SUMMARY OF 2008 OPERATION AND MAINTENANCE ACTIVITIES

DUAL-PHASE EXTRACTION SYSTEM (DPE)

DIESEL NO. 2 REMEDIATION SITE

(LPST NO. 95897)

DIESEL No. 2 REMEDIATION SITE
(LPST I.D. No. 95897)
2008 OPERATION, MONITORING, AND PERFORMANCE REPORT

1.0 INTRODUCTION

This Operation, Monitoring, and Performance Report (OMPR) was prepared by Raba-Kistner Consultants (SW), Inc.(**R-K**) at the request of ASARCO Incorporated (ASARCO) to fulfill the reporting requirements of the Leaking Petroleum Storage Tank (LPST) division of the Texas Commission on Environmental Quality (TCEQ). This report contains information pertaining to the operation and monitoring of the Dual Phase Extraction (DPE) system for the Asarco Diesel No. 2 Remediation Site (LPST ID 95897) for the 2008 operational period. ASARCO personal performed all field data collection and **R-K** compiled and evaluated the data into this OMPR.

Monitoring information, which includes groundwater measurements, non-aqueous petroleum liquid (NAPL) measurements, and corrected ground water measurements, are presented as hydrocarbon distribution maps and groundwater gradient maps for interpretation purposes. The report also includes quantification of Phase Separated Hydrocarbons (PSH), total fluid, and mass of hydrocarbons recovered. Copies of laboratory reports and associated chain-of-custody documentation are also included.

1.1 REPORTING PERIOD ACTIVITIES

The OMPR contains information regarding the Operation, Monitoring and Performance of the Diesel No. 2 DPE (LPST ID 95897) system from January 2008 through December 2008. Groundwater monitoring, gauging and sampling activities were performed as follows:

Monitoring and Sampling Activity Periods for 2007	
First Quarter - Winter Event	February 11 through February 19, 2008
Second Quarter - Spring Event	April 29 through April 30, 2008
Third Quarter - Summer Event	September 10 through September 22, 2008
Fourth Quarter - Fall Event	December 3 through December 5, 2008

2.0 FIELD AND LABORATORY DATA

This section of the report presents the results of groundwater monitoring and diesel thickness measurements in affected monitoring wells.

2.1 GROUNDWATER/NAPL MEASUREMENTS

The Diesel No. 2 Remediation Site includes 23 monitor and/or recovery wells (**Figure 1**) which were monitored and sampled on a quarterly basis. The DPE recovery system is located in historic Smeltertown on a covered concrete equipment slab, adjacent to the existing Diesel No. 2 system building. The Diesel No. 2 system building contains the vacuum pumps and blowers from the original Diesel No. 2 recovery system, which utilizes a manifold system with 70 DPE recovery points located within Smeltertown. The Diesel No. 2 system is used to extract both free-phase and vapor-phase diesel from selected areas of the Smeltertown plume. The DPE Recovery system layout is presented in **Figure 2**. Appendix A contains a cumulative list of groundwater/PSH level measurements.

2.2 HYDROCARBON DISTRIBUTION MAPS

Groundwater and diesel thickness measurements where obtained from all wells associated with the diesel No. 2 remediation project for each of the four quarterly events in 2008 by ASARCO. Groundwater elevation and diesel thickness measurements were evaluated by Raba-Kistner Consulting, Inc. **(R-K)** and used to create hydrocarbon distribution maps for each quarterly event. The resulting hydrocarbon distribution maps are presented as **Figures 3, 4, 5, and 6**. Across the four quarters of groundwater monitoring, the thickness of the diesel plume ranged from no measurable product (NP) in the down-gradient wells near the Rio Grande, to a maximum thickness of 0.98-ft in well EP-25. The most up-gradient well, EP-21, the thickness of the diesel plume ranged from 0.27-ft in the first quarter to no measurable product in the fourth quarter.

2.3 GROUNDWATER GRADIENT MAPS

Groundwater elevations at the project site are related to precipitation events at the eastern (up-gradient) portion of the project site and the elevation of the Rio Grande River near the western (down-gradient) portion of the project site. The United States Bureau of Reclamation (USBR) regulates the amount of water in the Rio Grande and seasonal irrigation diversions occur from the third week of March through the first week of September. These releases correspond to increases and decreases in surface water levels in the Rio Grande which directly influence the local groundwater elevations at the western portion of Diesel No. 2 Remediation Site. Groundwater elevations during the fall and winter months are generally lower than during the spring and summer months.

Depths to groundwater measurements were used to create groundwater gradient maps for each quarterly event. Groundwater gradient maps are presented as **Figures 7, 8, 9, and 10**. Based upon the gradient maps, groundwater flows in a generally southwesterly direction. Average groundwater gradients from monitor wells EP-21 to EP-52 and EP-58 to EP-62 are summarized below for each quarterly event:

Groundwater Gradients for Monitoring and Sampling Activity Periods for 2007		
Wells for Gradient Calculation	EP-21 to EP 52 Gradient (ft/ft)	EP-58 to EP-62 Gradient (ft/ft)
First Quarter - Winter Event	0.047	0.0061
Second Quarter - Spring Event	0.045	0.0035
Third Quarter - Summer Event	0.045	0.0056
Fourth Quarter - Fall Event	0.028	0.0044

2.4 GROUNDWATER SAMPLING RESULTS

Groundwater samples were submitted to Trace Analysis, Inc. in Lubbock, Texas, and analyzed for Benzene, Toluene, Ethylbenzene, total Xylenes (BTEX, EPA SW 846, Method 8021B) and Total Petroleum Hydrocarbons (TPH, EPA SW 846, Method TX1005). A cumulative list of analytical results is presented in **Appendix B**. Copies of Laboratory Analytical Reports for each 2008 quarterly sampling event are included in **Appendices C** (C-1, C-2, C-3, and C-4). Laboratory reports obtained from non-diesel impacted wells indicated hydrocarbon concentrations within regulatory limits. The findings of the 2008 quarterly sampling events are summarized in the following sub-sections.

2.4.1 First Quarter Data - Winter 2008

The first quarter sampling event (February 2008) included the gauging of 23 monitor wells and the collection of groundwater samples from 14 monitor wells (EP-23, 26, 51, 52, 53, 54, 55, 56, 59, 60, 62, 63, 64, and 66). The samples were collected from wells where PSH was not detected. Analytical analysis of the 14 groundwater samples indicated measurable concentration of Benzene present only in EP-54. TPH concentrations were not detected in any of the 14 samples.

Field measurements of the 23 monitor wells identified PSH in 2 monitor wells (EP-21 and 25) with thicknesses ranging from 0.27 feet in EP-21 to a maximum thickness of 0.98 feet in EP-25.

2.4.2 Second Quarter Data - Spring 2008

The second quarter sampling event (April 2008) included the gauging of 23 monitor wells and the collection of groundwater samples from 14 monitor wells (EP-23, 26, 51, 52, 53, 54, 55, 56, 59, 60, 62, 63, 64, and 66). The samples were collected from wells where PSH was not detected. Analytical analysis of the 14 groundwater samples indicated measurable BTEX constituents present only in EP-23 with a measured Benzene concentration of 3.0 µg/l, an Ethylbenzene concentration of 1.8 µg/l, and a Total Xylenes concentration of 2.1 µg/l. The analytical analysis performed on the sample collected from EP-54 used a dilution of 20 and identified no measurable BTEX constituents above 20.0 ug/l. Historically, EP-54 measures concentrations of BTEX constituents below 20.00 ug/l. TPH concentrations were not detected in any of the 14 groundwater samples.

Field measurements of the 23 monitor wells identified PSH in 3 monitor wells (EP-21, 25, and 55) with thicknesses ranging from a sheen in EP-55 to a maximum thickness of 0.59 feet in EP-25.

2.4.3 Third Quarter Data - Summer 2008

The third quarter sampling event (September 2008) included the gauging of 23 monitor wells and the collection of groundwater samples from 14 monitor wells (EP-23, 26, 51, 52, 53, 54, 55, 56, 59, 60, 62, 63, 64, and 66). The samples were collected from wells where PSH was not detected. Analytical analysis of the 14 groundwater samples indicated BTEX constituents present in 2 monitor wells; EP-23 measured a Benzene concentration of 6.0 µg/l and EP-54 measured a Benzene concentration of 6.8 ug/l. TPH concentrations were not detected in any of the 14 groundwater samples.

Field measurements of the 23 monitor wells identified PSH in 3 monitor wells (EP-21, 25, and 55) with thicknesses ranging from a sheen (<0.01-ft) in EP-55 to thickness of 0.92 feet in EP-25.

2.4.4 Fourth Quarter Data - Fall 2008

The fourth quarter sampling event (December 2008) included the gauging of 23 monitor wells and the collection of groundwater samples from 14 monitor wells (EP-23, 26, 51, 52, 53, 54, 55, 56, 59, 60, 62, 63, 64, and 66). The samples were collected from wells where PSH was not detected. Analytical analysis of the 14 groundwater samples indicated BTEX constituents present in 2 monitor wells; EP-23 measured a Benzene concentration of 5.1 µg/l and an Ethylbenzene concentration of 2.2 µg/l, and EP-54 measured a Benzene concentration of 5.0 µg/l. TPH concentrations were not detected in any of the 14 groundwater samples.

Field measurements of the 23 monitor wells identified PSH in 2 monitor wells (EP-21 and 24) with thicknesses ranging from 0.12 feet in EP-21 to a thickness of 0.96 feet in EP-25.

3.0 PERFORMANCE EVALUATION OF THE DPE SYSTEM

3.1 RECOVERY OF PHASE SEPARATED HYDROCARBON (PSH)

Recovery activities prior to March of 1999 consisted of utilizing the passive means of waiting for the diesel to migrate into recovery trenches and sumps where it was then extracted. The addition of the DPE recovery system takes an active approach by enhancing the migration process of the diesel plume. The DPE recovery system extracts the diesel under a vacuum, resulting in greatly improved diesel recovery rates. Recovered diesel is transferred to an above ground diesel storage tank. The storage tank requires monitoring and periodic emptying; where the recovered diesel is picked up and disposed of by an authorized used oil recycler/reclaimer. Treated water is returned to the plant's make-up water system.

In 2008, about 22 gallons of diesel were recovered by the DPE recovery system. Approximately 36,061 gallons of diesel have been recovered from the Diesel No. 2 project since the implementation of the first corrective action measures in 1992 (35,125 gallons from the DPE system and 936 gallons from recovery trenches). **Table 1** contains a cumulative list of PSH recovered by the DPE system. **Figure 11** graphically depicts the monthly and cumulative trend of diesel recovery since the implementation of the DPE system. **Figure 12** is graphs of cumulative PSH decline in impacted monitor wells.

3.2 HYDROCARBON REMOVAL RATE

In 2008, a mass of approximately 152.2 lbs. of PSH hydrocarbons and approximately 18.13 lbs of vapor phase hydrocarbons were removed from the site. To date, a mass of approximately 253,047 lbs. of hydrocarbons (PSH and Vapor phase) have been removed since the implementation of the first abatement measure; 6,475 lbs. prior to the installation of the DPE system and 246,572 lbs. after its installation. **Figure 13** graphically depicts the cumulative mass of hydrocarbons removed from the PSH phase, vapor phase and total after the installation of the DPE system. **Table 2** contains a cumulative list representing the mass of hydrocarbons removed/remaining from the PSH phase. **Figure 14** graphically depicts the cumulative hydrocarbon removal rates in pounds per hour from the PSH and vapor phase.

3.3 GROUNDWATER RECOVERY

Approximately 1,595,848 gallons of groundwater have been recovered since the installation of the DPE system. During the 2008 reporting period, approximately 23,905 gallons of groundwater were recovered. Product and groundwater recovered by the DPE system is separated using an oil water separator. The water portion is discharged to the Asarco diesel No. 1 air sparging system for further treatment. After sparging, the water is further treated on the Asarco wastewater treatment facility. Treated groundwater is used for dust suppression on Asarco plant. **Table 3** contains a cumulative list of Total Fluid Recovered by the DPE System.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Diesel No. 2 recovery system has successfully prevented further migration of the diesel plume and has been successful in aggressively recovering liquid and vapor phase PSH. The results of continued operation of the Dual Phase Extraction System indicate that the thickness of diesel in wells containing measurable PSH are decreasing over time. Some fluctuations are observed in the PSH impacted wells. However, the variability in PSH thicknesses observed can be attributed to seasonal fluctuations in groundwater levels and product migration through recovery efforts.

To date, 40 quarters of monitoring and sampling activities have been performed. Data obtained from these activities indicate that the diesel plume is decreasing in thickness and extent and is currently confined to the upper portions of the facility. Data obtained from non-diesel impacted monitoring wells indicate hydrocarbon concentrations remain within regulatory limits. Groundwater monitoring results from monitor wells EP-62, EP-63, and EP-66, the most downgradient monitoring wells, have consistently measured below laboratory detection limits for hydrocarbon concentrations.

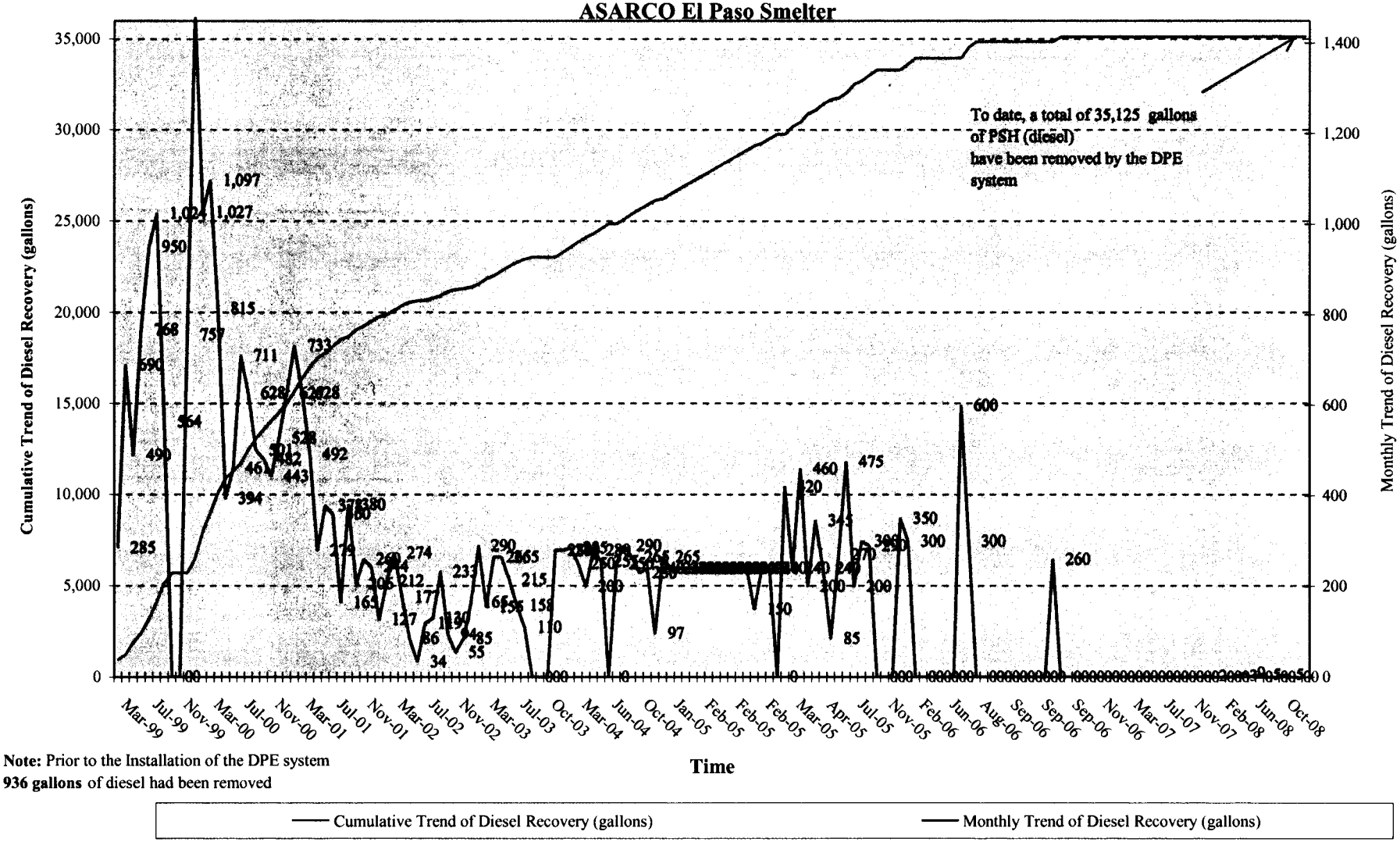
Information presented in the 2008 Operation, Monitoring, and Performance (OMP) of the remedial system indicates that the DPE system is effective in removing diesel from the Smeltertown area and in reducing the thickness of diesel in the On-Plant monitoring wells. However, during the 2008 operations, only 22 gallons of PSH were recovered by the DPE system. This small amount of PSH recovery is attributed to the continued decreasing thickness of the PSH plume in the Smeltertown area. To Date an estimated 36,061 gallons of PSH has been recovered; total PSH recovery is 36,039 gallons (35,125 from the DPE system and 936 gallons from recovery trenches).

Groundwater recovery data indicates that approximately 1,595,848 gallons of groundwater have been recovered by the DPE system. The 2008 operational period recovered approximately 23,905 gallons of groundwater.

As addressed in the ASARCO El Paso Copper Smelter Risk-Based Site Assessment for Diesel No. 2 Site (LPST I.D. No. 95897) accepted by the TNRCC in October of 1997, the Diesel No. 2 Remediation system should remain in operation to further reduce the thickness of diesel to less than 0.1 feet throughout the affected area and to prevent impacts to the IBWC American Canal.

For year 2009, **R-K** recommends the continuation of weekly Operation and Maintenance of the DPE system and to perform quarterly sampling and monitoring activities of non-impacted monitoring wells.

Figure 11. Cumulative and Monthly Trend of Diesel Recovery
Diesel No. 2 (LPST ID 95897)
ASARCO El Paso Smelter



Note: Prior to the Installation of the DPE system
936 gallons of diesel had been removed