Report

First Quarter 2015 Remediation Progress Report SFPP Norwalk Pump Station Norwalk, California

Prepared for

Kinder Morgan Energy Partners, L.P.

1100 Town and Country Road

Orange, California 92868

April 15, 2015

CH2MHILL®

6 Hutton Centre Drive

Suite 700

Santa Ana, California 92707

EN0413151059SCO

Signature Page

The material and data presented in this report were prepared consistent with current and generally accepted consulting principles and practices. This work was supervised by the following CH2M HILL licensed professional.

April 15, 2015

William Breedlove
CH2M HILL
California Professional Chemical Engineer, No. 5142

Date

Contents

Acronyms and Abbreviations

µg/L	micrograms per liter
1,2-DCA	1,2-dichloroethane
Air Tech	Air Technology Laboratories
ASTM	ASTM International (formerly American Society for Testing and Materials)
ATL	Advanced Technology Laboratories
EPA	U.S. Environmental Protection Agency
FBBR	fluidized bed bioreactor
GWE	groundwater extraction
GWTS	groundwater treatment system
KMEP	Kinder Morgan Energy Partners, L.P.
LGAC	liquid-phase granular activated carbon
MTBE	methyl tertiary butyl ether
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
OWS	oil-water separator
PID	photoionization detector
ppmv	parts per million by volume
RBCA	Risk-Based Corrective Action
RWQCB	California Regional Water Quality Control Board, Los Angeles Region
SCAQMD	South Coast Air Quality Management District
SFPP	, L.P.
SVE	soil vapor extraction
TBA	tertiary butyl alcohol
TFE	total fluids extraction
TPH-d	total petroleum hydrocarbons quantified as diesel
TPH-g	total petroleum hydrocarbons quantified as gasoline
TPH-o	total petroleum hydrocarbons quantified as oil
TPH-total	total petroleum hydrocarbons quantified as gasoline, diesel, and oil
VGAC	vapor-phase granular activated carbon
VOC	volatile organic compound
WSB	West Side Barrier

SECTION 1

Introduction

CH2M HILL has prepared this report on behalf of SFPP, L.P. (SFPP), an operating partnership of Kinder Morgan Energy Partners, L.P. (KMEP), to summarize remediation activities performed at the former SFPP Norwalk Pump Station, located within the Defense Fuel Support Point, at 15306 Norwalk Boulevard, Norwalk, California (the site; Figure 1) during the first quarter 2015 reporting period.

This progress report is submitted pursuant to a request from the California Regional Water Quality Control Board, Los Angeles Region (RWQCB) in its letter dated October 25, 2006 (RWQCB, 2006). Additional site background information can be found in the *Conceptual Site Model and Proposed Alternate Interim Remedy for Soil, Groundwater, and LNAPL* (CH2M HILL, 2013a), and in previously submitted semiannual groundwater monitoring reports.

This report summarizes the remediation systems present at the site and describes remediation activities for the period of January through March 2015 with documentation of the following tasks:

- Operations and maintenance (O&M) of remediation systems performed by SFPP field personnel
- Remediation system evaluation

The remediation activities performed during January through March 2015 and the progress achieved through those activities are summarized in the following sections.

SECTION 2

Remediation Systems

SFPP currently operates remediation systems consisting of soil vapor extraction (SVE), total fluids extraction (TFE) of free product and/or groundwater using a top-loading pump, and treatment of extracted soil vapors and groundwater to address two specific areas at and near the site: the south-central area and the southeastern area. Operation of the West Side Barrier (WSB) groundwater extraction (GWE) system (WSB system) for remediation of the western offsite area was discontinued in August 2008.

Remediation in the south-central and southeastern areas consists of SVE and TFE. At several well locations, SVE is coupled with TFE in a process referred to as dual-phase extraction. SVE is performed using a blower to remove soil vapors from the south-central and southeastern areas. The extracted vapors are conveyed to a knock-out tank that separates entrained moisture from the soil vapors. Accumulated moisture in the knock-out tank is treated by the main groundwater treatment system (GWTS) described below. The soil vapors are then treated in a thermal oxidizer where volatile organic compounds (VOCs) are converted to carbon dioxide and water prior to being discharged to the atmosphere. Operation of the GWTS and SVE is conducted in accordance with Permits to Construct (Application Nos. 569588 and 567723, respectively; ID 110835) issued by the South Coast Air Quality Management District (SCAQMD).

The main GWTS handles free product and groundwater recovered from the south-central and southeastern parts of the site. Free product and groundwater recovered by pneumatically operated top-loading total fluids pumps are piped to an oil-water separator (OWS). Free product, if any, from the OWS is collected in a storage tank and recycled at an offsite location. Water from the OWS is treated using liquid-phase granular activated carbon (LGAC). Treated water is routed through an onsite 3,000-gallon equalization tank. Two fluidized bed bioreactors (FBBRs) installed downstream of the equalization tank treat fuel oxygenates such as tertiary butyl alcohol (TBA) and methyl tertiary butyl ether (MTBE) that are not treated in the LGAC. The treated groundwater then passes through polishing LGAC units prior to discharge in accordance with a National Pollutant Discharge Elimination System (NPDES) permit (NPDES No. CA0063509, CI No. 7497).

A summary of remediation wells in the south-central, southeastern, and WSB areas is presented in Table 1. Table 1 includes well identifications, well construction details, well use, and operational status at the end of the first quarter 2015. The remediation system layout is presented in Figure 2.

SECTION 3

Operations and Maintenance

During the first quarter 2015 reporting period, O&M of the remediation systems included the following tasks:

- Performed weekly maintenance and monitoring of the south-central and southeastern SVE and TFE wells, and the SVE and groundwater treatment systems (collectively referred to as remediation systems).
- Removed, inspected, and made repairs to the TFE pumps and associated discharge lines.
- Performed cleanout of the OWS, sump, equalization tank, and transfer tank.
- Performed carbon changeout of LGAC vessels.
- Replaced the broken OWS transfer pump with a new transfer pump.
- Installed vapor-phase granular activated carbon (VGAC) treatment system to treat off-gas from the product tank and OWS.
- Installed a new Sensaphone 800 alarm system to add more specific alarm callouts to the TFE treatment system.
- Installed a new, calibrated process air thermocouple on the SVE system.

Overall, during the first quarter 2015, the GWTS operated approximately 87 percent of the time; the SVE system was operational only 3 percent (last 5 days of March) of the reporting period due to SCAQMD permitting constraints.

The remediation systems operated during the first quarter 2015 with the following exceptions:

- The SVE system was turned off on July 1, 2014, due to a leaky heat exchanger. The SVE system was repaired in December 2014 and restarted on March 27, 2015, after the new SCAQMD permit was issued.
- The GWTS was turned off on February 3, 2015, to clean out the OWS, OWS transfer tank, sump, and equalization tank. The system was restarted on the same day.
- The GWTS was off on arrival on March 3, 2015, due to a high product tank alarm. The system was restarted on the same day.
- The GWTS was off between March 14 and March 19, 2015, due to a broken OWS transfer pump. The pump was replaced and the system was restarted on March 19, 2015.
- The GWTS was off between March 20 and March 23, 2015, due to a faulty level switch on the OWS transfer tank. Repair of the level switch was made and the system was restarted on March 23, 2015.
- The GWTS was off between March 24 and March 25, 2015, due to a high level tank alarm. The system was restarted on March 25, 2015.
- The GWTS was off on March 26, 2015, for troubleshooting of the level switch in the OWS transfer tank. The system was restarted later that same day.
- The GWTS was off on March 30 and March 31, 2015, due to a high product tank alarm. A mixture of water and product from the OWS drained to the product tank and VGAC drums due to a loose fitting. The product tank was emptied and the VGAC drums were replaced, and the system was restarted on March 31, 2015.

The SVE system was brought online on March 27, 2015, after the new SCAQMD permit to construct was issued. The SVE had been offline since the third quarter 2014 because a leak was detected in the heat exchanger, causing reduced treatment efficiency. During the downtime, SFPP modified the previous SCAQMD permit (No. F13759 for the SVE system) to include the horizontal biosparge system that is planned to be operational by the second or third quarter 2015. The heat exchanger was bypassed to eliminate the leakage in December 2014. Table 2 presents the SVE system operations summary. Extracted vapor photoionization detector (PID) and analytical results for the first quarter 2015 are summarized in Tables 3 and 4, respectively.

During this reporting period, remediation system inspections were performed on a weekly basis. For these inspections, volumes of extracted groundwater, hours of operation, and other system parameters were recorded during system operation. The groundwater remediation system operation activities for the first quarter 2015 are summarized in Table 5. The extracted groundwater analytical results for the first quarter 2015 are summarized in Table 6. Historical (post-2007) gauging results of select TFE and SVE wells are provided in Table 7. Pre-2007 data can be found in previous semiannual groundwater monitoring reports.

Vapor samples from the SVE system influent and water samples from the GWTS influent were collected during the first quarter 2015 when the systems were in operation. During the first quarter 2015, influent vapor samples were collected on March 31, 2015. Influent water samples were collected on January 15, February 20, and March 3, 2015, when the GWTS was operating. The water samples were delivered to Advanced Technology Laboratories (ATL) of Las Vegas, Nevada, for analysis. ATL is certified by the California Department of Public Health Environmental Laboratory Accreditation Program. The vapor samples were delivered to Air Technology Laboratories (Air Tech) of City of Industry, California, for analysis.

Air Tech analyzed the vapor samples for the following:

- Fixed gases (methane, carbon dioxide, oxygen, and argon) using ASTM International (ASTM) D1946
- Total petroleum hydrocarbons quantified as gasoline (TPH-g) using U.S. Environmental Protection Agency (EPA) Method TO-3
- Total gaseous non-methane organic carbon using SCAQMD Method 25.1
- VOCs using EPA Method TO-15

ATL analyzed the water samples for the following:

- TPH-g, TPH quantified as diesel (TPH-d), and TPH quantified as oil (TPH-o) (collectively referred to as TPH-total) using EPA Method 8015(M)
- VOCs using EPA Method 8260B

The effluent water sampling results were in compliance with the NPDES permit for the first quarter 2015 and will be provided under separate cover in the NPDES effluent monitoring report.

SECTION 4

Summary of Remediation Progress

Based on weekly monitoring of the influent vapor concentration, vapor extraction flow rate, and hours of operation, the total mass of VOCs removed by SVE was 4,299 pounds during the first quarter 2015, for a cumulative mass removal of 3,202,055 pounds since SVE implementation in September 1995 (Table 2). The cumulative mass removed by SVE does not include the mass removed by naturally occurring in situ biodegradation.

A total of 936,119 gallons of groundwater was extracted during the first quarter 2015 (Table 5). No water was extracted from the WSB area during the first quarter 2015. Approximately 92.3 million gallons of groundwater has been extracted from the south-central, southeastern, and WSB areas since GWTS operations first began in 1996.

Groundwater extraction was discontinued in the WSB region during the third quarter 2008 based on the reduced lateral extent and low concentrations of MTBE and 1,2-dichloroethane (1,2-DCA) west of the site. Detected concentrations of MTBE and 1,2-DCA in wells west of the site have been below the site-specific Risk-Based Corrective Action (RBCA) goals (Geomatrix Consultants, Inc., 1999) since August 2005. The lower (more conservative) RBCA goals for MTBE and 1,2-DCA are 40 micrograms per liter (µg/L) and 70 µg/L, respectively. 1,2-DCA, MTBE, and TBA concentrations in the western area continue to be monitored; other wells in the WSB system will be restarted if necessary.

The amount of free product that accumulated in the product holding tank of the GWTS was estimated to be 66 gallons during the first quarter 2015. Since 1995, a total of 11,320 gallons of product has been removed by TFE, vacuum truck, or manual bailing operations. Beginning in March 2015, some online TFE wells were gauged and pump inlets were reset to maximize product removal. These activities will continue into the second quarter 2015 until all pumps are reset.

The estimated mass removal (pounds) of hydrocarbons by the GWTS is shown in Table 5. Mass removal estimates between 1996 and 2005 are based on benzene, toluene, ethylbenzene, and total xylenes (BTEX) and MTBE concentrations in the groundwater influent (TPH data were not available) and total volume of extracted groundwater; mass removal estimates between 2006 and 2011 are based on groundwater influent TPH-g and TPH quantified as fuel product (TPH-fp) concentrations, and total volume of extracted groundwater; mass removal estimates between 2012 and 2015 are based on groundwater influent TPH-total (TPH-g, TPH-d, and TPH-o) concentrations and total volume of extracted groundwater. Since groundwater extraction first began in 1996, hydrocarbon mass removed by the GWTS is estimated to be 8,941 pounds. During the first quarter 2015, the mass removal of hydrocarbons was estimated to be 1,321 pounds, which is a significant increase since previous quarters. The increase in mass removal is attributed to the higher TPH-total concentrations in the groundwater influent; TPH-total concentrations ranged between 13,870 and 560,000 µg/L during the first quarter 2015 (Table 6). The higher concentrations of TPH-total are attributed to the free product that is emulsified in the groundwater influent during TFE operations. As discussed in Section 5, the measurable free product thickness in some TFE wells has increased recently due to continued declining water levels across the site due to drought conditions.

SECTION 5

System Evaluation and Optimization

For the SVE treatment system, during the first quarter 2015, vapor-phase VOC concentrations were measured in individual wells using a PID (calibrated as 100 parts per million by volume [ppmv] hexane) on March 31, 2015, as shown in Table 3. The operational status of the SVE wells at the end of the first quarter 2015 is shown in Table 1. PID readings recorded on March 31, 2015, indicated VOC concentrations were close to, or higher than, 100 ppmv in the majority of the SVE wells; therefore, the SVE system will be operated until influent VOC concentrations reach low asymptotic levels.

The second semiannual 2014 groundwater monitoring event in the WSB region occurred during the fourth quarter 2014. Monitoring results support the continued shutdown of GWE in the WSB region. 1,2-DCA, MTBE, and TBA concentrations in the western area will continue to be monitored. The WSB system will be restarted if necessary. The first semiannual 2015 groundwater monitoring event is scheduled for April 2015.

As shown in Table 7, measurable free product was observed in 28 remediation wells during the previous semiannual groundwater monitoring event (fourth quarter 2014). The product thicknesses for these wells ranged from 0.01 foot in MW-SF-16 to 5.81 feet in GMW-O-12. It is believed that increased product thicknesses observed during the fourth quarter 2014 are indicative of continued declining water levels across the site (Figure 3). The current low water levels have allowed residual product to drain from pore spaces within the smear zone and collect in certain wells, or increase in thickness in wells with measureable product already present. The water table elevation is related to annual rainfall and the cumulative rainfall over time. As shown in Figure 3, since the 2005/2006 El Niño, groundwater elevations in the uppermost aquifer have declined approximately 5 feet to the current low water levels across the site. Continued TFE extraction will remove the product that has accumulated due to these low water levels.

The TFE system currently consists of 11 wells operated for product recovery and hydraulic control in the south-central part of the site, and 3 wells equipped with TFE pumps operated for product recovery and hydraulic control in the southeastern part of the site (Table 1). TFE operations from these wells will continue and pump inlets will be adjusted, as needed, to optimize product recovery.

SECTION 6

Planned Second Quarter 2015 Activities

During the second quarter 2015, SFPP plans to continue to focus remedial efforts on the south-central and southeastern areas. The following maintenance activities are planned for the second quarter 2015:

- Measure individual well vapor concentrations.
- Continue weekly maintenance and monitoring of the south-central and southeastern SVE and groundwater treatment systems.
- Remove, inspect, and repair GWTS pumps and associated discharge lines.
- Collect and analyze system influent vapor and groundwater samples.
- Replace OWS and retrofit piping to accommodate new equipment.
- Install biosparge ancillary equipment and new Southern California Edison (SCE) power drop in the south-central area. Pilot testing activities are planned to commence, as outlined in the *Horizontal Biosparge System Construction and Pilot Test Work Plan* submitted to the RWQCB on November 18, 2013 (CH2M HILL, 2013b), in the second or third quarter 2015.

The TFE and SVE systems for the south-central and southeastern areas will continue to operate. Operation of the TFE system in the southeastern area will be monitored closely, and adjustments will be made to optimize fluid recovery. System inspections will continue on a weekly basis; system evaluation parameters will be collected as needed. The remediation activities and progress for the second quarter 2015 will be described in the Second Quarter 2015 Remediation Progress Report, to be submitted by July 15, 2015.

Field activities are currently underway to install the horizontal biosparge system as described in the pilot test work plan (CH2M HILL, 2013b) and the response to RWQCB comments on the work plan (CH2M HILL, 2014). The RWQCB approved the pilot test work plan in a letter dated February 26, 2014 (RWQCB, 2014). The purpose of the biosparge system is to enhance mass removal of free-phase and dissolved-phase hydrocarbon constituents beneath the south-central area of the site. Pilot testing of the system is planned to be conducted for a period of approximately 1 year in order to evaluate the feasibility of system expansion. The horizontal biosparge well was installed in August 2014; the aboveground portion of the system (air compressor, piping, and electrical) is planned to be installed by the second quarter 2015. Monthly progress reports on the pilot testing activities will be submitted to RWQCB once testing begins and until completion of the pilot test, as requested in RWQCB's letter (RWQCB, 2014).

SECTION 7

References

California Regional Water Quality Control Board, Los Angeles Region (RWQCB). 2006. Letter to Mr. Kola Olowu, Defense Energy Support Center, Los Angeles, and Mr. Michael Pitta, Kinder Morgan Energy Partners; Conditional Approval of Revised Remedial Action Plan and Second Addendum to Remedial Action Plan for the Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk (SLIC No. 0286A, DOD No. 16638). October 25.

California Regional Water Quality Control Board, Los Angeles Region (RWQCB). 2014. *Approval of Horizontal Biosparge System Pilot Test Work Plan.* February 26.

CH2M HILL. 2013a. *Conceptual Site Model and Proposed Alternate Interim Remedy for Soil, Groundwater, and LNAPL, Defense Fuel Support Point, Norwalk, California*. September 3.

CH2M HILL. 2013b. *Horizontal Biosparge System Construction and Pilot Test Work Plan, SFPP Norwalk Pump Station, 15306 Norwalk Boulevard, Norwalk, California.* Submitted to Mr. Paul Cho, California Regional Water Quality Control Board, Los Angeles Region. November 18.

CH2M HILL. 2014. *Response to Comments – Horizontal Biosparge System Construction and Pilot Test Work Plan, SFPP Norwalk Pump Station, 15306 Norwalk Boulevard, Norwalk, California*. November 18.

Geomatrix Consultants, Inc. 1999. *Risk-Based Corrective Action, Western 1,2-DCA and MTBE Plumes*. February.

Tables

Figures

Appendix A
Laboratory Analytical Reports