Jacobs

Revised Groundwater Sampling and Analysis Plan – SFPP Norwalk Pump Station

Prepared for:

Kinder Morgan, Inc.
15306 Norwalk Boulevard, Norwalk, California

March 31, 2023

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Certification

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 Jacobs licensed professional.

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Acronyms and Abbreviations

1,2-DCA	1,2-dichloroethane
bgs	below ground surface
BMTgTd	benzene, MTBE, TPH-g, and TPH-d
CH2M	CH2M HILL, now part of Jacobs Engineering Group Inc.
COPC	contaminant(s) of potential concern
CSM	conceptual site model
cVOC	chlorinated volatile organic compound
DFSP	Defense Fuel Support Point
DLA Energy	Defense Logistics Agency Energy
ELAP	California Department of Health Services Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
ESL	environmental screening level
IRAP	Interim Remedial Action Plan
Jacobs	Jacobs Engineering Group Inc.
Kinder Morgan	Kinder Morgan, Inc.
LNAPL	light nonaqueous phase liquid
MRP	Monitoring and Reporting Program
MTBE	methyl tertiary butyl ether
NSZD	natural source zone depletion
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RWQCB	Regional Water Quality Control Board, Los Angeles Region
SAP	sampling and analysis plan
SFPP	SFPP, L.P.
SVE	soil vapor extraction
TBA	tertiary butyl alcohol
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons quantified as diesel fuel
TPH-fp	total petroleum hydrocarbons quantified as fuel product
TPH-g	total petroleum hydrocarbons quantified as gasoline
VOC	volatile organic compound

1. Introduction

This Revised Groundwater Sampling and Analysis Plan (revised SAP) documents the updated scope of work for the groundwater monitoring and reporting program (MRP) at the SFPP Norwalk Pump Station, located at 15306 Norwalk Boulevard, Norwalk, California (Figure 1). This revised SAP has been prepared by Jacobs Engineering Group Inc. (Jacobs, formerly CH2M HILL), on behalf of SFPP, L.P. (SFPP), a subsidiary of Kinder Morgan, Inc. (Kinder Morgan), and in response to conditional approval from the California Regional Water Quality Control Board, Los Angeles Region (RWQCB) of Kinder Morgan's *Interim Remedial Action Plan (IRAP) – Implementing an NSZD Remedy* (Jacobs, 2022a).

Kinder Morgan and Defense Logistics Agency Energy (DLA Energy; formerly DESC), contracting to Source Group Inc., jointly conduct groundwater sampling and analysis events at the former Defense Fuel Support Point (DFSP) Norwalk, referenced herein as the facility. While groundwater sampling is conducted jointly, the focus of this document is on the areas associated with Kinder Morgan operations and on certain areas where groundwater beneath Kinder Morgan operations overlaps with DLA Energy's operational area, referenced herein as the site. DLA Energy addresses sampling in the remaining areas in a separate SAP.

Groundwater monitoring at the site has been conducted in accordance with the Revised Groundwater SAP (CH2M, 2013), requested and approved by the RWQCB in 2013 (RWQCB, 2013a) (RWQCB, 2013b), and additional requests received thereafter from the RWQCB or the DFSP Norwalk Restoration Advisory Board, which are summarized in the revised sampling plan tables located at the end of this report. The 2013 SAP was a revision to the 1995 *Groundwater Sampling and Analysis Plan, DFSP Norwalk/SFPP Norwalk Pump Station, 15306 Norwalk Boulevard, Norwalk, California* (Geomatrix, 1995), which marked the initiation of the Kinder Morgan-DLA Energy joint groundwater monitoring agreement.

The IRAP was submitted to the RWQCB on January 31, 2022, and conditionally approved in a letter from the RWQCB dated October 4, 2022 (RWQCB, 2022). In that letter, the RWQCB requested the following from Kinder Morgan:

- Submit a revised groundwater monitoring plan, including light nonaqueous phase liquid (LNAPL) gauging, for review and approval to effectively monitor changes in dissolved-phase plume characteristics from the residual LNAPL in the subsurface environment.
- Include in the site's future groundwater monitoring and remedial progress reports discussions and recommendations related to the contingency plans in the IRAP based on the observed LNAPL saturation and contaminant phase changes.

This revised SAP was prepared to meet these two RWQCB requests based on ongoing evaluations of the existing groundwater dataset at the site, which are reported in the groundwater reports (Jacobs, 2022c) and remediation reports (Jacobs, 2022b). This revised SAP identifies redundant and/or antiquated data collection practices in the current MRP, with an aim to optimize and modernize the MRP, and identifies contingency (i.e., downgradient) monitoring wells within the monitoring well network that will be the focus of sampling moving forward.

1.1 Objectives

This revised SAP will accomplish the following objectives:

- Assess groundwater flow conditions and monitor the extent of the fuel hydrocarbon plume in the uppermost groundwater zone as well as changes in fuel hydrocarbon constituent concentrations over time beneath the south-central, southern offsite, western offsite, and southeastern areas of the site.
- Monitor the effectiveness of the remediation systems that are addressing the fuel hydrocarbon constituents in the vadose zone and the uppermost groundwater zone.
- Monitor potential impacts to the Exposition aquifer, which underlies the uppermost groundwater zone.
- Document findings in semiannual groundwater monitoring reports that are submitted to the RWQCB.

These objectives will be accomplished by gauging, sampling, and analyzing groundwater samples from a robust network of monitoring wells that are located upgradient, within the plume, transverse gradient, and downgradient of the plume and the remediation systems. To account for seasonal and long-term variations in site conditions, all wells will be gauged semiannually and will be sampled either semiannually, annually, or bi-annually to evaluate concentrations of the fuel hydrocarbon constituents in groundwater. The sampling schedule is described in detail below.

1.2 Report Organization

This revised SAP is organized as follows:

- **Section 1 – Introduction:** Provides a summary-level description of the revised SAP evolution, purpose, objectives, and organization.
- **Section 2 – Background:** Summarizes site background information, including the site description, hydrogeologic setting, impacted areas and chemicals of concern, and remediation systems.
- **Section 3 – Groundwater Monitoring Program:** Discusses Kinder Morgan's monitoring well network for routine semiannual groundwater monitoring activities, and identifies specific wells that are to be used for remediation system effectiveness monitoring.
- **Section 4 – Field and Laboratory Procedures:** Describes the procedures to be followed during groundwater level measurements, LNAPL measurements, and collection of groundwater samples for laboratory analysis from the groundwater monitoring wells at the SFPP Norwalk Pump Station.
- **Section 5 – Quality Assurance/Quality Control:** Describes the quality assurance (QA) and quality control (QC) procedures for the groundwater monitoring program.
- **Section 6 – Reporting:** Describes the semiannual reporting of groundwater monitoring and sampling results for the second and fourth quarters. Reports will be submitted to the RWQCB.
- **Section 7 – References:** Provides a bibliography of documents cited in text.

Tables, figures, and appendices are provided at the end of text.

2. Background

This section summarizes site background information, focusing on the site description, hydrogeologic setting, impacted areas and chemicals of concern, and remediation systems.

2.1 Site Description

The former DFSP is located at 15306 Norwalk Boulevard in Norwalk, California (Figure 1), and consists of two adjacent parcels of land referred to as the 36-acre parcel to the west (currently owned by the federal government), and the 15-acre parcel to the east (currently owned by the City of Norwalk). Previously, Kinder Morgan operated a pump station near the south-central area of the facility (within the 36-acre parcel) and had other equipment related to refined petroleum product pipelines in the southernmost portion of the facility along the southern block wall. Currently, Kinder Morgan has an easement for its three refined petroleum products pipelines that traverse the facility along the southern block wall boundary.

Groundwater monitoring is conducted by Kinder Morgan (contracted to Jacobs) in conjunction with DLA Energy (contracted to Source Group Inc.) at the facility. While the groundwater impacts at the site are monitored jointly, sources of impacts at the site are generally divided into approximately six areas:

1. North-Central Area (generally DFSP sources)
2. East-Central Area (generally DFSP sources)
3. Western Area (potentially comingled DFSP and Kinder Morgan sources)
4. Truck Rack Area (potentially comingled DFSP and Kinder Morgan sources)
5. South-Central Area (includes South-Central/Onsite and South-Central/Offsite areas; generally Kinder Morgan sources)
6. Southeastern Area (generally Kinder Morgan sources)

The remedial management of the site is relatively bifurcated between the DFSP source impacts in the northern portion of the site and the Kinder Morgan source impacts along the southern boundary of the site in the areas listed and described above. The facilities present at the site were decommissioned in 2001 with the exceptions of the existing Kinder Morgan pipelines.

Kinder Morgan maintains remediation equipment within 2 acres at the facility and has an easement for its pipelines along the southern and eastern boundaries of the facility.

2.2 Hydrogeologic Setting

The hydrogeologic units underlying the 50-acre facility consist of the following units (see IRAP for complete details of the Bellflower and Exposition units):

- Uppermost groundwater zone (discussed in greater detail below)
- Bellflower aquitard
- Exposition aquifer

The uppermost groundwater zone in the site vicinity is a semiperched unit with a vadose zone from ground surface to approximately 25 feet below ground service (bgs) and a saturated zone approximately between 25 and 50 feet bgs. The lithology within the uppermost groundwater zone consists of poorly graded sand, silty sand, clayey sand, and sandy silt. Overall, there is a general pattern that the lower 20 feet (from 20 to 50 feet bgs) consists of mostly sandy or clean sand materials while the upper 30 feet (from ground surface to 30 feet bgs) consists of more interbedded sand, silty sand, clayey sand, and sandy silt.

Groundwater flow within the uppermost groundwater zone, as interpreted during previous assessments and monitoring at DFSP, is historically observed on average to be toward the north under a horizontal gradient of approximately 0.002 foot per foot. Hydraulic conductivity of the uppermost groundwater zone has been reported to range from 12 to 73 feet per day in the south-central area of the facility to 20 to 60 feet per day in the southeastern area (AMEC, 2010). The average porosity of the uppermost zone is approximately 0.25 (unitless). Based on the hydraulic gradients and conductivities, groundwater velocities are approximately 0.09 to 4 feet per day in the uppermost groundwater aquifer.

2.3 Impacted Areas and Chemicals of Concern

Contaminants of potential concern (COPCs) in groundwater are sourced from the remaining, primarily residual, LNAPL (Jacobs, 2022c). Subsurface assessments have been performed at the facility since 1986. Over the years, numerous groundwater monitoring wells have been installed at the site for monitoring and as components of groundwater remediation systems. The investigations have evaluated and defined the distribution of the LNAPL-phase, sorbed-phase, and dissolved-phase fuel hydrocarbons in soil and groundwater beneath the facility and at offsite properties to the south, west, and east.

Based on previous investigations, LNAPL was determined to be present in groundwater in three distinct areas of the site: the north-central area, monitored by DLA Energy; the south-central area (onsite and offsite), monitored primarily by Kinder Morgan; and the southeastern area, monitored by Kinder Morgan. As of 2022, only 8 of 178 total wells contain measurable LNAPL at the site, including 4 located in the DLA Energy areas and 4 located in the Kinder Morgan areas. The dissolved-phase plumes in shallow groundwater in these areas are sourced from this LNAPL. Although there is no measurable LNAPL present in the western area, relatively low concentrations of dissolved-phase components have historically been present in the western area beneath the facility and offsite beneath the residential area to the west.

Previous site assessments have shown soil impacts from COPCs including total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), chlorinated VOCs (cVOCs), and oxygenates. In particular, benzene, oxygenates (primarily methyl tertiary butyl ether [MTBE]), total petroleum hydrocarbons quantified as gasoline (TPH-g), and total petroleum hydrocarbons quantified as diesel fuel (TPH-d) remain the only nonchlorinated COPCs, which are routinely still detected in site groundwater. Relatively minor and discrete detections of 1,2-dichloroethane (1,2-DCA), another cVOC, are also present in groundwater, although they are not sourced from the LNAPL releases at the site (Jacobs 2022c). Historical groundwater data are provided in Appendix A. Additional details regarding historical sampling are provided in semiannual groundwater sampling reports (Jacobs, 2022c) and have also been summarized in the quarterly remediation reports (Jacobs, 2022b). In general, in the Kinder Morgan areas, TPH-g serves as a surrogate for all other COPCs with the exception of the chlorinated COPCs, as all COPCs are primarily sourced from gasoline in these areas.

Additional details on the petroleum hydrocarbon-related subsurface impacts can be found in the latest conceptual site model (CSM) report (CH2M, 2013), more recent LNAPL CSM report (CH2M, 2018), and the IRAP (Jacobs, 2022a).

2.4 Kinder Morgan Remediation Systems

Kinder Morgan currently operates remediation systems consisting of soil vapor extraction (SVE) and biosparging in only one area at the site (South-Central/Offsite) in addition to ongoing natural source zone depletion (NSZD) monitoring in the Truck Rack Area, South-Central Area (includes South-Central/Onsite and South-Central/Offsite areas), and Southeastern Area (generally Kinder Morgan sources).

Historically SVE, biosparging, total fluids extraction (extraction of free product, groundwater, or both, using a top-loading pump), groundwater extraction (extraction of groundwater using a bottom-loading pump), and treatment of extracted soil vapors and groundwater were used to address the following three areas:

- **South-Central Area.** LNAPL and dissolved-phase hydrocarbons occur in the south-central area beneath the facility and offsite beneath the residential area to the south. These impacts occurred from a historical release from the "intermediate 24-inch block valve" and potentially other unidentified sources at the former pump station.
- **Southeastern Area.** LNAPL and dissolved-phase hydrocarbons occur in the southeast area beneath the facility and offsite in the Holifield Park area. These impacts occurred from a historical release from the "southeastern 24-inch block valve" or "offsite 24-inch block valve" in this area.
- **Western Area.** Dissolved-phase hydrocarbons occur in the western area beneath the facility and offsite beneath the residential area to the west.

As described in the IRAP (Jacobs, 2022a) and ongoing remediation reports, these previous remediation systems have all reached endpoints, but have been maintained in place as a contingency if needed.

2.5 DLA Energy Remediation Systems

DLA Energy operates remediation systems to address the north-central tank farm area, the truck fill stand (or Truck Rack Area), the northwestern boundary area, and the eastern area, a portion of which extends into the northern portion of Holifield Park. It is anticipated that these areas will be discussed in a separate SAP prepared by DLA Energy.

3. Groundwater Monitoring Program

This section discusses Kinder Morgan's monitoring well network for routine semiannual groundwater monitoring activities, and identifies specific wells that are to be used for remediation system effectiveness monitoring.

3.1 Monitoring Well Network

A summary of the wells currently being sampled as part of the 2013 SAP and SAP amendments is provided in Table 1A (sorted by sampling criteria) and Table 1B (sorted alphabetically). Well construction for these wells is provided in Appendix B although SFPP is currently responsible for sampling 70 of these wells and gauging 94 wells.

Currently wells are gauged semiannually, primarily to evaluate groundwater contours and within the SFPP areas to monitor the four remaining wells containing LNAPL. The set of wells used for gauging and their gauging schedule will remain unchanged for the time being; however, as needed, wells may be removed from this gauging schedule or the frequency at which the wells are gauged may be revised with approval from the RWQCB based on data needs.

In addition to SFPP well gauging, 61 of these wells are sampled semiannual and 9 are sampled quarterly for groundwater analysis. Since the previous groundwater SAP, significant improvements in site conditions warranted the reevaluation of the wells being sampled and the frequency of sampling. Based on a review of historical dissolved-phase data, which are discussed in semiannual groundwater reports (Jacobs, 2022c) and statistics for which are provided in Appendix C, the following criteria were used to redefine the sampling frequency:

1. Wells that have been nondetect in the most recent sampling for the COPCs of benzene, MTBE, TPH-g, and TPH-d (BMTgTd) and have demonstrated long-term decreasing trends will be transitioned to a biannual sampling frequency (every other year). Wells that fall into these criteria are also under consideration for suspending sampling and/or abandoning these wells in future requests to the RWQCB. In total, 35 wells meet these criteria as detailed in Table 1A.
2. Wells that have had detections in one or more of the COPCs of BMTgTd in the last sampling event but are below RWQCB generic Tier 1 environmental screening levels (ESLs), have a downward trend in those COPCs, and are in areas of lower concern (i.e., bounded by other wells that are nondetect for BMTgTd and not on downgradient property boundaries) will be transitioned to annual sampling frequency. Note that groundwater criteria have not been established for the site nor are criteria being established here; however, these values represent a conservative starting point for evaluating well sampling frequency. In total, seven wells meet these criteria as detailed in Table 1A.
3. Wells that have been above Tier 1 ESLs for one or more of the COPCs of BMTgTd but have downward trends and are in areas of lower concern will also be transitioned to annual sampling frequency. In total, four wells meet these criteria as detailed in Table 1A. Note that only three wells will be sampled as GMW-O-23 has been abandoned and is represented by GMW-O-11.
4. Wells that have been above Tier 1 ESLs for one or more of the COPCs of BMTgTd but have no downward or upward trend and are in areas of lower concern will also be transitioned to annual sampling frequency. In total, six wells meet these criteria as detailed in Table 1A.
5. Contingency wells, which are discussed further in the next section, will be used to adjust remediation activities if the dissolved-phase trends in these wells change from stable to increasing and are located in key downgradient or plume delineation locations, which will be monitored semiannually, although some of these wells meet the first four criteria listed above. In total there are eight contingency wells as detailed in Table 1A.
6. No wells have increasing trends in BMTgTd.

Following review using the above criteria, five Exposition aquifer and 72 uppermost groundwater zone monitoring wells were selected for sampling at frequencies from semiannually to biannually in the monitoring program.

SFPP and DLA Energy may elect to sample Exposition aquifer wells EXP-1, EXP-2, and EXP-3 concurrently as split samples to ensure quality control in these monitoring wells.

The wells selected for SFPP's monitoring program are summarized in Table 1A and their locations and sampling frequencies are illustrated on Figure 2. Construction details for all sitewide wells are included in Appendix A. Additional wells not included in this monitoring program may be gauged periodically in order to optimize the operation of SFPP's remediation systems.

3.2 Monitoring Objectives

The objectives of the groundwater monitoring program and well network are summarized as follows, consistent with the requirements stated in the RWQCB's letter dated October 4, 2022 (RWQCB, 2022):

- Monitor changes in dissolved-phase plume characteristics from the residual LNAPL in subsurface environment.
- Monitor the remaining four Kinder Morgan wells containing LNAPL (GMW-23, GMW-29, GMW-30, GMW-O-12)

Additionally, the monitoring objectives include continued optimization of the groundwater monitoring data. Adjustments to the groundwater monitoring plan may be requested from the RWQCB based on the criteria discussed in Section 3.1 as COPCs continue to decline in wells due to remediation.

The monitoring well program summarized in Table 1A and the well network shown on Figure 2 meet these objectives.

A subset of wells around the South-Central/Onsite, South-Central/Offsite, and Southeastern areas function as the contingency wells for each of the primary remediation areas. These wells are monitored at a higher frequency (semiannually) and will be used to adjust remediation activities if the dissolved-phase trends in these wells change from stable conditions to increasing conditions. The well locations and density of the well network surrounding these areas are robust and sufficient to assess the behavior of the remaining groundwater plume.

4. Field and Laboratory Procedures

This section describes the procedures to be followed during groundwater level measurements, LNAPL measurements, and collection of groundwater samples for laboratory analysis from the groundwater monitoring wells at the site. Monitoring wells will be gauged and sampled on a semiannual frequency. The sampling events will occur in the second and fourth quarters of each year. The purpose of performing the monitoring events during these quarters is to capture the seasonal high and seasonal low groundwater elevation conditions.

4.1 Groundwater and LNAPL Measurements

Prior to sampling, all Kinder Morgan monitoring wells will be gauged using either an electronic water level meter or an electronic oil-water interface probe. Wells with historically low concentrations or with no detectable hydrocarbon constituents will be gauged using a water level meter. Wells with higher concentrations of hydrocarbon constituents and with historical presence of LNAPL will be gauged using an oil-water interface probe. Each well will be measured to the nearest 0.01 foot and referenced to the top of casing at each wellhead. Depth to water and/or LNAPL and well total depth will be measured and recorded in the field logbook or field sheets.

If pressure is suspected or has developed inside the well casing prior to water level measurement, the well will be allowed to stand without a cap to allow water levels to stabilize under atmospheric conditions before taking the water level measurement. Equipment placed in the wells for gauging will be cleaned before each use according to the procedures presented in Section 4.4.

4.2 Purging and Equipment Calibration

Where possible, groundwater samples will be collected using the low-flow sampling method, consistent with U.S. Environmental Protection Agency (EPA) guidance in "Low-flow (Minimal Drawdown) Ground-water Sampling Procedures" (EPA, 1996). In cases where this method is not possible, such as where the well does not provide sufficient yield for the low-flow method or there are permanent remediation pumps in the well, samples will be collected using alternate methods.

4.2.1 Low-Flow Purging

An electronic submersible pump or positive displacement bladder pump will be placed at or near the midpoint of the saturated well screen. The well then will be pumped at a flow rate to maintain minimal drawdown of the water level during pumping; it is estimated that the flow rate will be approximately 0.1 to 0.5 liter per minute. The water levels in the well will be monitored during pumping to monitor the drawdown during purging. The purging equipment will be decontaminated before and after well purging at each well is complete.

During purging, the groundwater will be monitored for conductivity, pH, temperature, turbidity, oxidation-reduction potential, and dissolved oxygen. Accurate measurement of the field parameters will require a flow-through cell or other means to ensure that the purge water is continuously monitored. Each well will be pumped until the measured field parameters (temperature, pH, turbidity, and conductivity) have stabilized within 10 percent over three successive readings prior to collecting samples. The water level also should be stable or rising during sampling. The water level and water quality parameter measurements will be recorded on the well monitoring field forms, along with the primary and/or duplicate sample identification name/number, purging and sampling methods, total well depth, depth to groundwater, and volume of water removed from the well.

Equipment used to measure field parameters will be maintained and calibrated according to manufacturer's specifications. At a minimum, calibration will occur at the start of each day, and will be recorded in the field logbook along with the equipment serial number.

4.2.2 Alternate Purging Methods

For remediation wells with extraction pumps, groundwater samples will be collected directly from the wellhead sample ports or the ports located at the groundwater treatment system manifold. Prior to sample collection, field parameters will be collected per the methods described above to ensure that the purge water is continuously monitored. The groundwater sampling contractor will coordinate with Kinder Morgan to determine remediation well operation status prior to sampling activities.

4.3 Well Sampling and Analysis

Groundwater samples will be collected from all selected wells that do not contain a measured thickness of LNAPL, and from which purged water does not exhibit a hydrocarbon sheen. Wells with a measured LNAPL layer or noticeable hydrocarbon sheen on purge water will not be sampled. In general, wells will be sampled in an order progressing from least VOC contamination to highest VOC contamination, to prevent cross-contamination of wells with minimal or undetectable VOC concentrations.

After purging activities are complete (using low-flow methods), a groundwater sample will be collected from the well through the pump used to purge the well. Samples will be transferred into sample bottles supplied by the analytical laboratory through the pump discharge hose. In some cases, it may be necessary to sample remediation extraction wells through the wellhead sampling port or at the groundwater treatment system manifold. In these cases, samples will be collected directly from the wellhead or manifold sampling port.

Samples to be analyzed for VOCs and TPH (gasoline and diesel) will be collected in five 40-milliliter glass volatile organic analysis vials. The vials will be filled so that no headspace is present after sample collection. Filled containers will be checked by inverting the vial and tapping to reveal any air bubbles. If air bubbles are present, containers will be emptied, reacidified, and refilled. If, after several attempts at sample collection, air bubbles remain, the sample will be described in the field notebook as an "aerated sample."

All groundwater samples will be cooled to 4 degrees Celsius and stored away from sunlight prior to shipping by immediately placing the full sample bottle into an iced cooler.

4.3.1 Sample Labeling

Sample containers will be labeled with self-adhesive tags having the following information written in waterproof ink: project name and number, sample number, date and time of sample collection, and initials of sample collector.

4.3.2 Sample Containers and Preservation

Sample containers with the proper preservatives will be supplied by the laboratory. Samples will be preserved in accordance with EPA requirements of the laboratory methods.

Samples sealed in glass containers will be bubble-wrapped and placed in individual zip-close-style bags labeled with the sample number. Samples will be packed inside the ice cooler with inert cushioning material (e.g., styrofoam) to prevent glass containers from breaking. Ice, double-sealed in resealable plastic bags, will be added to the cooler. A chain-of-custody form will be completed, sealed in a zip-close-style bag, and taped to the inside of the cooler lid. The cooler will be taped shut with strapping tape; and two chain-of-custody seals will be taped across the cooler lid. The samples then will be delivered to an analytical laboratory certified by the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP).

Samples that cannot be shipped the same day will be properly preserved; custody will be maintained in a locked area or vehicle.

4.3.3 Laboratory Analysis

Groundwater samples will be submitted to an ELAP-approved laboratory for the following analyses:

- TPH using EPA Method 8015 (modified) following both the purge and trap preparation technique, and the extraction sample preparation technique
- VOCs including fuel oxygenates (tertiary butyl alcohol [TBA], MTBE, di-isopropyl ether, ethyl tertiary butyl ether, and tertiary amyl methyl ether) using EPA Method 8260B

Results for TPH analyses using the purge and trap preparation technique will be quantified and reported against a commercial gasoline standard and abbreviated as “TPH-g.” Historically, results for TPH analyses using extraction sample preparation for groundwater samples were quantified and reported against a standard of site fuel collected from the north-central remediation system. These total petroleum hydrocarbons quantified as fuel product results were abbreviated as “TPH-fp.” TPH-fp was subsequently replaced with TPH quantified as diesel (“TPH-d”) analysis in April 2012. The primary concern with reporting TPH-g and TPH-fp is that the carbon ranges for these compounds overlap and thus the hydrocarbons are double counted, potentially yielding false high total TPH values. Because the laboratory-defined carbon ranges for TPH-g (C4 to C13) and TPH-d (C13 to C22) match up back-to-back, both gasoline and diesel fuels are more accurately measured by the combination of these two methods. Approval to analyze TPH-d in lieu of TPH-fp was granted by the RWQCB in an e-mail from Mr. Paul Cho, dated April 5, 2012.

The carbon ranges for TPH-g, TPH-fp, and TPH-d are approximately as follows:

TPH-g	C4 to C13
TPH-fp	C8 to C22
TPH-d	C13 to C22

4.4 Decontamination

The methods for cleaning reusable equipment that is not dedicated to a particular well are presented in the following sections.

4.4.1 Water Level Equipment

Water level equipment will be cleaned by wiping the instrument with disposable towels, rinsing the probe or portion of the instrument that was immersed in water or product with a solution of laboratory-grade detergent and potable water, rinsing with potable water followed by rinsing with deionized water, and drying with a clean paper towel or air drying.

4.4.2 Water Quality Meters

Water quality meters will be cleaned by rinsing the probe portions in deionized water and allowing to air dry.

4.4.3 Purge Pumps

Purge pumps will be decontaminated using a laboratory-grade detergent wash followed by potable water and deionized water rinses. Decontamination will include pumps and associated tubing, piping, and fittings. Internal surfaces will be decontaminated by operating the pump in a manner such that wash and rinse solutions are pumped through all internal parts of the pump and all portions of the discharge line. External surfaces of the pump and discharge line will be washed and rinsed by hand.

4.4.4 Sample Bottles and Bottle Caps

All sample bottles and bottle caps will be factory-new or cleaned by the subcontracted laboratory using standard EPA-approved methods.

4.4.5 Bailers

If bailers are used, they will be factory-new polyethylene disposable bailers; therefore, decontamination will not be required.

4.5 Investigative-Derived Waste

Spent personal protective equipment (PPE), purged groundwater, decontaminant rinsate water, and other materials derived from activities will be collected and staged at Kinder Morgan's remediation pad in the south-central area of the facility. PPE and other miscellaneous materials will be transferred to 55-gallon Department of Transportation-approved drums provided by Kinder Morgan. The drums will be sealed and labeled as nonhazardous waste. Purge and rinsate water will be transferred to the remediation pad sump for eventual treatment by Kinder Morgan's groundwater treatment system. In the event that the remediation system is not operating, or the purge water is not suitable for processing in the treatment equipment, Kinder Morgan will arrange for alternate disposal in accordance with applicable regulations.

5. Quality Assurance/Quality Control

This section describes the QA and QC procedures for the groundwater monitoring program. The QA program will consist of QC samples, field documentation, and data quality assessment.

5.1 QC Samples

A field QC program will be implemented to help maintain the required level of confidence in the field data and to provide cross-checks on the laboratory performing the analyses. QC samples, such as blanks, replicates, and surrogate spikes, will be collected routinely. QC samples will be collected for each analyte or each analytical method. Because the number of QC samples frequently depends on how the fieldwork is organized and implemented, the frequency of QC sample collection will be continually monitored so unnecessary QC samples are not collected.

The following types of field QC samples will be collected:

- Duplicate samples
- Equipment rinsate samples
- Trip blanks

QC samples are described in detail in the following sections.

5.1.1 Duplicate Samples

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned an identification number in the field such that they cannot be identified (blind duplicate) as duplicate samples by laboratory personnel performing the analysis.

Duplicate samples will be collected to assess the reproducibility of field sampling methods and the repeatability of laboratory analysis. One duplicate sample will be collected for every 10 samples collected during each groundwater monitoring event. The duplicates will be analyzed for the same parameters as the groundwater samples.

5.1.2 Equipment Rinsate Samples

Equipment rinsate samples will be collected on the sampling equipment to assess the effectiveness of equipment decontamination procedures and to evaluate the potential for cross-contamination between sample locations. One equipment rinsate blank sample will be collected per day during each groundwater monitoring event. The rinsate blank will be analyzed for the same parameters as the groundwater samples. Laboratory-grade deionized water provided by the analytical laboratory will be used for sample blanks.

5.1.3 Trip Blanks

The trip blank consists of a VOC sample vial filled in the laboratory with laboratory-grade deionized water, transported to the sampling property, handled like an environmental sample, and returned to the laboratory for analysis. Trip blanks are not opened in the field. Trip blanks are prepared only when VOC samples are taken and are analyzed only for VOCs. Trip blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. One trip blank will be collected per sample cooler used during each monitoring event to evaluate the potential for contaminant introduction during shipping.

5.2 Field Documentation

The groundwater sampling technician will maintain appropriate field documentation. Documentation requirements, as well as procedures for correcting documentation, are briefly summarized as follows.

5.2.1 Well-Monitoring Field Forms

Water quality parameters will be recorded on well monitoring field forms, along with the primary and/or duplicate sample identification name/number, date and time sampled, name of sample collector, well designation, well diameter, purging and sampling methods, total well depth, depth to groundwater, depth from which sample was obtained, results of instrument calibration, volume of water removed from each well, sample matrix, analysis requested, sample container preservative, and project name and number.

5.2.2 Wellhead Protection

The condition of each well and well vault will be documented on a wellhead inspection form for each sampling event. The inspection form will include comments on the following elements:

- Well aboveground or flush-mount completion
- Visibility of well or well vault
- Well identification tag present or not present
- Physical damage to well, well vault, and cover
- Cover to well vault secured properly with bolts
- Well pad condition (for example, cracked or broken)
- Concrete or steel bollards present or not present
- Functioning lock present or not present
- Watertight cap present or not present
- Well vault condition (dry or free of debris)
- Measured depth of well
- Corrective actions completed in field
- Recommended corrective actions

5.2.3 Corrections to Documentation

All original data in field sampling forms and chain-of-custody records will be recorded using waterproof ink. None of these documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies.

If an error is made on a document assigned to one individual, the individual will make corrections by lining through the error and entering the correct information. The erroneous information is *not* to be obliterated. Any subsequent error discovered on an accountable document will be corrected by the person who made the entry, if possible. All subsequent corrections will be initialed and dated.

5.3 Data Quality

Data quality is assessed by representativeness, comparability, accuracy, precision, and completeness. Definitions of these terms, the applicable procedures, and level of effort are described below. The applicable QC procedure, quantitative target limits, and level of effort for assessing data quality are dictated by the intended use of the data and the nature of the analytical methods. The following is a description of the data quality assessment criteria.

Representativeness is a measure of how closely the results reflect the actual concentration or distribution of the analytes in the matrix samples. Sampling plan design, sampling techniques, and sample handling protocols (e.g., for storage, preservation, and transportation) have been developed and are discussed in Section 4. The proposed documentation will establish that protocols have been followed and sample identification and integrity assured. Equipment rinsate blanks and field duplicate samples will be used to assess field and transport contamination and method variation. To assess laboratory contamination, laboratory method blanks will be run at a minimum frequency of 5 percent of the samples.

Comparability expresses the confidence with which one dataset can be compared to another. Data comparability will be maintained using standard procedures where available and the use of consistent methods and consistent units. Actual detection limits will depend on the sample matrix and will be reported as defined for the specific samples.

Accuracy is an assessment of the closeness of the measured value to the true value. For samples, accuracy of analytical test results is assessed by spiking samples with known standards and establishing the average recovery. For a matrix spike, known amounts of a standard compound identical to the compounds being measured are added to the sample. Target accuracy goals for the analytical methods proposed, expressed as percent recovery of spiked sample, are 75 to 125 percent. Percent recoveries outside these goals will be qualified as appropriate.

Precision of the data is a measure of the data spread when more than one measurement has been taken on the same sample. Precision can be expressed as the relative percent difference. The target precision goal for the analytical methods proposed, expressed as relative percent difference between duplicate samples, is ±25 percent. A relative percent difference outside this goal will be qualified as appropriate.

6. Reporting

Groundwater monitoring and sampling results for the second and fourth quarters will be presented in semiannual monitoring reports submitted to the RWQCB. Consistent with the current agreement, Kinder Morgan will prepare and submit the first half of the year report for period January 1 to June 30 and DLA Energy will prepare and submit the second half of the year report for period July 1 to December 31. Prior to submitting each report to the RWQCB, Kinder Morgan and DLA Energy will review each other's reports. The first half of the year report will be due on July 31 and the second half of the year report will be due on January 30. The report prepared by Kinder Morgan will include the following information:

- Descriptions of field and laboratory methods.
- Tables of current and historical groundwater level data and analytical results.
- Groundwater contour maps and interpreted direction of groundwater flow for the uppermost groundwater zone and Exposition aquifer.
- Figures of the site base map showing the estimated extent of LNAPL and dissolved-phase plumes based on the current sampling round analytical results (e.g., TPH, benzene, MTBE, TBA, and 1,2-DCA).
- Brief discussion of groundwater elevations, gradients, and water quality analytical results, and a comparison to the previous semiannual event.
- Time-series charts for select monitoring wells presented as an appendix.
- Field sampling forms, laboratory analytical reports, and chain-of-custody documentation submitted as appendices to the report.

Reports will be prepared under the supervision of a California Registered Geologist or Professional Engineer and will be submitted to the RWQCB.

7. References

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Tables

Figures

Appendix A
Historical Analytical Data

Appendix B
Sitewide Well Construction Details

Appendix C
Groundwater Statistical Analysis