Serial No.: \_\_\_\_\_  
 Instrument Detection Limit: \_\_\_\_\_ Calibrated:  Yes  No Calibration Gas: \_\_\_\_\_  
 Arrival Time: \_\_\_\_\_ Departure Time: \_\_\_\_\_  
 Sampler [Print Name]: \_\_\_\_\_ Sampler [Signature]: \_\_\_\_\_

### AMBIENT AIR CONDITIONS

PPM works with numerous volatile and semi-volatile contaminants, some of which have threshold limits assigned by OSHA to ensure worker health is not impaired. To ensure site conditions are and remain acceptable, it is necessary that ambient site conditions be monitored frequently and consistently. The assigned Site Safety Officer must collect baseline samples. Additional samples should be collected in and around the work zone taking into consideration exposures to PPM personnel, subcontractors and the general public. A minimum of 4 samples must be collected within worker breathing zones every 2 hours so long as readings remain within acceptable action limits. Readings in excess of assigned action limits (outlined within the HASP) must be immediately reported to the Health and Safety Director and will require more frequent collections and may require site evacuation.

Action Limit<sub>Gasoline</sub>:      100 ppm [toxicity]      10% or 1400 ppm [flammability]      All other COCs, see Table 5-1 of HASP

**Draw diagram of site identifying all collection locations.**

Description of Sample Locations	
Sample ID	Describe location of sample collection point
AM-1	
AM-2	
AM-3	
AM-4	
AM-5	
AM-6	
AM-7	
AM-8	
AM-9	
AM-10	

Sample ID	NSEW	Result	Time	Sample ID	NSEW	Result	Time	Sample ID	NSEW	Result	Time

Notes/Comments:

**TAILGATE SAFETY MEETING LOG**



**HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROGRAM**  
**TAILGATE SAFETY MEETING LOG**

**2019**

Site Name: \_\_\_\_\_ Project Number: \_\_\_\_\_

Trainer [Name/Title]: \_\_\_\_\_ / \_\_\_\_\_ Date: \_\_\_\_\_

This form is to be used in conjunction with the HASP and must document all items discussed during each daily safety tailgate meeting. Be sure to include notations for special considerations (i.e., subcontractor concerns, etc.) as they arise during the course of the project. All affected parties must participate in this safety briefing and sign the attendance portion of this form. Forms must be returned along with other field forms to the safety department upon completion of the project.

**DAILY WORK PLAN ACTIVITIES**

**SAFETY TOPICS**

Standard operating or safety procedures: \_\_\_\_\_

Required protective clothing and equipment: \_\_\_\_\_

Identify and discuss all chemical hazards: \_\_\_\_\_

Identify any special equipment used: \_\_\_\_\_

Other discussion items/requirements: \_\_\_\_\_

Emergency procedures (outline evacuation area, break area and directions to nearest medical facility):

Evacuation warning: \_\_\_\_\_

Evacuation area: \_\_\_\_\_ Break area: \_\_\_\_\_

Location of hospital: \_\_\_\_\_ Phone #: \_\_\_\_\_

**ATTENDANCE RECORD**

Print Name:	Signature:	Print Name:	Signature:

**HASP ACKNOWLEDGMENT FORM**





**APPENDIX H – COST PROPOSAL NO. 25 – EQUIPMENT PURCHASE**

**Alabama Tank Trust Fund  
Cost Proposal  
Part I**

**I.1 Cost Proposal Information:**

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
25 Equipment Purchase	8/29/2019
UST or AST Incident Number:	Facility I.D. Number:
UST13-04-02	22176-097-006446

**I.2 Facility Information**

Facility Name:	Former Pantry 1559 (Circle K Store No. 2721559)
Facility Address:	10 North University Blvd Mobile, AL

**I.3 Owner Information:**

Owner Name:	Circle K Stores, Inc.
Owner Address:	1100 Situs Court, Suite 100 Raleigh, NC 27606
Employer Tax Number (IRS):	56-1574463

**I.4 Response Action Contractor Information:**

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	<a href="mailto:rodney.kilgore@ppmco.com">rodney.kilgore@ppmco.com</a>
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number:

25

Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

**I.5 Activity Information:**

Indicate below the activities for which the cost proposal is submitted:

<input type="checkbox"/>	Site Stabilization/Initial Abatement
<input type="checkbox"/>	Preliminary Investigation
<input type="checkbox"/>	Secondary Investigation / Additional Well Installation
<input type="checkbox"/>	Alabama Risk Based Corrective Action (ARBCA)
<input type="checkbox"/>	Groundwater Sampling
<input type="checkbox"/>	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
<input type="checkbox"/>	Corrective Action Plan Evaluation
<input type="checkbox"/>	Develop Corrective Action Plan
<input checked="" type="checkbox"/>	Corrective Action
<input type="checkbox"/>	Stockpile Sampling / Management / Disposal
<input type="checkbox"/>	Provision of Alternate Water Supply
<input type="checkbox"/>	Pilot Test
<input type="checkbox"/>	Monitoring/Recovery/Injection Well Abandonment
<input type="checkbox"/>	System Decommissioning/Removal

**Activities/Other/Brief Summary of Activities:**

Purchase Ozone System and Sparge Point Materials

Provide proposed completion date for this phase of work activities:

60 Days following ADEM approval

Provide projected date of cleanup completed:

Unknown

**I.6 Subcontractor Information:**

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
H2O Engineering, Inc.	Ozone System/Sparge Point Materials
189 Granada Drive, San Luis Obispo, CA	

Cost Proposal Number:

25


Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

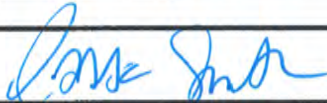
Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

**I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:**

*I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.*

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Brent Puzak, Director, North Amer. Env. Shared Serv.
Email address:	<a href="mailto:BPuzak@circlek.com">BPuzak@circlek.com</a>
Date:	8/29/19

**I.8 Cost Proposal- Contractor Signature:**

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	8/29/19

**I.9 Trust Fund Obligation Information:**

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	\$750,000.00
Total of Previously Approved Cost Proposals:	\$465,371.21
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	\$527,254.39
Estimate Percent Completion of entire project to date:	70%

**I.10 Cost Proposal Amount**

Proposed Costs under this Cost Proposal:	\$61,883.18	<b>Personnel</b>	<b>\$1,311.00</b>
		<b>Field Equipment</b>	<b>\$0.00</b>
Owners Required Contribution for UST Release(\$5,000): <i>Applicable for CP#1 Only</i>		<b>Mileage</b>	<b>\$0.00</b>
		<b>Per Diem</b>	<b>\$0.00</b>
		<b>Drilling</b>	<b>\$0.00</b>
Owners Required Contribution for AST Release(\$10,000): <i>Applicable for CP#1 Only</i>		<b>Analytical</b>	<b>\$0.00</b>
		<b>Other</b>	<b>\$60,572.18</b>
<b>Total of This Cost Proposal:</b>	<b>\$61,883.18</b>		

<b>Cost Proposal Summary</b>					
CP Total	Facility I.D. #	CP #	Incident Number	Site Name	
\$61,883.18	22176-097-006446	25	UST13-04-02	ner Pantry 1559 (Circle K Store No. 2721	
<b>Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal</b>					
<u>Scenarios</u>		<u>Unit \$</u>	<u>Units</u>	<u>Quantity</u>	<u>Requested\$</u>
System Purchase Letter		\$1,311 /ltr		1	\$1,311.00
<b>Total Report and Plan Costs</b>					<b>\$1,311.00</b>
<b>Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal</b>					
Postage / Shipping and Copying (plans reports, ADEM and owner)		\$85 /sow		1	\$85.00
<b>Total Field Costs</b>					<b>\$85.00</b>
<b>Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal</b>					
<b>Total Drilling Costs</b>					<b>\$0.00</b>
<b>Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal</b>					
		<u>Pass Through</u>	<u>Quoted Amount</u>	<u>Requested\$</u>	
Corrective Action System Purchase		5%	\$52,000.00	\$54,600.00	
Other/Misc. (receipts required)	Sparge Points (4 @ \$319.04 ec.)	5%	\$1,276.16	\$1,339.97	
Other/Misc. (receipts required)	Riser Pipe (8 @ \$35.75/10 ft.)	5%	\$286.00	\$300.30	
Other/Misc. (receipts required)	Riser Pipe (4 @ \$26.07/5 ft.)	5%	\$104.28	\$109.49	
Other/Misc. (receipts required)	Well Head Connectors (4 @ \$143.85 ec)	5%	\$575.40	\$604.17	
Other/Misc. (receipts required)	O.R Tubing (500 feet @ \$4.33/ft.)	5%	\$2,165.00	\$2,273.25	
Other/Misc. (receipts required)	Shipping for SP materials	5%	\$400.00	\$420.00	
Other/Misc. (receipts required)	Shipping for Ozone Unit	5%	\$800.00	\$840.00	
<b>Total Subs / Vendors / Utilities</b>					<b>\$60,487.18</b>

**APPENDIX I – COST PROPOSAL NO. 26 – OZONE SYSTEM INSTALLATION  
AND STARTUP**

**Alabama Tank Trust Fund  
Cost Proposal  
Part I**

**I.1 Cost Proposal Information:**

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
26 System Install	8/29/2019
UST or AST Incident Number:	Facility I.D. Number:
UST13-04-02	22176-097-006446

**I.2 Facility Information**

Facility Name:	Former Pantry 1559 (Circle K Store No. 2721559)
Facility Address:	10 North University Blvd Mobile, AL

**I.3 Owner Information:**

Owner Name:	Circle K Stores, Inc.
Owner Address:	1100 Situs Court, Suite 100 Raleigh, NC 27606
Employer Tax Number (IRS):	56-1574463

**I.4 Response Action Contractor Information:**

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	<a href="mailto:rodney.kilgore@ppmco.com">rodney.kilgore@ppmco.com</a>
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number:

26

Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

**I.5 Activity Information:**

Indicate below the activities for which the cost proposal is submitted:

	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

**Activities/Other/Brief Summary of Activities:**

Install four ozone sparge points and ozone system

Provide proposed completion date for this phase of work activities:

90 Days following ADEM approval

Provide projected date of cleanup completed:

Unknown

**I.6 Subcontractor Information:**

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
Walker Hill Environmental, Inc	Drilling and system installation
P.O. Box 1147, Foxworth, MS	
Ecosouth Services, Inc.	Soil Disposal
12945 Highway 43, Axis, AL	



Cost Proposal Number:

26


Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

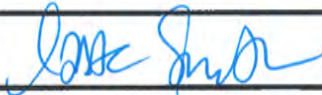
Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

**I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:**

*I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.*

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Brent Puzak, Director, North Amer. Env. Shared Serv.
Email address:	<a href="mailto:BPuzak@circlek.com">BPuzak@circlek.com</a>
Date:	8/29/19

**I.8 Cost Proposal- Contractor Signature:**

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	8/29/19

**I.9 Trust Fund Obligation Information:**

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	\$750,000.00
Total of Previously Approved Cost Proposals:	\$526,820.39
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	\$564,860.39
Estimate Percent Completion of entire project to date:	75%

**I.10 Cost Proposal Amount**

Proposed Costs under this Cost Proposal:	\$38,040.00	Personnel	\$20,223.50
		Field Equipment	\$0.00
Owners Required Contribution for UST Release(\$5,000): <i>Applicable for CP#1 Only</i>		Mileage	\$278.40
		Per Diem	\$0.00
		Drilling	\$4,945.60
		Analytical	\$55.00
Owners Required Contribution for AST Release(\$10,000): <i>Applicable for CP#1 Only</i>		Other	\$12,537.50
<b>Total of This Cost Proposal:</b>	<b>\$38,040.00</b>		

Cost Proposal Summary				
CP Total	Facility I.D. #	CP #	Incident Number	Site Name
\$38,040.00	22176-097-006446	26	UST13-04-02	Mer Pantry 1559 (Circle K Store No. 2721
Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal				
Scenarios	Unit \$	Units	Quantity	Requested\$
CA System Installation Report (all Classes same)	\$7,552 /report		1	\$7,552.00
<b>Total Report and Plan Costs</b>				<b>\$7,552.00</b>
Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal				
Porous material 0-30 feet	\$324 /well		4	\$1,296.00
System Installation Oversight (up to 7 days in field)	\$8,714 /system		1	\$8,714.00
System Startup	\$1,664 /system		1	\$1,664.00
Travel				
<b>Mileage Rate</b>			\$0.580	
Mileage (One way office to site)			30	
Number of round trips to site			8	\$278.40
Technician(s)-travel time	\$63 /hr		3	\$189.00
Geologist/Engineer-travel time	\$87 /hr		7.5	\$652.50
Project Manager-travel time	\$104 /hr		1.5	\$156.00
Postage / Shipping and Copying (plans reports, ADEM and owner)	\$85 /sow		1	\$85.00
Analytical Samples				
	<b>Method</b>		<b>Pass Through</b>	<b>Sample #</b>
TPH	418.1	\$50 /sample	10%	1
<b>Total Field Costs</b>				<b>\$55.00</b>
<b>Total Field Costs</b>				<b>\$13,089.90</b>
Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal				
Scenarios	Unit \$	Unit	Quantity	Requested\$
Mileage Rate (Current Federal Rate)			\$0.580	
Mileage (drilling device driven or ATV) ( <b>ONE WAY</b> mileage up to 450	\$2.32 /mile		150	
Number of Mobilizations (includes \$200 mob/demob amount)			1	\$896.00
Well Pad Completions for Monitoring Wells (2" and 4")(12" cover) <sup>2</sup>	\$200.00 /well		4	\$800.00
Sonic Drilling	\$35.00 /foot		80	\$2,800.00
Pass Through (if appropriate) Enter "5" or "10" as appropriate			10%	\$449.60
<b>Total Drilling Costs</b>				<b>\$4,945.60</b>
Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal				
		<b>Pass Through</b>	<b>Quoted Amount</b>	<b>Requested\$</b>
ADEM Solid Waste Profile (ADEM review fee)		10%	\$250.00	\$275.00
Corrective Action System Install		5%	\$10,000.00	\$10,500.00
Phone Costs (telemetry)		10%	\$100.00	\$110.00
Power Costs		10%	\$500.00	\$550.00
Roll off Dumpster (includes hauling/handling)		10%	\$325.00	\$357.50

<b>Cost Proposal Summary</b>					
CP Total	Facility I.D. #	CP #	Incident Number	Site Name	
\$38,040.00	22176-097-006446	26	UST13-04-02	ner Pantry 1559 (Circle K Store No. 2721	
Solid Waste Soil Disposal (to include hauling/handli			10%	\$600.00	\$660.00
<b>Total Subs / Vendors / Utilities</b>				<b>\$12,452.50</b>	

**APPENDIX J – COST PROPOSAL NO. 27 - FIRST QUARTER O&M**

**Alabama Tank Trust Fund  
Cost Proposal  
Part I**

**I.1 Cost Proposal Information:**

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
27 OM1	8/29/2019
UST or AST Incident Number:	Facility I.D. Number:
UST13-04-02	22176-097-006446

**I.2 Facility Information**

Facility Name:	Former Pantry 1559 (Circle K Store No. 2721559)
Facility Address:	10 North University Blvd Mobile, AL

**I.3 Owner Information:**

Owner Name:	Circle K Stores, Inc.
Owner Address:	1100 Situs Court, Suite 100 Raleigh, NC 27606
Employer Tax Number (IRS):	56-1574463

**I.4 Response Action Contractor Information:**

Approved Response Action Contractor Name:	PPM Consultants, Inc.
Approved Response Action Contractor Address:	30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	<a href="mailto:rodney.kilgore@ppmco.com">rodney.kilgore@ppmco.com</a>
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number:

27

Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

**I.5 Activity Information:**

Indicate below the activities for which the cost proposal is submitted:

	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
X	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

**Activities/Other/Brief Summary of Activities:**

Operate ozone sparge system for three months and collect 13 GW samples + 2 QAQC

Provide proposed completion date for this phase of work activities:

120 Days following system installation & startup

Provide projected date of cleanup completed:

Unknown

**I.6 Subcontractor Information:**

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
TestAmerica Laboratories, Inc.	Analytical
3355 McLemore Drive, Pensacola, FL	
Erwin Remediation, Inc.	Disposal
422 Ditmar Street, Pensacola, FL	

Cost Proposal Number:

27


Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)


Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

**I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:**

*I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.*

1. Owner or Operator Signature:	
Typed or Printed Name and Title:	Brent Puzak, Director, North Amer. Env. Shared Serv.
Email address:	<a href="mailto:BPuzak@circlek.com">BPuzak@circlek.com</a>
Date:	8/29/19

**I.8 Cost Proposal- Contractor Signature:**

2. Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	8/29/19

**I.9 Trust Fund Obligation Information:**

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	\$750,000.00
Total of Previously Approved Cost Proposals:	\$564,860.39
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	\$577,260.19
Estimate Percent Completion of entire project to date:	77%

**I.10 Cost Proposal Amount**

Proposed Costs under this Cost Proposal:	\$12,399.80	Personnel	\$8,306.90
		Field Equipment	\$1,001.00
Owners Required Contribution for UST Release(\$5,000): <i>Applicable for CP#1 Only</i>		Mileage	\$278.40
		Per Diem	\$0.00
		Drilling	\$0.00
Owners Required Contribution for AST Release(\$10,000): <i>Applicable for CP#1 Only</i>		Analytical	\$1,072.50
		Other	\$1,741.00
<b>Total of This Cost Proposal:</b>			<b>\$12,399.80</b>

Cost Proposal Summary				
CP Total	Facility I.D. #	CP #	Incident Number	Site Name
\$12,399.80	22176-097-006446	27	UST13-04-02	Mer Pantry 1559 (Circle K Store No. 2721
Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal				
Scenarios	Unit \$	Units	Quantity	Requested \$
SEMR - Ozone, AS, SVE, Chemox, Biosparge - Reports 1-12 wells, BTEX/MTBE/Naphthalene	\$4,371 /report		1	\$4,371.00
SEMR adder >12 wells, BTEX/MTBE/Naph	\$37.50 /well		1	\$37.50
<b>Total Report and Plan Costs</b>				<b>\$4,408.50</b>
Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal				
Groundwater Sampling Set-up (2hrs tech time)	\$126.00 /sow		1	\$126.00
Purge/Development Water Handling (see Basis)	\$94.50 /sow		1	\$94.50
Groundwater Sampling and Gauging 2" Well	\$63.00 /well		11	\$693.00
Groundwater Sampling and Gauging 4" Well	\$72.45 /well		2	\$144.90
Ozone, biosparge, SVE, biovent and Air Sparge O&M 3 months	\$1,928 /quarter		1	\$1,928.00
Travel				
<b>Mileage Rate</b>			\$0.580	
Mileage (One way office to site)			30	
Number of round trips to site			8	\$278.40
Technician(s)-travel time	\$63 /hr		12	\$756.00
Project Manager-travel time	\$104 /hr		1.5	\$156.00
Equipment and Equipment Kits				
55-Gallon Drums	\$50 /drum		2	\$100.00
Sampling Expendables(gloves, ice, string, jars, foil, distilled water, paper towels)	\$50 /sow		1	\$50.00
Expendables O&M	\$25 /day		6	\$150.00
Groundwater Monitoring	\$160 /day		1	\$160.00
Bailers	\$7 /bailer		13	\$91.00
Ozone Sparge O&M	\$75 /day		6	\$450.00
Postage / Shipping and Copying (plans reports, ADEM and owner)	\$85 /sow		1	\$85.00
Postage / Shipping (Sample Shipping)	\$50 /samples		1	\$50.00
Analytical Samples				
	<b>Method</b>		<b>Pass Through</b>	<b>Sample #</b>
BTEX/MTBE/Naph (water)	8260	\$65 /sample	10%	13
Other	QAQC	\$65.00 /sample	10%	2
<b>Total Field Costs</b>				<b>\$6,385.30</b>
Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal				
<b>Total Drilling Costs</b>				<b>\$0.00</b>
Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal				
			<b>Pass Through</b>	<b>Quoted Amount Requested \$</b>



<b>Cost Proposal Summary</b>					
CP Total	Facility I.D. #	CP #	Incident Number	Site Name	
\$12,399.80	22176-097-006446	27	UST13-04-02	ner Pantry 1559 (Circle K Store No. 2721	
Phone Costs (telemetry)			10%	\$100.00	\$110.00
Power Costs			10%	\$1,200.00	\$1,320.00
Water Treatment/Disposal			10%	\$160.00	\$176.00
<b>Total Subs / Vendors / Utilities</b>				<b>\$1,606.00</b>	

**APPENDIX K – COST PROPOSAL NO. 28 - SECOND QUARTER O&M**

**Alabama Tank Trust Fund  
Cost Proposal  
Part I**

**I.1 Cost Proposal Information:**

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
28 OM2	8/29/2019
UST or AST Incident Number:	Facility I.D. Number:
UST13-04-02	22176-097-006446

**I.2 Facility Information**

Facility Name:	Former Pantry 1559 (Circle K Store No. 2721559)
Facility Address:	10 North University Blvd Mobile, AL

**I.3 Owner Information:**

Owner Name:	Circle K Stores, Inc.
Owner Address:	1100 Situs Court, Suite 100 Raleigh, NC 27606
Employer Tax Number (IRS):	56-1574463

**I.4 Response Action Contractor Information:**

Approved Response Action Contractor Name:	PPM Consultants, Inc. 30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Approved Response Action Contractor Address:	
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	<a href="mailto:rodney.kilgore@ppmco.com">rodney.kilgore@ppmco.com</a>
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number:

28

Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

**I.5 Activity Information:**

Indicate below the activities for which the cost proposal is submitted:

	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
X	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

**Activities/Other/Brief Summary of Activities:**

Operate ozone sparge system for three months and collect 7 GW samples + 2 QAQC

Provide proposed completion date for this phase of work activities:

240 Days following ADEM approval

Provide projected date of cleanup completed:

Unknown

**I.6 Subcontractor Information:**

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
TestAmerica Laboratories, Inc.	Analytical
3355 McLemore Drive, Pensacola, FL	
Erwin Remediation, Inc.	Disposal
422 Ditmar Street, Pensacola, FL	

Cost Proposal Number:

28


Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)


Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

**I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:**

*I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.*

1.Owner or Operator Signature:	
Typed or Printed Name and Title:	Brent Puzak, Director, North Amer. Env. Shared Serv.
Email address:	<u>BPuzak@circlek.com</u>
Date:	8/21/19

**I.8 Cost Proposal- Contractor Signature:**

2.Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	8/29/19

**I.9 Trust Fund Obligation Information:**

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	\$750,000.00
Total of Previously Approved Cost Proposals:	\$577,260.19
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	\$588,540.99
Estimate Percent Completion of entire project to date:	78%

**I.10 Cost Proposal Amount**

Proposed Costs under this Cost Proposal:	\$11,280.80	<b>Personnel</b>	<b>\$7,796.90</b>
		<b>Field Equipment</b>	<b>\$909.00</b>
Owners Required Contribution for UST Release(\$5,000): <i>Applicable for CP#1 Only</i>		<b>Mileage</b>	<b>\$278.40</b>
		<b>Per Diem</b>	<b>\$0.00</b>
		<b>Drilling</b>	<b>\$0.00</b>
Owners Required Contribution for AST Release(\$10,000): <i>Applicable for CP#1 Only</i>		<b>Analytical</b>	<b>\$643.50</b>
		<b>Other</b>	<b>\$1,653.00</b>
<b>Total of This Cost Proposal:</b>	<b>\$11,280.80</b>		

Cost Proposal Summary				
CP Total	Facility I.D. #	CP #	Incident Number	Site Name
\$11,280.80	22176-097-006446	28	UST13-04-02	Mer Pantry 1559 (Circle K Store No. 2721
Part II- Alabama Tank Trust Fund Itemization Form "A" Cost Proposal				
Scenarios	Unit \$	Units	Quantity	Requested\$
SEMR - Ozone, AS, SVE, Chemox, Biosparge - Reports 1-12 wells, BTEX/MTBE/Naphthalene	\$4,371 /report		1	\$4,371.00
<b>Total Report and Plan Costs</b>				<b>\$4,371.00</b>
Part II- Alabama Tank Trust Fund Itemization Form "B" Cost Proposal				
Groundwater Sampling Set-up (2hrs tech time)	\$126.00 /sow		1	\$126.00
Purge/Development Water Handling (see Basis)	\$94.50 /sow		1	\$94.50
Groundwater Sampling and Gauging 2" Well	\$63.00 /well		5	\$315.00
Groundwater Sampling and Gauging 4" Well	\$72.45 /well		2	\$144.90
Ozone, biosparge, SVE, biovent and Air Sparge O&M 3 months	\$1,928 /quarter		1	\$1,928.00
Travel				
<b>Mileage Rate</b>			\$0.580	
Mileage (One way office to site)			30	
Number of round trips to site			8	\$278.40
Technician(s)-travel time	\$63 /hr		10.5	\$661.50
Project Manager-travel time	\$104 /hr		1.5	\$156.00
Equipment and Equipment Kits				
55-Gallon Drums	\$50 /drum		1	\$50.00
Sampling Expendables(gloves, ice, string, jars, foil, distilled water, paper towels)	\$50 /sow		1	\$50.00
Expendables O&M	\$25 /day		6	\$150.00
Groundwater Monitoring	\$160 /day		1	\$160.00
Bailers	\$7 /bailer		7	\$49.00
Ozone Sparge O&M	\$75 /day		6	\$450.00
Postage / Shipping and Copying (plans reports, ADEM and owner)	\$85 /sow		1	\$85.00
Postage / Shipping (Sample Shipping)	\$50 /samples		1	\$50.00
Analytical Samples				
	<b>Method</b>		<b>Pass Through</b>	<b>Sample #</b>
BTEX/MTBE/Naph (water)	8260	\$65 /sample	10%	7
Other	QAQC	\$65.00 /sample	10%	2
<b>Total Field Costs</b>				<b>\$5,391.80</b>
Part II- Alabama Tank Trust Fund Itemization Form "C" Cost Proposal				
<b>Total Drilling Costs</b>				<b>\$0.00</b>
Part II- Alabama Tank Trust Fund Itemization Form "D" Cost Proposal				
			<b>Pass Through</b>	<b>Quoted Amount</b>
Phone Costs (telemetry)			10%	\$100.00
				<b>Requested\$</b>
				\$110.00

Cost Proposal Summary						
CP Total	Facility I.D. #	CP #	Incident Number	Site Name		
\$11,280.80	22176-097-006446	28	UST13-04-02	her Pantry 1559 (Circle K Store No. 2721		
Power Costs				10%	\$1,200.00	\$1,320.00
Water Treatment/Disposal				10%	\$80.00	\$88.00
<b>Total Subs / Vendors / Utilities</b>					<b>\$1,518.00</b>	

**APPENDIX L – COST PROPOSAL NO. 29 – THIRD QUARTER O&M**



**Alabama Tank Trust Fund  
Cost Proposal  
Part I**

**I.1 Cost Proposal Information:**

Cost Proposal Number:	Date of Cost Proposal (mm/dd/yy):
29 OM3	8/29/2019
UST or AST Incident Number:	Facility I.D. Number:
UST13-04-02	22176-097-006446

**I.2 Facility Information**

Facility Name:	Former Pantry 1559 (Circle K Store No. 2721559)
Facility Address:	10 North University Blvd Mobile, AL

**I.3 Owner Information:**

Owner Name:	Circle K Stores, Inc.
Owner Address:	1100 Situs Court, Suite 100 Raleigh, NC 27606
Employer Tax Number (IRS):	56-1574463

**I.4 Response Action Contractor Information:**

Approved Response Action Contractor Name:	PPM Consultants, Inc.
Approved Response Action Contractor Address:	30704 Sgt. E.I. "Boots" Thomas Drive Mobile, Alabama 36527
Project Contact:	Rodney M. Kilgore, P.G.
Project Contact Phone #:	251-990-9000
Project Contact E-mail:	<a href="mailto:rodney.kilgore@ppmco.com">rodney.kilgore@ppmco.com</a>
Employer Tax Number (IRS):	72-1256279

Cost Proposal Number:

29

Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

**I.5 Activity Information:**

Indicate below the activities for which the cost proposal is submitted:

	Site Stabilization/Initial Abatement
	Preliminary Investigation
	Secondary Investigation / Additional Well Installation
	Alabama Risk Based Corrective Action (ARBCA)
X	Groundwater Sampling
	Free Product Removal/Mobile Enhanced Multiphase Extraction (MEME)
	Corrective Action Plan Evaluation
	Develop Corrective Action Plan
X	Corrective Action
	Stockpile Sampling / Management / Disposal
	Provision of Alternate Water Supply
	Pilot Test
	Monitoring/Recovery/Injection Well Abandonment
	System Decommissioning/Removal

**Activities/Other/Brief Summary of Activities:**

Operate ozone sparge system for three months and collect 7 GW samples + 2 QAQC

Provide proposed completion date for this phase of work activities:

360 Days following ADEM approval

Provide projected date of cleanup completed:

Unknown

**I.6 Subcontractor Information:**

Indicate Subcontractors to be used during this phase of work:

Name & Address	Service Provided
TestAmerica Laboratories, Inc.	Analytical
3355 McLemore Drive, Pensacola, FL	
Erwin Remediation, Inc.	Disposal
422 Ditmar Street, Pensacola, FL	

Cost Proposal Number:

29


Facility Name:

Former Pantry 1559 (Circle K Store No. 2721559)

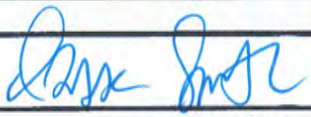
Signatures must be provided in Sections I.7 and I.8 below for this proposal to be processed.

**I.7 Certification of Unintentional release of Motor Fuel & Cost Proposal- Owner Signature:**

*I certify that an unintentional release has occurred from a motor fuel underground or aboveground tank system at this site and I authorize this Cost Proposal amount for corrective action activities to be conducted at this site.*

1. Owner or Operator Signature:	
Typed or Printed Name and Title:	Brent Puzak, Director, North Amer. Env. Shared Serv.
Email address:	<a href="mailto:BPuzak@circlek.com">BPuzak@circlek.com</a>
Date:	8/29/19

**I.8 Cost Proposal- Contractor Signature:**

2. Response Action Contractor Signature:	
Typed or Printed Name and Title:	Mr. Isaac Smith - District Manager
Date:	8/29/19

**I.9 Trust Fund Obligation Information:**

Estimated Total Cost of all Anticipated Response Actions (To be updated overtime):	\$750,000.00
Total of Previously Approved Cost Proposals:	\$588,540.99
Total Proposed Costs to Date (Approved Costs Plus Costs Proposed in this Cost Proposal):	\$599,821.79
Estimate Percent Completion of entire project to date:	80%

**I.10 Cost Proposal Amount**

Proposed Costs under this Cost Proposal:	\$11,280.80	Personnel	\$7,796.90
		Field Equipment	\$909.00
Owners Required Contribution for UST Release(\$5,000): <i>Applicable for CP#1 Only</i>		Mileage	\$278.40
		Per Diem	\$0.00
		Drilling	\$0.00
Owners Required Contribution for AST Release(\$10,000): <i>Applicable for CP#1 Only</i>		Analytical	\$643.50
		Other	\$1,653.00
<b>Total of This Cost Proposal:</b>	<b>\$11,280.80</b>		

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# Simplifying the Complex

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