Jacobs

Technical Memorandum

2600 Michelson Drive, Suite 500
Irvine, California 92612
United States
T +1.949.224.7500
F +1.949.224.7501
www.jacobs.com

Subject	**Second 2022 Semiannual Soil Vapor Monitoring Report**	**Project Name**	SFPP Norwalk Pump Station, Norwalk, California
Attention	Mr. Paul Cho/Los Angeles Regional Water Quality Control Board		
Prepared by	Marjory Fure/Jacobs Todd Kremmin/Jacobs		
Reviewed by	Eric Davis/Jacobs		
Date	November 3, 2022		
Copies to	Court Reece/Kinder Morgan		

1. Introduction

Jacobs Engineering Group Inc. (Jacobs) is pleased to submit this technical memorandum (tech memo) on behalf of Santa Fe Pacific Pipelines, L.P. (SFPP), an operating partner of Kinder Morgan, Inc. (Kinder Morgan). This tech memo presents soil vapor monitoring analytical results from the second semiannual sampling event of 2022, conducted in August and September 2022, at the SFPP, L.P. (SFPP) Norwalk Pump Station, located within Defense Fuel Support Point (DFSP) Norwalk, at 15306 Norwalk Boulevard, Norwalk, California (the Site; Figure 1).

This tech memo is being submitted to the Los Angeles Regional Water Quality Control Board (Regional Board) in accordance with an April 11, 2022, decision by the Regional Board allowing Kinder Morgan to temporarily reduce soil vapor monitoring and reporting frequency from quarterly to semiannually due to ongoing construction and redevelopment activities at the Site (Regional Board, 2022a). Therefore, this tech memo serves as the second semiannual soil vapor monitoring tech memo for 2022 and supersedes the prior requirement from the Regional Board requesting that Kinder Morgan conduct and submit quarterly soil vapor monitoring reports (Regional Board, 2021).

At the request of the Regional Board in the Conditional Approval of the Interim Remedial Action Plan (IRAP) letter (Regional Board, 2022b), Kinder Morgan has initiated the process of reviewing the current soil vapor monitoring Sampling and Analysis Plan (SAP) and determining the need to prepare a revised SAP. If a revised SAP is warranted, Kinder Morgan will collaborate with the Regional Board to develop an updated SAP, to be submitted in early 2023.

2. Background

For the first 2022 semiannual sampling event, Kinder Morgan utilized a network of 31 dual- and triple-nested soil vapor monitoring probes (SVPs) located within and around the three areas of ongoing treatment and monitoring at the Site: the south-central area in the 36-acre parcel, the offsite/south-central area in the residential area south of the 36-acre parcel, and the southeastern area in the 15-acre parcel (Figure 2). These SVPs comprised 66 unique sample intervals from approximately 5, 10, 15, and 22 feet below ground surface (ft bgs).

With Regional Board concurrence, several SVPs were destroyed in May 2022, after the first 2022 semiannual sampling event was conducted, because they are in the way of the construction and redevelopment activities mentioned above. The destroyed SVPs include offsite/south-central SVP "SVM-15" and southeastern area SVPs "SVM-17," "SVM-18," "SVM-19," and "SVM-20." Therefore, the SVP network was reduced to 26 dual- and triple-nested SVPs, with 55 unique sample intervals available for sampling (Table 1).

Additional Site background information and historical data from long-term soil vapor monitoring can be found in the *IRAP – Implementing an NSZD Remedy* (Jacobs, 2022a), the *Second Quarter 2022 Remediation Progress Report* (Jacobs, 2022b), and the previous soil vapor monitoring tech memos, available on "GeoTracker", the Regional Board's internet accessible database.

3. Sampling

During the second 2022 semiannual sampling event, 55 native samples were collected from 31 SVPs (Table 1, Figure 2) in August and September using 1.4-liter Summa canisters. Four ambient air samples were also collected, along with three duplicate samples. Sampling was performed in accordance with the Department of Toxic Substances Control's (DTSC) *Advisory for Active Soil Gas Investigations* (DTSC, 2015). The samples were analyzed by the American Analytics laboratory for the following analytes:

- Volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method TO-15
- Total petroleum hydrocarbon – gasoline (TPH-g) using EPA Method TO-3
- Fixed gases (carbon dioxide, methane, and oxygen) using EPA Method 3CM

Included in the TO-15 list of analytes were benzene, toluene, ethylbenzene, and xylene (BTEX), methyl tert-butyl ether (MTBE), naphthalene, tertiary butyl alcohol, 1,2-dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-butylbenzene, sec-butylbenzene, isopropylbenzene, n-propylbenzene, and 2-propanol (the leak test compound). These constituents were identified as contaminants of potential concern (COPCs) based on the results of the *Vapor Intrusion Sampling and Human Health Risk Assessment* (Geomatrix, 2006).

4. Results

Table 2 presents the analytical results for samples collected during the second 2022 semiannual sampling event compared to DTSC-modified screening levels (DTSC, 2020) and EPA regional screening levels (RSLs) (EPA, 2021), derived with an attenuation factor currently in guidance (DTSC, 2011). It should be noted that there are no established screening levels for certain analytes. Laboratory analytical reports are included in Attachment A. A summary of results is as follows:

- No COPCs were detected in any SVP during the second semiannual sampling event of 2022.
- Non-COPC compounds that were detected include: 2,2,4-trimethylpentane, acetone, bromodichloromethane, carbon disulfide, chloroform, ethanol, tetrachloroethylene (PCE), and TPH-g (C4-C12). The only exceedance of criteria were at deeper sample ports SVP-108-10 (790 micrograms per liter [µg/L]) and SVM-6-13 (22,000 µg/L) for TPH-g (C4-C12), with both locations bounded above by soil vapor samples which did not exceed criteria.

5. Statistical Evaluation

Recent detections of TPH-g in soil vapor were evaluated using statistical analysis (descriptive and quantitative trends). Only TPH-g trend analysis is discussed in this report, as other contaminants are similar to TPH-g results and TPH-g is a more useful (and conservative) proxy for evaluation of both sitewide vapor phase hydrocarbons and light nonaqueous phase liquid (LNAPL). Section 5.1 summarizes the statistical approach (methodology) to the evaluation and the underlying assumptions. The quantitative results of the statistical evaluation are described below in Section 5.2.

5.1 Statistical Methodology

The Mann-Kendall test (Mann, 1945; Kendall, 1975; Gilbert, 1987) and the Theil-Sen slope estimator (Theil, 1950; Sen, 1968) were used for trend testing and estimation of trend magnitude, respectively. These methods are suited for univariate time-series with monotonous trends and no seasonal or other cycles in the data (no autocorrelation in the time-series). Nonparametric methods are preferred to parametric methods (i.e., ordinary linear regression analysis) because they make no assumption about the probability distribution of the data. Additionally, nonparametric methods and, in particular, methods for the estimation of trend magnitude, are robust to the presence of outliers or to abrupt breaks due to inhomogeneous time-series (Hirsch et al., 1982).

The null hypothesis in the Mann-Kendall test assumes that there is no trend (the data are independent and randomly ordered) and this is tested against the alternative hypothesis, which assumes that there is a trend. The calculated probability (p-value) of the test represents the probability that any observed trend would occur purely by chance (given the variability and sample size of the data set). A significance level of 0.05 (i.e., 95 percent confidence) was used to test the null hypothesis that there is no trend in the data. The significance level is the probability that a test erroneously detects a trend when none is present. Only p-values less than 0.05 indicate a statistically significant trend. The result of the Mann-Kendall test is either a significantly increasing or decreasing trend, or a non-significant result (no trend, stable).

Additional details about the statistical methodology used are included in Attachment B (Hollander and Wolfe 1973, p. 201; EPA, 2009; ITRC, 2013; Kaplan and Meier, 1958; EPA, 2015, Helsel, 2012, and Singh et al., 2006).

5.2 Statistical Results

Trend analysis was conducted for TPH-g from September 2015 through September 2022. In 2015 biosparging began in the horizontal wells in the south-central area which establishes a natural starting point (time zero) for statistical analysis at most locations. Attachment B represents a summary table of the trend analysis results along with descriptive statistics. The results are summarized as follows:

- There were 55 sample points evaluated using the Mann-Kendall test
  - One location, SVM-14D, has a statistically significant decreasing trend.
  - No locations had increasing trends.
- There were 38 cases of non-significant test results (i.e. no trend, stable), meaning that the null hypothesis of no trend could not be rejected at the specified 95% confidence level.
  - All cases had no trend because >50% of the results were nondetect.
- There were 30 cases of insufficient data for analysis (IS), meaning that three or fewer observations for that unique location and analyte were available.

6. Conclusions and Recommendations

There were no detections of any COPCs during the second 2022 semiannual sampling event; therefore, no COPCs currently present unacceptable risk at the Site. The only exceedences of criteria were at SVP-06D and SVP-108D. The concentration of TPH-g (C4-C12) at SVM-06D exceeded both the residential and commercial RSLs however the upper bounding sample from SVM-6S from 7-7.5 ft bgs did not exceed criteria. Similarly, the concentration of TPH-g (C4-C12) at SVP-108D exceeded the residential RSLs; however, the upper bounding sample from SVP-108S from 5-5.5 ft bgs did not exceed criteria. A statistical analysis of TPH-g from 2015 through September 2022 demonstrate that there are no increasing trends for TPH-g in soil vapor.

Other detected compounds (non-COPCs) are detected infrequently and at relatively low concentrations, below DTSC-modified screening levels and EPA RSLs, in the shallow soil vapor (defined as the upper 10 feet of soil). Observed transitory increases of non-COPCs, such as TPH-g, are an artifact of ongoing biosparging operations and are closely monitored with field-based observations on a weekly to biweekly basis. Further details and data regarding these observations are provided in the quarterly remediation progress reports.

As concluded in the *IRAP* (Jacobs, 2022a) and other documents such as the *Review of the Offsite Soil Vapor Monitoring Probe Network* (Jacobs, 2020a) and *Updated Human Health Risk Assessment for the Offsite/South-Central and Offsite/Southeastern Areas* (Jacobs, 2020b), exposure pathways at the Site are largely incomplete and insignificant for the petroleum releases in groundwater, subsurface soil, and soil vapor.

Moreover, multiple lines of evidence point to the presence at the Site of a clean, biologically active zone in shallow soil where aerobic biodegradation controls the diffusion of petroleum VOCs to the ground surface, further mitigating potential exposure pathways. This conclusion is also consistent with the conclusions presented in the 2006 human health risk assessment (HHRA) (Geomatrix, 2006) and the HHRAs supporting the closure of the DFSP 15-acre and 36-acre parcels (CH2M, 2017; Jacobs, 2019).

Results from the soil vapor monitoring and sampling in the first half of 2023 will be summarized in a tech memo to be submitted by mid-2023.

7. References

CH2M HILL (CH2M). 2017. *Results of Additional Soil and Soil Vapor Sampling and Revised Human Health Risk Assessment to Support Shallow Soil Closure for the Eastern 15-Acre Parcel, Defense Fuel Support Point, Norwalk, California*. March.

Department of Toxic Substances Control (DTSC). 2011. *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air.* October.

Department of Toxic Substances Control (DTSC). 2015. *Advisory for Active Soil Gas Investigations.* July.

Department of Toxic Substances Control (DTSC). 2020. *Human Health Risk Assessment (HHRA) Note: Human and Ecological Risk Office (HERO) HHRA Note Number: 3, DTSC-modified Screening Levels (DTSC-SLs).* June. https://dtsc.ca.gov/wp-content/uploads/sites/31/2019/04/HHRA-Note-3-June-2020-A.pdf.

Geomatrix Consultants, Inc. (Geomatrix). 2006. *Vapor Intrusion Sampling and Human Health Risk Assessment, DFSP Norwalk Facility, Norwalk, California*. December.

Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring*. Wiley, New York.

Helsel, D.R. 2012. Statistics for Censored Environmental Data Using Minitab and R, Second Edition. John Wiley and Sons, New Jersey.

Hirsch, R.M., J.R. Slack, and R.A. Smith. 1982. "Techniques of Trend Analysis for Monthly Water-Quality Data." *Water Resources Research*. No. 18. pp. 107-121.

Hollander, M. and D.A. Wolf. 1973. *Nonparametric Statistical Methods*. Wiley, New York. p. 201.

Interstate Technology & Regulatory Council (ITRC). 2013. *Groundwater Statistics and Monitoring Compliance: Statistical Tools for the Project Life Cycle*. GSMC-1. December.

Jacobs Engineering Group Inc. (Jacobs). 2019. *Additional Soil and Soil Vapor Sampling and Human Health Risk Assessment to Support Shallow Closure for the 36-Acre Parcel – Revision 1.* April 15.

Jacobs Engineering Group Inc. (Jacobs). 2020a. *Review of the Offsite Soil Vapor Monitoring Probe Network, SFPP Norwalk Pump Station, Norwalk, California*. July 9.

Jacobs Engineering Group Inc. (Jacobs). 2020b. *Updated Human Health Risk Assessment for the Offsite/South-Central and Offsite/Southeastern Areas, SFPP Norwalk Pump Station, Norwalk, California*. August 28.

Jacobs Engineering Group Inc. (Jacobs). 2022a. *Interim Remedial Action Plan (IRAP) – Implementing an NSZD Remedy, SFPP Norwalk Pump Station, Norwalk, California*. January 31.

Jacobs Engineering Group Inc. (Jacobs). 2022b. *Second Quarter 2022 Remediation Progress Report, SFPP Norwalk Pump Station, Norwalk, California*. July 15.

Kaplan, E.L. and O. Meier. 1958. "Nonparametric Estimation from Incomplete Observations." *Journal of the American Statistical Association*. No. 53. pp. 457-481.

Kendall, M.G. 1975. *Rank Correlation Techniques*. 4th edition. Charles Griffen. London.

Mann, H.B. 1945. "Nonparametric Tests Against Trend." *Econometrica*. No. 13. pp. 245-259.

Regional Water Quality Control Board, Los Angeles Region (Regional Board). 2021. Letter, *Approval of Workplan for Offsite Soil Vapor Probe Installation and Requirement for Soil Vapor Monitoring, Defense Fuel Support Point, Norwalk, California*. November 9.

Regional Water Quality Control Board, Los Angeles Region (Regional Board). 2022a. Email, *KM Norwalk – Proposed Well and SVP Networks Based on Construction (15-acre Parcel and 12247 Cheshire St), Defense Fuel Support Point, Norwalk, California*. April 11.

Regional Water Quality Control Board, Los Angeles Region (Regional Board). 2022b. Letter to Mr. Court Reece, Kinder Morgan Energy Partners, Houston; *Conditional Approval of Interim Remedial Action Plan for the Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk (SCP No. 0286B Site No. 204DM00)*. October 4.

Sen, P.K. 1968. "Estimates of Regression Coefficient Based on Kendall's Tau." *Journal of the American Statistical Association*. No. 63. pp. 1379-1389.

Singh, A., R. Maichle, and S. Lee. 2006. *On the Computation of a 95% Upper Confidence Limit of the Unknown Population Mean Based Upon Data Sets with Below Detection Limit Observations*. EPA/600/R-06/022. March.

Theil, H. 1950. A Rank Invariant Method of Linear and Polynomial Regression Analysis, i, II, III. In *Proceedings of the Koninklijke Nederlandse Akademie Wetenschappen, Series A - Mathematical Sciences*. No. 53. pp. 386-392, 521-525, 1397-1412.

U.S. Environmental Protection Agency (EPA). 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance*. EPA-530-R-09-007. Office of Resource Conservation and Recovery, U.S. Environmental Protection Agency. March.

U.S. Environmental Protection Agency (EPA). 2015. *ProUCL Version 5.1 Technical Guide*. October.

U.S. Environmental Protection Agency (EPA). 2021. *Regional Screening Levels*. May. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

Tables

Figures

Attachment A
Laboratory Analytical Reports

Attachment B
Statistical Analysis Summary Table