

# Tank 5 Quarterly Release Response Report Red Hill Bulk Fuel Storage Facility JBPHH, Oahu, Hawaii

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## ***Executive Summary***

Navy Region Hawaii (NRH) prepared this Quarterly Release Response Report in accordance with the State of Hawaii Department of Health (DOH) Underground Storage Tank (UST) Technical Guidance Manual (DOH, 2000) and in response to the DOH release response letters dated February 12, 2014 and February 26, 2014 for the Red Hill Bulk Fuel Storage Facility (Facility). The objective of this report is to describe the actions taken by the Navy between July and September 2016 in response to the fuel reportedly released from Tank 5 in January 2014.

Soil vapor and groundwater samples continue to be collected from locations inside the Red Hill tunnel system. Groundwater samples are also collected from locations outside the Red Hill tunnel system. Laboratory analytical results continue to indicate the drinking water at Red Hill is in compliance with all Federal and State regulations and safe for human consumption.

The Navy continues to perform work to ensure the drinking water around the Facility remains safe. Future release response actions include determining the feasibility of alternatives for investigating and remediating releases from the Facility and continuing efforts to monitor and characterize the flow of groundwater around the Facility.

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## **1.0 Introduction**

As required by Hawaii Administrative Rules 11-281-80.1, Release Response Reporting, this Quarterly Release Response Report presents the following information:

- 1) All release response actions taken pursuant to subchapter 7 after the last reported date;
- 2) A plan for future release response actions to be taken; and
- 3) Information required pursuant to section 11-281-78.1.

This report presents a summary of the release response activities performed from July 1 through September 30, 2016 at the Red Hill Bulk Fuel Storage Facility (hereinafter referred to as “the Facility”) located at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii.

### **1.1 Statement of Purpose**

Release response actions were performed to address a fuel release observed in Tank 5.

### **1.2 Previous Reports**

The following documents were previously submitted to DOH:

- Release confirmation information for Tank 5 as Navy Region Hawaii (NRH) letter 5090 Ser N45/044 dated January 23, 2014
- Initial Release Response Report, enclosed with NRH letter 5090 Ser N45/320 dated April 24, 2014
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/563 dated July 22, 2014
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/929 dated November 10, 2014
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/121 dated January 21, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/322 dated April 20, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/573 dated July 17, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/812 dated October 16, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0411 dated January 13, 2016
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0508 dated April 13, 2016

- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0583 dated July 28, 2016

## **2.0 Background**

The following sections provide a description of the site and information on the Facility.

### **2.1 Site Description**

The Facility is located on federal government land (zoned F1- Military and Federal), located in Halawa Heights, approximately 2.5 miles northeast of Pearl Harbor. It is located on a low ridge on the western edge of the Koolau Mountain Range that divides Halawa Valley from Moanalua Valley. The Facility occupies 144 acres of land and the majority of the site is at an elevation of approximately 200 to 500 feet above mean sea level (msl) (Environmental Science International, Inc., 2014).

The Facility is bordered on the west by the United States (U.S.) Coast Guard reservation, on the south by residential neighborhoods, and on the east by Moanalua Valley. The Facility is bordered on the north by Halawa Correctional Facility and Halawa Industrial Park, which includes private businesses and a former bus facility. A quarry is located less than a quarter mile away to the northwest.

### **2.2 Facility Information**

The Facility contains eighteen (18) active and two (2) inactive bulk fuel field-constructed underground storage tanks (USTs), which are operated by Naval Supply Systems Command (NAVSUP) Fleet Logistics Center (FLC) Pearl Harbor (formerly Fleet and Industrial Supply Center). The Facility was constructed by the U.S. Government in the early 1940s. Twenty (20) USTs and a series of tunnels were constructed to supply fuel to the Navy. Each UST has a capacity of approximately 12.5 million gallons. The Facility is located approximately 100 feet above the basal aquifer. The USTs currently contain Jet Fuel Propellant-5 (JP-5), Jet A Aviation Fuel (F-24), or Marine Diesel Fuel (F-76). Tank 5 was used to store Jet Fuel Propellant-8 (JP-8).

Four (4) groundwater monitoring wells (wells RHMW01, RHMW02, RHMW03, and RHMW05) are located within the lower access tunnel, and one (1) sampling point (RHMW2254-01) is located at Red Hill Shaft. Sampling point RHMW2254-01 is located inside the infiltration gallery of the Department of the Navy (Navy) Well 2254-01. Navy Well 2254-01 is located down-gradient of the USTs and provides potable water to the JBPHH Water System, which serves approximately 65,200 military customers. Naval Facilities Engineering Command (NAVFAC) Public Works Department operates the infiltration gallery and Navy Well 2254-01.

Five (5) groundwater monitoring wells (RHMW04, RHMW06, RHMW07, HDMW2253-03, and OWDFMW01) are located outside of the Facility tunnel system. Monitoring well RHMW04 is located by the Navy firing range. Well HDMW2253-03 is located at the Halawa Correctional



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Facility (outside the Facility) and well OWDFMW01 is located at the former Oily Waste Disposal Facility, near Adit 3.

### ***3.0 Groundwater and Soil Vapor Monitoring***

The following sections describe activities that were performed to monitor the groundwater and soil vapor beneath Tank 5 from July 1 through September 30, 2016.

#### ***3.1 Oil/Water Interface Measurements***

The water level at each well was gauged and measured for the presence of light non-aqueous phase liquids (LNAPLs) using an interface meter. The interface meter was lowered into the wells and sampling point to determine the depth of water to the nearest 0.01 foot, and the existence of any immiscible layers (LNAPL).

Oil/water interface measurements were taken at monitoring wells RHMW01, RHMW02, RHMW03, and RHMW05 in July, August, and September 2016. No LNAPL was detected. A summary of interface measurements from January 2014 through September 2016 are presented in Appendix A.

#### ***3.2 Soil Vapor Monitoring***

Soil vapor samples were collected and analyzed in the field for volatile organic compound (VOC) concentrations using a photo-ionization detector (PID). Soil vapor monitoring points (SVMPs) were given a SV prefix, followed by the associated tank number, and then the location under the tank: “S” for shallow or front of the UST, “M” for mid depth or middle of the UST, and “D” for deep or outer edge of the UST.

A conservative approach to assess the integrity of the associated tank system is to measure if VOC concentrations exceed 280,000 parts per billion by volume (ppbv) in soil vapor monitoring probes beneath tanks containing JP-5 or F-24, or 14,000 ppbv in soil vapor monitoring probes beneath tanks containing marine diesel fuel (TEC, 2010). These values are 50 percent of the calculated vapor concentration from fuel-saturated water.

Soil vapor monitoring was performed at all active and accessible tanks in July, August, and September 2016. Soil vapor VOC concentrations at Tank 5 were below the action level of 280,000 ppbv during the July, August, and September monitoring events. In July, August, and September, soil vapor VOC concentrations at all other active and accessible tanks were below the action levels, with no consistent trending.

Soil vapor sampling results from March 2008 through September 2016 are presented in Appendix B.

### **3.3 Groundwater Sampling and Analysis**

Groundwater samples were collected from sampling point RHMW2254-01 and monitoring wells located inside and outside the Red Hill lower access tunnel in July 2016. All groundwater samples were analyzed for petroleum constituents.

Analytical results for wells RHMW01, RHMW02, and RHMW03 were compared to site specific risk based levels (SSRBLs) for total petroleum hydrocarbons as diesel fuel (TPH-d) and benzene (TEC, 2008). Groundwater analytical results were also compared to DOH Environmental Action Levels (EALs) for sites where groundwater is a current or potential drinking water source (DOH, 2011).

#### **3.3.1 Inside Tunnel Wells**

Groundwater samples were collected from four (4) groundwater monitoring wells (wells RHMW01, RHMW02, RHMW03, and RHMW05) located within the lower access tunnel, and one (1) sampling point (RHMW2254-01) located at Red Hill Shaft. A summary of sampling activities and laboratory analytical results are provided in a groundwater monitoring report, presented as Appendix C.

#### **3.3.2 Outside Tunnel Wells**

Groundwater samples were collected from five (5) groundwater monitoring wells (RHMW04, RHMW06, RHMW07, HDMW2253-03, and OWDFMW01) located outside of the Facility tunnel system. A summary of sampling activities and laboratory analytical results are provided in a groundwater monitoring report, presented as Appendix D.

### **3.4 Drinking Water Sampling**

Drinking water samples were collected from the Red Hill Shaft post-treatment regulatory compliance sampling point (360-011, Tap Outside Chlorine Building) on September 20, 2016. Samples were analyzed for Lead, JP-8/F-24, and contaminants listed in the Transition Plan. A drinking water sample was also collected from the Red Hill Shaft pre-treatment regulatory compliance sampling point (360-001, Red Hill Shaft Pumphead) on December 16, 2015 and analyzed for TPH-o and contaminants listed in the Transition Plan. The analysis for TPH-o was a one-time event not required by the Transition Plan. Collection of samples from sampling point 360-001 is also not required by the Transition Plan.

U.S. Environmental Protection Agency (EPA) Methods 524.2 (VOCs), 525.2 (SVOCs), 8015B (JP-8/F-24 and TPH-o), and 200.8 (Lead) were used and all analyses were conducted by labs certified by the DOH State Laboratories Division.

Lead was detected at a concentration below the action level in the sample that was collected during the June 21, 2016 event and acceptable for distribution. Sample test results for the December 16, 2015 and September 2016 events were below detectable levels and acceptable for distribution. A summary of the drinking water sampling is provided in Table 1.

**RED HILL DRINKING WATER SHAFT SAMPLING  
TRANSITION PLAN FOR TANK 5 RED HILL RELEASE FROM EMERGENCY RESPONSE TO REMEDIATION AS AMENDED ON FEBRUARY 13, 2014**

Date	JP-8	Lead	Benzene	Carbon tetrachloride	Chlorobenzene	1,2-Dichlorobenzene (o-Dichlorobenzene)	1,4-Dichlorobenzene (para-Dichlorobenzene)	1,2-Dichloroethane	1,1-Dichloroethylene	cis-1,2-Dichloroethylene	trans-1,2-Dichloroethylene	Dichloromethane (Methylene Chloride)	1,2-Dichloropropane	Ethylbenzene	Napthalene (unregulated)	Styrene	Tetrachloroethylene	Toluene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	Trichloroethylene	Vinyl chloride	Xylenes, Total	Acenaphthene (unregulated)	Acenaphthylene (unregulated)	Anthracene (unregulated)	Benzo(a)pyrene	Di(2-ethylhexyl)adipate	Di(2-ethylhexyl)phthalate	Fluoranthene (unregulated)	Phenanthrene (unregulated)	Pyrene (unregulated)			
MCL (ug/L) <sup>1</sup>	-	15 (action level)	5	5	100	600	75	5	7	70	100	5	5	700	-	100	5	1,000	70	200	5	5	2	10000	-	-	-	0.2	400	6	-	-	-			
DW Toxicity (ug/L) <sup>2</sup>	190	15	5	5	100	600	75	0.15	7	70	100	4.8	5	700	17	100	5	1,000	70	200	5	5	2	10000	370	240	1800	0.2		6	1500	240	180			
Final Grdwater AL (ug/L) <sup>2</sup>	100	5.6	5	5	25	10	5	0.15	7	70	100	4.8	5	30	17	10	5	40	25	62	5	5	2	20	20	30	0.73	0.014		6	8	4.6	2			
MRL <sup>3</sup>	100	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.2	0.5	0.1	0.1	0.1	0.02	0.6	0.6	0.1	0.1	0.1			
<b>360-011, Tap Outside Chlorine Building (After Treatment)</b>																																				
1/14/2014	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
1/16/2014	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1/21/2014	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1/28/2014	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
2/11/2014	ND	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
2/28/2014	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3/11/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
4/8/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
5/13/2014	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6/10/2014	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7/8/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
10/7/2014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1/21/2015	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4/7/2015	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/16/2015	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9/15/2015	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12/15/2015	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12/21/2015	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3/22/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/21/2016	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
9/20/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12/20/2016																																				
<b>360-001, Pumphead</b>																																				
1/16/2014	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
2/11/2014	-	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2/28/2014	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3/11/2014	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4/8/2014	-	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Method	8015B	200.8	524.2															525.2																		

**NOTES:**

- MCLs are drinking water maximum contaminant levels per 40 CFR 141 and HAR 11-20.
- Action levels from "Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater, Hawaii Edition", Fall 2011 (revised January 2012), Hawaii Department of Health Hazard Evaluation and Emergency Response
- MRL is the Minimum Reporting Level
- One time sample to analyze for TPH-o. Detection levels less than or equal to MRLs
- ND - not detected at the minimum reporting level (MRL)

**HISTORICAL DRINKING WATER RESULTS AT RED HILL SHAFT:**

- Lead, VOCs and SVOCs regulated by HAR 11-20 and are monitored every 3 years. All petroleum-related contaminants were ND since 2000 (monitoring data not available prior to 2000).  
 - UEM conducted additional monitoring for benzene, toluene, and xylene quarterly and benzo(a)pyrene twice a year from mid 1990's - 2013. Results not available prior to 2002. All results from 2002 were ND.  
 - UEM also conducted additional quarterly monitoring for lead from mid 2012 - 2013. Lead was detected on:

8/17/12	6 ppb
11/27/12	1 ppb
8/22/13	1.9 ppb
11/19/13	1.8 ppb

#### **4.0 Continued Groundwater and Soil Vapor Monitoring**

Based on discussions with DOH and EPA, continued monitoring of the groundwater and soil vapor will be conducted as follows:

- Oil/water interface measurements – monthly
- Soil vapor sampling – monthly
- Groundwater sampling and analysis – quarterly

Monitoring results will be submitted to DOH for each sampling event.

#### **5.0 Continued Drinking Water Sampling**

In accordance with the approved Transition Plan, drinking water sampling will continue on a quarterly schedule at the entry point to the distribution system (360-011 Tap Outside Chlorine Building). Samples will be analyzed using the following analytical methods:

- VOCs – EPA 524.2
- SVOCs – EPA 525.2
- Gas Chromatography for JP-8/F-24 – EPA 8015
- Lead – EPA 200.8

#### **6.0 Planned Future Release Response Actions**

The Navy and DLA negotiated with the EPA and DOH (the “Regulatory Agencies”) release response actions that will be pursued. Future release response actions include determining the feasibility of alternatives for investigating and remediating releases from the Facility and continuing efforts to monitor and characterize the flow of groundwater around the Facility. A Work Plan/Scope of Work that describes the future release response actions was submitted pursuant to the Red Hill Administrative Order on Consent to the Regulatory Agencies in May 2016. Comments were received from the Regulatory Agencies in September 2016. The Navy and DLA are working with the Regulatory Agencies on the requested revisions.

#### **7.0 Public Notifications**

The Navy provided notifications to the public through the following documents:

- Press Release “Navy’s Red Hill Work Plan response statement” of October 3, 2016
- Press Release “Navy keeps stakeholders informed about Red Hill” of September 28, 2016
- Red Hill Update Stakeholder Letter of September 23, 2016
- Press Release “Navy breaks ground on 11<sup>th</sup> Red Hill groundwater monitoring site” of July 27, 2016

Copies of these documents are included as Appendix E.

## ***8.0 Conclusions and Recommendations***

Results of oil/water interface measurements, groundwater sampling and analysis, and drinking water sampling and analysis indicate the release of JP-8 from Tank 5 has not impacted the Red Hill Shaft.

Additional release response actions have been negotiated with the EPA and DOH to protect the drinking water sources located down-gradient of the Facility.

The next quarterly release response report will be submitted in January 2017 and will cover the release response actions completed between October and December 2016.

## **9.0 References**

DOH, 2000, Technical Guidance Manual for Underground Storage Tank Closure and Release Response, Environmental Management Division, Solid and Hazardous Waste Branch, Underground Storage Tank Section, March 2000.

DOH, 2011, Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater, Environmental Management Division, Fall 2011, revised January 2012.

DOH, 2013, Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan, Office of Hazard Evaluation and Emergency Response, Interim Final, March 2013.

Environmental Science International, Inc., 2014, Final Third Quarter 2014 – Quarterly Groundwater Monitoring Report, Inside Tunnel Wells, Red Hill Bulk Fuel Storage Facility, Prepared for Department of the Navy, Naval Facilities Engineering Command, Hawaii, JBPHH, Hawaii, September 2014.

Hawaii Administrative Rules, Title 11, Chapter 281, Underground Storage Tanks, August 2013.

TEC, 2007, Final Technical Report, Red Hill Bulk Fuel Storage Facility, Prepared for Department of the Navy, Commander Naval Facilities Engineering Command, Pacific, Pearl Harbor, Hawaii, August 2007.

TEC, 2008, Final Groundwater Protection Plan, Red Hill Fuel Storage Facility, Prepared for Navy Region Hawaii, Pearl Harbor, Hawaii, January 2008, revised December 2009 and August 2014.

TEC, 2010, Final Soil Vapor Sampling Monitoring Analysis Letter Report, February 1, 2010.

***Appendix A***  
***Oil/Water Interface Measurements***  
***January 2014 through September 2016***

***Appendix B***  
***Soil Vapor Sampling Results through September 2016***



***Appendix C***  
***Final Third Quarter 2016 – Quarterly Groundwater Monitoring***  
***Report Inside Tunnel Wells***  
***(1 hard copy, 1 CD)***

***Appendix D***  
***Final Third Quarter 2016 – Quarterly Groundwater Monitoring***  
***Report Outside Tunnel Wells***  
***(1 hard copy, 1 CD)***

*Appendix E*  
*Public Notifications*