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# REPORT OF NATURAL ATTENUATION CHARACTERISTICS AND SOIL VAPOR CHARACTERISTICS ABOVE DISSOLVED-PHASE BENZENE PLUMES

## PACIFIC COAST PIPELINE (PCPL) SUPERFUND SITE FILLMORE, CALIFORNIA

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# REPORT OF
# NATURAL ATTENUATION CHARACTERISTICS AND SOIL VAPOR CHARACTERISTICS ABOVE DISSOLVED-PHASE BENZENE PLUMES

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Presented in this report are the results of vapor sampling activities conducted at the Chevron Environmental Management Company (Chevron) Pacific Coast Pipeline (PCPL) Superfund Site (Site) located in Fillmore, California. The purpose of the investigation was to characterize subsurface vapor conditions as well as establish natural attenuation characteristics above two dissolved-phase benzene plumes located along the western edge of the Site

The investigation was conducted in general accordance with a work plan entitled *Sampling & Analysis Plan for Natural Attenuation Characteristics and Soil Vapor Characteristics Above Dissolved-Phase Benzene Plumes* (URS, 2006). The work plan was approved by EPA in a letter dated August 28, 2006 (EPA, 2006).

This documentation report is focused primarily on the vapor sampling results from several multi-depth well installations. A separate well installation report was submitted to the agency on May 11, 2007 (URS, 2007).

No express or implied representation or warranty is included or intended in this report except that the work was performed within the limits prescribed by Chevron with the customary thoroughness and competence of professionals working in the same area on similar projects.

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# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| bgs | below ground surface |
| BTEX | benzene, toluene, ethyl benzene, and total xylenes |
| Chevron | Chevron Environmental Management Company |
| CMT | Continuous Multichannel Tubing |
| CFR | Code of Federal Regulations |
| DCA | dichloroethane |
| DTSC | Department of Toxic Substances Control |
| England Geosystem | England Geosystem, Inc. |
| EPA | Environmental Protection Agency |
| Equilon | Equilon Pipeline Company LLC |
| ESI | Environmental Solutions, Inc. |
| feet/day | feet per day |
| ft/ft | foot per foot |
| GWTS | groundwater treatment system |
| LARWQCB | Regional Water Quality Control Board – Los Angeles Region |
| NPL | National Priorities List |
| NPDES | National Pollutant Discharge Elimination System |
| NSA | northern sampling area |
| ORC® | oxygen release compound |
| PCPL | Pacific Coast Pipeline |
| P.G. | Professional Geologist |
| PID | photoionization detector |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| Site | Pacific Coast Pipeline Superfund Site |
| SVE | soil vapor extraction |
| SSA | southern sampling area |
| SWRCB | State Water Resources Control Board |
| TTTI | Texaco Trading and Transportation, Inc. |
| TPH | total petroleum hydrocarbons |
| URS | URS Corporation |
| USA | Underground Service Alert |
| USCS | Unified Soil Classification Systems |
| EPA | United States Environmental Protection Agency |
| VCWPD | Ventura County Watershed Protection District |
| VOC | volatile organic compound |
| work plan | Sampling and Analysis Plan for Natural Attenuation Characteristics and Soil Vapor Characteristics Above Dissolved-Phase Benzene Plumes |

# 1.0 INTRODUCTION

On behalf of Chevron Environmental Management Company (Chevron), URS Corporation (URS) has prepared this report to document a soil and soil vapor investigation conducted at the Pacific Coast Pipeline (PCPL) Superfund Site (the Site). The Site is located at 67 East Telegraph Road in Fillmore, California. The Site location map is shown on Figure 1. The Site plan with investigation areas is shown on Figure 2.

The purpose of the investigation was to characterize subsurface vapor conditions and establish natural attenuation characteristics above two dissolved-phase benzene plumes located along the western edge of the Site. This was accomplished by collecting soil cores and installing and sampling vapor monitoring wells. The vapor monitoring well installations were previously discussed in a well installation report, which was submitted to the U.S. EPA on May 11, 2007 (URS, 2007). This report describes the field methods used to collect soil and vapor samples and presents analytical results for vapor samples, soil core photography, and physical/geochemical testing results for soil samples. A well installation summary is provided in Table 1.

The vapor sampling was conducted in general accordance with a work plan entitled *Sampling & Analysis Plan for Natural Attenuation Characteristics and Soil Vapor Characteristics Above Dissolved-Phase Benzene Plumes* (URS, 2006a). The work plan was approved by the United States Environmental Protection Agency (EPA) in a letter dated August 28, 2006. The agency communications are provided in Appendix A.

The content of this report addresses the completion of the following:

- Subsurface soil sampling for analysis of physical/geochemical properties of soils relating to natural attenuation of volatile organic compounds (VOCs) beneath the Site.
- A preliminary subsurface vapor investigation used in conjunction with soil physical/geochemical results to determine optimal placement of vapor monitoring points.
- Subsurface soil vapor monitoring point installation and subsequent vapor sample collection (two seasonal opposite events) for chemical analysis to provide data for the evaluation of vapor migration from two dissolved-phase benzene plumes (southern and northern) in groundwater beneath the Site.

The results presented in this report were used to:

- Evaluate the impact of existing soil chemistry and physical properties on the natural attenuation of subsurface hydrocarbons beneath the Site.
- Plot soil vapor concentrations versus depth to understand the role of biodegradation in controlling vapor migration above the dissolved-phase benzene plumes.

- Assess whether vapor migration from dissolved-phase benzene plumes in groundwater beneath the Site has the potential to impact human health.

## 1.1 Site Name and Location

The site is referred to as the PCPL Superfund Site. The EPA identification number for this Site is CAD980636781. The Site is located along the eastern border of Fillmore, California (Figure 1).

## 1.2 Regulatory Authority

The EPA (Region 9) is the regulatory authority administering the Consent Decree (EPA, 1993). The Department of Toxic Substances Control (DTSC) is the state agency administering the Consent Decree for the State of California. However, the EPA became the lead agency for the project when the site was listed on the National Priorities List (NPL).

The Record of Decision (ROD) lists five chemical constituents with groundwater cleanup goals for benzene, toluene, ethylbenzene, 1,2-dichloroethane (1,2-DCA) and methylene chloride (EPA, 1992). The ROD has no regulatory provision for soil characterization other than for protection of the underlying groundwater from the five listed chemicals of concern (benzene, toluene, ethylbenzene, 1,2-DCA, and methylene chloride) identified.

## 1.3 Objectives

The Site is a former refinery that operated from the early 1900s through the early 1950s. Texaco operated the refinery from 1928 to 1951. In 1951, the refinery was dismantled and became a pumping station until operations were permanently discontinued in the summer of 2002. The Site is currently inactive and is not used for petroleum refining, storage, and/or transportation. The Site was added to the NPL in 1989. Groundwater remediation was initiated due to the discovery of dissolved-phase constituents in groundwater beneath the Site, including benzene, toluene, ethylbenzene, 1,2-DCA, and methylene chloride. A project background summary is provided in Section 2.0.

A major goal applied during the development of the EPA-approved *Final Phase 2 Design Report* (England and Associates, 1994) was that active remedial activities would be concentrated on-site to minimize the impact to the residents of the City of Fillmore. Off-site remediation was to rely on natural processes.

In the eleven years since implementing the remedial design described in the *Final Phase 2 Design Report*, on-site source control through soil vapor extraction has reached the stated clean up goal and the EPA released Texaco (now a part of Chevron Corporation) from that activity. In addition, the groundwater treatment system (GWTS) has reached the effective limit to remediate the dissolved-phase benzene plumes beneath the Site. As discussed in EPA's Second Five Year Review Report (EPA 2006), Chevron

is currently evaluating whether monitored natural attenuation is adequately protective of human health and the environment.

There have been significant advances in the technology for evaluating and implementing natural attenuation as a remedial alternative, particularly for benzene, toluene, ethylbenzene, and total xylenes (BTEX) since the issuance of the ROD. Therefore, Chevron is collecting subsurface information to support developing a natural attenuation remediation alternative with institutional controls. This phase of the natural attenuation evaluation includes collecting soil/vapor samples above the area of current maximum benzene concentration in groundwater for both physical and chemical characterization.

Based on the depth, geometry, and chemistry of the off-site dissolved-phase plumes, and the lack of impacts on distant municipal drinking water wells, the primary potential exposure pathway to nearby residents being evaluated is intrusion to indoor air of benzene vapors that may migrate from underlying groundwater.

Potential risks to human health from vapor intrusion to indoor air were evaluated by directly measuring soil vapor concentrations of select VOCs (primarily benzene), considering the impact of natural attenuation through biodegradation processes, and comparing with available California Human Health Screening Levels (CHHSLs) published by DTSC (2004). In particular, soil vapor concentration profiles were determined within two off-site investigation areas (southern and northern) located above the dissolved-phase benzene plumes in groundwater. These investigation areas represent the highest dissolved benzene concentrations in groundwater, and therefore represent a “worst-case” scenario.

## 1.4 Sampling Area Description

There are two designated sampling areas corresponding to the highest observed off-site concentration of benzene in groundwater as measured in March 2005. The Southern Sampling Area (SSA) is located in the general vicinity of groundwater monitoring wells MW-39S and MW-50S (Figure 3). The Northern Sampling Area (NSA) is in the general vicinity of MW-32S and MW-42S (Figure 4). The SSA is located within property owned by Chevron. The NSA is located within property owned by Ventura County Watershed Protection District (VCWPD).

## 1.5 Seven-Step Data Quality Objectives Process

A seven-step data quality objective (DQO) process was used during this investigation as requested by the EPA. The DQO process as presented in the approved work plan is detailed as follows:

**1. State the Problem**

Groundwater impacted by dissolved VOCs, including benzene, exists off site and beneath residences adjacent to the PCPL Fillmore Site. Groundwater sampling results show that natural attenuation is occurring. The dissolved plumes are stable, with declining benzene concentrations that range from about 0.001 to 0.5 milligrams per liter (mg/L). Natural attenuation (biodegradation) of the vapor phase likely occurs in vadose zone soil located within the upper 55 feet of the SSA and 90 feet of the NSA. A

working hypothesis assumed that some level of vapor would be present. The objective of this investigation was to evaluate potential health risks of VOCs off-gassing from groundwater and migrating into indoor air through collection of specific Site data and application of data evaluation techniques acceptable to EPA and DTSC.

The intended purpose of this study was two-fold:

- Collect subsurface soil samples for analyses of specific physical/geochemical properties of soils related to biodegradation of VOCs beneath the Site to better understand biodegradation of the vapor phase.
- Collect and analyze soil vapor samples above two dissolved-phase benzene plumes (northern and southern) in groundwater. The data were used to assess potential impacts to off-site receptors and decide if further actions are necessary.

While the findings may be applicable to the entire PCPL Fillmore Site, this vapor study was intentionally focused on the off-site plume areas. The on-site areas of historical operations are being addressed in a phased investigation of potentially impacted soils via a separate work plan submitted for approval to EPA and DTSC (URS, 2007a).

Therefore, the decision statement for the vapor study is as follows:

- Gather soil and vapor data above off-site dissolved VOC (benzene) plumes, determine vertical vapor concentration profiles in soil, and assess whether detected concentrations present a potential health risk to off-site residents.

### 2) Identify Goals of the Study

The study's goals were to acquire reliable and defensible data that will be used to answer the following questions:

a) What is the vertical concentration profile of soil vapor above the dissolved plumes?

b) Is there a complete pathway for migration of VOCs in vapors from groundwater to off-site receptors living above the plume?

c) Do target constituent (primarily benzene) vapor concentrations represent a potential health risk to off-site receptors?

d) What is the effect of biodegradation on migration of VOCs in vapors from groundwater at the study area?

The acquired data were compared to screening criteria recommended in *Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (DTSC, 2004). Additional data evaluations described in the approved work plan (Section 8.0) were used to compliment, not substitute for, the guidance document established by DTSC. These methods were used to evaluate the potential for risk to human health.

### 3) Identify Information Inputs

Information inputs include existing data provided in the approved work plan (summarized in Section 2.0), appropriate sampling and analytical methods described in the approved work plan (Sections 3.0 and Section 4.0), laboratory reporting limits below DTSC (2004) and EPA proposed screening level criteria (100 times target indoor air benzene concentration of 0.31 ug/m$^3$), and, when acquired, preliminary vapor

data to locate most appropriate sites for sampling.

**4) Define Boundaries of Study**

The study area includes locations corresponding to the highest observed dissolved concentrations in off-site groundwater plumes near residences. The sampling locations and depths are defined in the approved work plan (Section 3.0). As documented in twelve years of groundwater monitoring reports, the dissolved plumes are stable (not migrating), adequately delineated, and declining in benzene concentration. Therefore, transverse transects are appropriate.

Access issues have been considered during systematic planning, and a fence was constructed to enable easy access with minimal disruption to residents. City officials were consulted in this planning. The timeframe of the sampling considered seasonal effects, and was designed to include sample collection during both dry and wet seasons to capture representative data.

**5) Develop Analytical Approach.**

The analytical approach was developed based on known concentrations and depths to groundwater. If the outcome of the vapor investigation demonstrates non-detect, background level, or below method reporting limit (MRL) soil gas VOC concentrations, we would conclude that an acceptably low potential health risk from inhalation of vapors migrating into buildings has been demonstrated and no further investigation is necessary.

If soil gas VOCs exceed background or MRL concentrations, then the maximum concentration will be compared to CHHSLs, which are derived from Johnson & Ettinger (J&E) modeling. If maximum soil vapor concentrations exceed screening values, these concentrations will be used to estimate the potential vapor intrusion risks per procedures described in the DTSC guidance for site-specific screening evaluations (DTSC, 2004, Step 7). Prior to modeling, we would confer with EPA on appropriate application of the model, model inputs, and sensitivity testing. Possible outcomes are:

- J&E model predicts incremental cancer risks less than $10^{-5}$ to $10^{-6}$. If this is the case, then we would propose that an acceptably low potential health risk from vapor intrusion into buildings has been demonstrated, and no further investigation is necessary.
- J&E model predicts unacceptable vapor intrusion risk. If this is the case, then we would confer with EPA regarding appropriate next steps. These may include sub-slab soil gas sampling, indoor air sampling at the closest homes, and/or evaluating engineered controls for vapor migration.

If soil gas VOCs exceed 100 times the Acute Reference Exposure Level for benzene of 1.3 mg/m3 (OEHHA, 2000), then we would forego modeling and confer with EPA regarding appropriate next steps. These steps may include sub-slab soil gas sampling, indoor air sampling at the closest homes, and/or evaluating engineered controls for vapor migration.

**6) Specify Performance or Acceptance Criteria**

Performance and acceptance criteria for both field sampling and laboratory analysis are described in the approved work plan (Section 6.0 and Section 7.0). A program to verify data produced by this study is necessary to control decision errors. The approved work plan (Section 6.0) contains data quality indicators and data review and validation procedures to assess performance, referencing the Quality Assurance Project Plan (England & Associates, 1995), the– *USEPA Contract Laboratory Program--National Functional Guidelines for Organic Data Review* (EPA, 1999), *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2002a), and *Test Methods for Evaluating Solid Waste (SW-846)* (EPA, 2004). Section 7.0 of the work plan describes field quality

control sampling and cites the laboratory standard operating procedures (Appendix B), which include analytical performance and acceptance criteria.

**7) Develop the Plan for Obtaining Data**

A judgmental sampling design was selected for this project and is described in the approved work plan (Section 3.0).

# 2.0 BACKGROUND INFORMATION

## 2.1 SITE LOCATION

The Site (approximately 55 acres) is located north of state highway 126 at 67 East Telegraph Road along the eastern edge of Fillmore, California. A Site location map is shown on Figure 1. A Site plan with investigation areas is shown on Figure 2.

## 2.2 SITE OPERATIONS

The Site operations have changed over the years, but initially started as an oil refinery. The earliest known reference indicates that refining operations were conducted as the "Ventura Refinery" in 1917 (ENSR, 1990). Texaco purchased the existing refinery in 1928. They operated the refinery until it was shutdown in the early 1950s. Upon shutting down the refinery, the aboveground structures were removed from the Site except for approximately eight aboveground storage tanks and miscellaneous buildings. The site operated as a crude oil pumping station from 1951 until 2002. The remaining facilities were dismantled. The last tank was removed in August 2004.

The remaining infrastructure currently at the Site includes subsurface conveyance piping (oil, water, electrical, etc.), several concrete pads, tank dike berms, a deep well that supplies water to a local farmer, water storage tank, an idle groundwater treatment system, numerous groundwater monitoring wells, and a remedial contractor field office trailer.

## 2.3 REGULATORY HISTORY

A chronology of the Site regulatory history is provided as follows:

- **1980** – Investigation requested by the California Regional Water Quality Control Board – Los Angeles Region (LARWQCB).
- **1983 to 1989** – Voluntary groundwater and soil assessment conducted under the Department of Health Services and LARWQCB.
- **1986 -** Removed 38,000 tons of waste and contaminated soil from the former main waste pit and other small waste disposal areas.
- **1989 -** Site added to NPL by EPA.
- **1990** to **1992 -** *Remedial Investigation/Feasibility Study* (RI/FS) was completed (ENSR, 1991/1992). The RI/FS concluded that there were significant levels of total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylenes (BTEX) in groundwater and significant concentrations of TPH in the vadose zone, but very little evidence of BTEX in the vadose zone. The RI/FS concluded that groundwater pump-and-treat coupled with limited soil vapor extraction (SVE) in the vadose zone were the appropriate remediation technologies for the Site.

- **1992 -** The ROD was issued in March 1992 (EPA, 1992). The selected remedy included groundwater pump-and-treat and SVE for those areas that threaten to contaminate groundwater at levels above Site cleanup standards. The ROD listed groundwater cleanup levels for benzene, toluene, ethylbenzene, 1,2-DCA, and methylene chloride. Benzene and toluene are the only compounds that currently exceed the groundwater cleanup standards. Because there was little evidence of BTEX in the vadose zone, no soil cleanup standards were mandated.
- **1992** – A *Preliminary Design Work Plan* (Environmental Solutions, Inc. [ESI], 1992) was submitted and approved by EPA in December 1992.
- **1993 –** The Consent Decree was entered in August 1993. The *Phase 1 Design Report* (ESI, 1993) was completed in September 1993. The Phase 1 remedial program included pilot testing for SVE treatment and groundwater extraction and treatment with granular activated carbon and discharge to Pole Creek under a National Pollutant Discharge Elimination System (NPDES) permit. Phase 1 groundwater extraction and treatment began in December 1993.
- **1994 –** Phase 1 vapor extraction began and the *Final Phase 2 Design Report* (E&A, 1994) was submitted and approved.
- **1995 –** The *Final Phase 2 Remedial Action Work Plan* (E&A, 1995a) was submitted and approved. Phase 2 vapor extraction began using thermal oxidation for soil vapor treatment, and the groundwater treatment system (GWTS) operations were upgraded in capacity. The *Operation and Maintenance Plan* and the *Monitoring and Confirmation Sampling Plan* (E&A, 1995b and 1995c) were also submitted and approved.
- **1996** – An *Interim Remedial Action Plan Report* (E&A, 1996a) was submitted to fulfill the requirements for Construction Complete and Closeout Reporting required by the Consent Decree. System optimization measures were discussed with EPA and documented in a letter (E&A, 1996b).
- **1997** – Permitting with local agencies was completed and system optimization measures were implemented, including the installation of a new well in an area of higher concentration. The groundwater sampling program was modified as described in an approved technical memorandum (E&A, 1997).
- **1998** – Monitoring well network upgrades, including abandonment of damaged wells and wells that were no longer useful and installation of new wells, were completed (E&A, 1998a and 1998b).
- **2000 through 2002 -** Texaco applied for renewal of the NPDES permit in March 2000. LARWQCB indicated that processing for new permits was on hold pending finalization of the California Toxics Rule (CTR) and that the existing permit requirements would remain in effect in the interim. The CTR was finalized in May 2000 in Code of Federal Regulation (CFR) 40, Part 131 (EPA, 2000). The CTR promulgate numeric criteria for priority pollutants and require the state to issue compliance for new or revised NPDES permit limits. In response, the State Water Resources Control Board (SWRCB) adopted the State Implementation Plan (SWRCB, 2000). As a result of the CTR and the State Implementation Plan, more stringent limits were required for a new permit. Many of the CTR limits were below naturally occurring background levels. Following negotiations with LARWQCB, ChevronTexaco was given permission to continue operating under the old NPDES permit limits but were required to discontinue discharge under the permit prior to May 2003 (England Geosystem, 2002b).

- **2001 –** EPA completed the *First Five-Year Review Report for Pacific Coast Pipeline Superfund Site (*EPA, 2001). The report indicated that the treatment systems were operating as designed and the remedial action continues to be protective of human health and the environment.

- **2001 and 2002** - An early request for authorization to shut off the SVE system was submitted, as shutoff criteria were nearly met (England Geosystem, 2001). In January 2002, the shutoff criteria were met and a technical memorandum detailing the SVE shutoff and monitoring plans was submitted (England Geosystem, 2002a and 2002c). The shut off was approved on April 11, 2002; and the SVE system operations were discontinued on April 14, 2002. Soil gas concentrations were monitored monthly for eight months following SVE system shut-off. No rebound above the shutoff criteria was observed and soil vapor monitoring was discontinued in November 2002.

- **2002 - 2004 –** A technical memorandum for GWTS operational modifications and pilot study for enhanced bioremediation at the PCPL Superfund Site in Fillmore, California was submitted to EPA on October 16, 2002 (England Geosystem, 2002d). On-site conventional groundwater pump-and-treat technology had reached its effective limit at the Site. ChevronTexaco's proposal for modifying the operation of that system and investigating the implementation of enhanced monitored natural attenuation as a replacement or supplement to that system allows additional focused remediation while ensuring protection of public health and safety. EPA approved the modification to the operations of the GWTS at Fillmore and the pilot testing as proposed in January 2003. The oxygen release compound (ORC®) pilot-test, performed in 2003-2004 at the Site, demonstrated that ORC® injection was not effective in reducing dissolved-phase benzene concentrations at the Site. The results from the ORC® pilot study are described in *Evaluation of the Enhanced Bioattenuation Pilot Study* (England Geosystem, 2005b). Although the pilot study for enhanced bioattenuation was not effective, calculations have shown that natural attenuation accounts for a significant amount of destruction of dissolved hydrocarbons in groundwater. Therefore, Chevron continues to evaluate monitored natural attenuation as a groundwater remedial alternative at the Site. This work plan is being conducted to allow for further evaluation of monitored natural attenuation, and to document whether such a remedy could be implemented without resulting in unacceptable risks to human health or the environment.

- **2004 –** Regulatory and corporate meetings to discuss forward plans including monitored natural attenuation.

- **2005 –** A work plan for Phase 1 Soil Sampling within the former tank areas were submitted (England Geosystem, 2005a) to the EPA, and comments were received from both the EPA and DTSC (EPA, 2005). Another work plan was also submitted to EPA and DTSC for review; *Sampling and Analysis Plan for Natural Attenuation Characteristics and Soil Vapor Characteristics Above Dissolve Phase Benzene Plumes.*

- **2006 –** A response to agency comments regarding Phase 1 Soil Sampling was sent by Chevron, and the work plan was subsequently approved by EPA and DTSC in 2006. Phase 1 Soil sampling was conducted by URS and a report was submitted to the EPA and DTSC (URS, 2006b). The work plan, *Sampling and Analysis Plan for Natural Attenuation Characteristics and Soil Vapor Characteristics Above Dissolve Phase Benzene Plumes*, was revised based on comments received from the agencies and subsequently approved by EPA and DTSC (URS, 2006a). Fieldwork for this investigation began in September 2006 with the collection of soil and preliminary vapor samples.

  - During the third quarter of the year, the second Five-Year Review report was completed (EPA, 2006). The review of documents, applicable or relevant and appropriate requirements

(ARARs), risk assumptions, and the results of the site inspection indicate that the remedy is functioning as intended by the ROD to control further migration of the contaminated groundwater.

- **2007** – A vapor monitoring well installation report, *Continuous Multichannel Tubing Well Installation Report* (URS, 2007a), was submitted to EPA and DTSC. A work plan for Phase 2 Soil Sampling was submitted to EPA and DTSC for review. The work plan, *Soil Sampling Phase 2 – Historical Operations*, was revised based on comments received from the agencies and subsequently approved by EPA and DTSC (URS, 2007b). Field work for this investigation was conducted in September and October 2007.

## 2.4 Geology and Hydrogeology

The Site lies along the northern boundary of the Santa Clara Trough, which contains sedimentary deposits over 40,000 feet thick ranging from Cretaceous to Recent in age. In the Fillmore area, the Santa Clara Trough is bordered by the San Cayetano Fault on the north and the Oakridge Fault on the south. The San Cayetano Fault passes beneath the Site approximately parallel to the eastern Site boundary. Fractured bedrock along the fault has resulted in extensive land sliding. This fractured rock has also provided a conduit for naturally occurring hydrocarbons to reach ground surface. Crude oil seeps and tar sands are common features in the Site vicinity. The regional geology is shown on Figure 5. The Eastern Ventura Basin oil fields are shown on Figure 6.

The Site is located within the eastern portion of the Fillmore Groundwater Basin. Where the Site is located, the alluvial deposits and the underlying San Pedro Formation are the major water-bearing units. Groundwater flow is to the west following the Santa Clara River. The maximum recorded long-term fluctuation in groundwater levels is 50 feet, measured in a Ventura County Watershed Protection District (VCWPD) well located near the Site.

### 2.4.1 Regional Petroleum Occurrence and Geology

The Site lies within the eastern portion of the Ventura Basin petroleum province. Oil fields located within the Site vicinity include the Fillmore, Shiells Canyon, and Bardsdale fields. In addition to the oil fields, several surface oil and tar sand accumulations or seeps have been mapped near the Site. These occur in the fractured sands and shale of the Monterey Formation north of the Site along Pole Creek and in recent landslide debris directly adjacent to the Site. It is likely that the observed oil seeps resulted from the migration of hydrocarbons along fractures in the Monterey Formation associated with the San Cayetano Fault. Some of the seep material was analyzed and found to contain benzene.

### 2.4.2 Local Geology and Hydrogeology

The near-surface geology of the Site can be characterized as consisting of laterally discontinuous interlayers of unconsolidated, fine- to coarse-grained detritus deposited in stream channel, alluvial fan, and mass wasting depositional environments. The extreme heterogeneity of the subsurface strata has created a complex hydrogeologic environment. The primary zone of concern is denoted as Aquifer I which is an unconfined to semi-confined aquifer. Historical groundwater monitoring results indicate that

flow occurs in a northwest direction across the Site and then turns to the west after passing under Pole Creek. The average gradient across the Site in Aquifer I is approximately 0.006 foot per foot (ft/ft) to the west-northwest; hydraulic conductivity ranges from 0.5 to 27 feet per day (feet/day) when considering all aquifer testing data associated with the Site (constant rate and slug test results). When slug-testing data is not considered, the hydraulic conductivity ranges from 8 to 14 feet/day (England Geosystem, 2002e). The average calculated seepage velocity is 120 feet/year. The depth to water increases from approximately 60 ft bgs in the southern portion of the Site to approximately 90 ft bgs in the northern portion of the Site.

Historically, groundwater elevations rose approximately 30 feet from early 1991 to early 1993. This appears to be the high based on water level data from well in the Fillmore area dating back to the 1920s. Since that time, groundwater elevations have experienced seasonal fluctuations in general response to winter rainy season and summer dry seasons. The groundwater elevation contours (May 2007) are shown on Figure 2.

### 2.4.3 Soil Properties

The remediation history of the Site has predominately focused on the groundwater and soil vapor extraction activities. Therefore, there is little historical information regarding soil properties such as soil density, porosity, and moisture content. In 1994, a biotreatability study was conducted at the Site (Kaufman, 1994). According to that investigation, the moisture content of three soil samples was evaluated in the general vicinity of monitoring wells EW-2 (located along Pole Creek, southeast of the NSA), EW-4 (located immediately east of the SSA), and MW-47D (formerly located in the approximate center of the Site). The monitoring well locations are shown on Figure 2.

| Soil Moisture Content Data From 1994 Biotreatability Study | | |
|---|---|---|
| **Well** | **Reported Moisture Content (Percent)** | **Depth (Ft bgs)** |
| EW-2 | 13 | 85 |
| EW-4 | 16 | 60 |
| MW-47D | 18 | 45 |
| | | |

## 2.5 Contaminant Distribution in Groundwater

### 2.5.1 Contamination Source

Groundwater contamination at the Site is the result of activities at a former refinery that ceased operation in 1951. Groundwater is also impacted by the presence of naturally occurring hydrocarbons in soils and the underlying strata. The ROD identified primary sources of groundwater contamination from a series of nine unlined waste pits that were used to store liquid waste generated during refining operations. The contaminant source from all nine waste pits was removed during soil remediation (excavation) conducted in 1986. Because the pits more or less continuously contained liquid waste while they were in service,

there was a recharge source that provided a transport mechanism for the hydrocarbon contamination into the subsurface. Once the recharge source was removed, downward migration of waste materials would have been severely curtailed or eliminated. However, due to an almost 30 foot increase in groundwater levels in the early 1990s and an overall 50 foot increase in regional water levels since the 1920s, residual hydrocarbon contamination present in the unsaturated zone in the form of light non-aqueous phase liquids (LNAPL) has been entrained on the soil particles trapped below the current depth to groundwater and now provides a hydrocarbon contaminant source to groundwater.

### 2.5.2 ROD Cleanup Goals for Groundwater

The ROD cleanup goals for groundwater include five chemicals of concern summarized as follows:

| ROD CLEANUP GOALS FOR GROUNDWATER | |
|---|---|
| **Compound** | **Groundwater Cleanup Level in micrograms per liter (µg/L)** |
| Benzene | 1 |
| Toluene | 100 |
| Ethylbenzene | 680 |
| 1,2-Dichloroethane | 0.5 |
| Methylene Chloride | 5 |

Since 1990, detectable concentrations of ethylbenzene have never exceeded cleanup goals stated in the ROD. Methylene chloride and 1,2-DCA have not been chemicals of significant concern in the groundwater beneath the Site. Low concentrations of both constituents were detected infrequently in groundwater early in the monitoring program (1991). The presence of 1,2-DCA was detected in groundwater samples collected from MW-19S, MW26S, and three Ultramar service station wells. Since intervening wells completed in the same water-bearing zone between MW-19S and MW-26S did not exhibit concentrations of 1,2-DCA, it appears there is no continuous on-site 1,2-DCA plume. Methylene chloride was only detected three times (all at or below the ROD clean up goal) during sampling events; all in 1991. Two of the detections were off-site and cross gradient from the Site in Ultramar service station wells. The reporting limits for both of these constituents have varied during the sampling events due to laboratory dilution requirements. While the reporting limits for 1,2-DCA and methylene chloride have exceeded the ROD cleanup goals, there has been no evidence (i.e., no detections above method detection limits) to suggest that there is a problem with either of the two constituents mentioned.

Toluene is significantly less abundant in groundwater beneath the Site than benzene. In the few wells where the toluene concentration exceeds the ROD cleanup goal, benzene concentrations are also above the ROD cleanup goal. Therefore, of the five ROD identified chemicals of concern, benzene is the current chemical of primary concern in groundwater.

### 2.5.3 Benzene Occurrence in Groundwater

There are two benzene plumes found in the general Site vicinity designated using current nomenclature as the northern and southern plumes. The geometry and distribution of these plumes has been documented in periodic monitoring reports that have been performed since 1990. The benzene plumes are shown on Figure 2.

### 2.5.4 Contamination Distribution – Subsurface Soils

The ROD (USEPA, 1992) indicates that TPH contamination of subsurface soils was found "throughout the Site"; however, VOCs (primarily BTEX) were found in less than 10% of the subsurface soil samples analyzed. The benzene concentrations ranged from "below 11 ppb with a maximum concentration of 38 parts per billion (ppb)" (EPA, 1992). The primary SVOCs detected included 2-methylnaphthalene and naphthalene. 2-Methylnaphthalene was detected in 34 of the 154 samples with reported results ranging from 10 µg/kg to 160 µg/kg. Naphthalene was detected in 60 samples at concentrations ranging from 10 µg/kg to 160 µg/kg.

The distribution of soil contamination beneath the Site was coincident with the historical operation of nine unlined waste pits on the Site. In 1986, all of the identified pits were remediated by excavation and disposal of 38,000 tons of contaminated soils. The ROD concluded that:

> *The lateral and vertical distribution of VOCs and the range of VOC concentrations detected in sub-surface soils do not indicate the presence of a principal threat in soil. However, the low levels of VOCs (specifically benzene) in the vadose zone or capillary fringe may result in ongoing contamination of ground water.*

Soil vapor extraction and treatment to remove VOCs in the areas that threatened to contaminate ground water was ongoing at the Site from 1994 to 2002, resulting in the removal of approximately 2,190 pounds of benzene. Soil vapor concentrations in the capillary fringe dropped below the approved shut-off levels and soil vapor extraction and treatment operations were discontinued in 2002. Monitoring for eight consecutive months following treatment system shut-off showed no rebound.

# 3.0 DATA QUALITY OBJECTIVES

Chevron established criteria with which to evaluate data produced during the vapor sampling events conducted for this investigation. The data quality objectives (DQOs) includes field collection methods, laboratory analytical procedures, and quality assurance techniques used to evaluate whether the data are of acceptable quality and can be used for their intended purposes: 1) the soil chemistry, soil vapor chemistry, soil physical properties and lithologic data will be used to evaluate natural attenuation as a remedial alternative for this Site; and 2) the vapor chemistry data will be used to assess potential vapor pathways and resultant risks to human health and the environment related to a natural attenuation remedy for the Site.

The analytical methods were deemed appropriate by the regulatory agency to meet the objectives. Sampling for VOCs by EPA Method TO-15 is recommended in the guidance documents. The Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (DTSC, 2004) indicates that:

As a conservative approach, the analytical detection limits should be no higher than five hundred times the acceptable indoor air concentrations. Setting a detection limit at this level implies that a soil gas measurement taken at five feet below surface grade that has a non-detectable concentration of a VOC with a detection limit of five hundred times the acceptable indoor air concentration is protective of public health. This assumption is based upon the data gathered by OEHHA [Office of Environmental Health Hazard Assessment]. Hence, detection limits derived from this generic attenuation factor should be protective of public health in California.

Per EPA direction, a more conservative, 100-fold analytical attenuation factor for soil vapor was utilized during this investigation. The target indoor air benzene concentration to satisfy both the prescribed risk level and the target hazard index was 0.31 ug/m3 (EPA, 2002c). The reporting limit for TO-15 of 1.0 ug/$m^3$ was well below one hundred times the acceptable indoor air concentration of 31 ug/$m^3$.

# 4.0 SAMPLING RATIONALE

The sampling rationale for this program is based on a judgmental design process. The *Guidance on Choosing a Sampling Design for Environmental Data Collection for Use in Developing a Quality Assurance Project Plan* (EPA, 2002c) indicates that for soil contamination investigations, judgmental sampling is appropriate for situations in which any of the following apply:

1. Relatively small-scale features or conditions are under investigation.
2. An extremely small number of samples will be selected for analysis/ characterization.
3. There is reliable historical and physical knowledge about the feature or condition under investigation.
4. The objective of the investigation is to screen an area(s) for the presence or absence of contamination at levels of concern, such as risk-based screening levels (note that if such contamination is found, follow-up sampling is likely to involve one or more statistical designs).
5. Schedule or emergency considerations preclude the possibility of implementing a statistical design.

The areas selected for this investigation represent areas located above higher concentration off-site dissolved-phase benzene plumes that are well defined and there is prior knowledge regarding the dissolved benzene plume geometry. The sampling area locations were selected so that a transect of vapor monitoring points could be installed approximately perpendicular to the groundwater flow direction. The applicable judgmental sampling guidelines for this program included criteria 1, 3, and 4.

## 4.1 DRILLING METHODS

The drilling methods listed in chronological order of completion included hollow-stem auger, direct push, and rotary sonic drilling.

1. A **hollow-stem auger rig** was utilized to obtain continuous soil core samples from select boring locations for physical/geochemical testing. The continuous soil core samples were processed for detailed subsurface soil descriptions, physical/geochemical testing, and photographic documentation under ultraviolet light for potential occurrence of non-aqueous phase liquid (NAPL).
2. A **direct-push rig** was utilized during a preliminary vapor sampling investigation conducted perpendicular to the groundwater flow direction to establish a preliminary vapor concentration profile within each investigation area. The preliminary vapor concentration profile was used in conjunction with soil physical/geochemical results to determine the final placement of the vapor monitoring points.

3. A **rotary-sonic drilling** provided additional continuous cores for soil descriptions as well as installation of continuous multichannel tubing (CMT) sampling systems manufactured by Solinst® Canada Ltd. The CMT sampling system allowed the collection of soil vapor from discreet depths within the well.

## 4.2 Sampling Location

The sampling locations were based on the most current information regarding the occurrence of dissolved-phase benzene concentrations within the southern/northern plume areas (Figure 2). The fieldwork completed during this investigation is discussed in the following sections.

### 4.2.1 Southern Sampling Area

The sampling locations for the southern sampling area are shown on Figure 3. The sampling locations are situated in a line roughly perpendicular to groundwater flow and near the groundwater monitoring well generally containing the highest benzene concentration within the southern plume. The installations are summarized as follows:

- **Two soil borings were continuously cored to verify subsurface conditions** present within the investigation area (SSA-01 and SSA-02). Select soil samples were analyzed for physical/geochemical properties at depths commensurate with the vapor monitoring points. The physical/geochemical data was used to determine the final placement of the vapor monitoring points. Photographic documentation was performed under ultraviolet light to determine the potential occurrence of NAPL.
- **Four preliminary vapor sampling locations** were advanced at depth intervals of approximately 10 feet (SSA-03, SSA-04, SSA-05, SSA-06). The vapor samples were submitted for chemical analysis at a fixed laboratory. A preliminary vapor concentration profile was presented to the agency to determine the final placement of each vapor monitoring port during installation of the CMT.
- **Four CMT sampling systems** were installed with vapor monitoring ports placed at depth intervals of approximately 7 feet (SSA-07, SSA-09, SSA-10, SSA-11). The depth intervals allowed vapor collection at equal distances between ground surface and groundwater. The bottom sampling port was placed slightly below the water table (55 ft bgs). The depth to groundwater was determined from nearby groundwater monitoring wells MW-39S, MW-20S, and MW-50S.

### 4.2.2 Northern Sampling Area

The sampling locations for the northern sampling area are shown on Figure 4. The sampling locations are near the groundwater monitoring well generally containing the highest benzene concentration in the northern plume. The installations are summarized as follows:

- **One boring was continuously cored to verify subsurface conditions** present within the investigation area (NSA-01). Select soil samples were analyzed for physical/geochemical properties at depths commensurate with the vapor monitoring points. The physical/geochemical data was used to determine the final placement of the vapor monitoring points. Photographic

documentation was performed under ultraviolet light to determine the potential occurrence of non-aqueous phase liquid.

- **One preliminary vapor sampling location** was advanced at depth intervals of approximately 20 feet (NSA-02). The vapor samples were submitted for chemical analysis at a fixed laboratory. A preliminary vapor concentration profile was presented to the agency to determine the final placement of each vapor monitoring port during installation of the CMT.
- **One CMT sampling system** was installed with vapor monitoring ports placed at depth intervals of approximately 13 feet (NSA-03). The depth intervals allowed vapor collection at equal distances between ground surface and groundwater. The bottom sampling port was placed slightly below the water table (90 ft bgs). The depth to groundwater was determined from nearby groundwater monitoring wells MW-32S and MW-42S.

## 4.3 Soil Properties for Natural Attenuation

### 4.3.1 Total Organic Carbon

Total organic carbon (TOC) analysis was performed on select soil samples to assess the natural retardation properties of the sediments. The soil samples were collected from the continuously cored soil borings at depths generally corresponding with the vapor monitoring ports (seven sampling depths per hole). The TOC samples were generally collected from zones that did not contain hydrocarbon-impacts based on field screening (ex. visual observation, PID readings) in order to assess the natural occurrence of organic carbon within the sediments. The soil samples were analyzed by EPA Method 9060 (Walkley-Black Method) for TOC by PTS Laboratories, Inc. (PTS) located in Santa Fe Springs, California.

### 4.3.2 Soil Physical Property Analyses

Select soil samples were submitted for physical property analyses to assist with the natural attenuation evaluation. The soil samples were collected at depths generally corresponding with sampling depths associated with the vapor monitoring ports. The physical property testing (including methods) is summarized as follows:

| **Soil Physical Properties of Interest** | |
|---|---|
| **Property** | **Test Method** |
| Moisture Content | ASTM D2216 |
| Salinity | EPA Method 120.1 |
| Grain Size Distribution | ASTM D4464m-85 |
| Total Porosity<br>Grain Density<br>Bulk Density Dry<br>Air Permeability<br>Hydrocarbon Saturation<br>Volumetric Vapor Content<br>Volumetric Water Content | API – RP40 |

Note: ASTM = American Society of Testing Materials.
API = American Petroleum Institute.

The soil physical property analysis was conducted by PTS, with the exception of salinity which was analyzed by TestAmerica located in Irvine, California.

## 4.4 Soil Vapor Sample Chemical Analysis

Soil vapor samples were collected for chemical analysis from depth-specific vapor monitoring points. However, prior to installing the vapor monitoring points, a preliminary vapor sampling investigation was conducted to assist with final vapor monitoring point placement. The two programs are summarized as follows:

- ***Preliminary Vapor Sampling Investigation*** – a one-time preliminary vapor sampling investigation was conducted perpendicular to ground water flow direction to establish a preliminary vapor concentration profile within each investigation area. The preliminary vapor concentration profile was used in conjunction with soil physical/geochemical results to determine the final placement of the vapor monitoring points. The vapor samples were submitted to a fixed laboratory for chemical analysis by EPA Method TO-15 for VOCs and oxygen ($O_2$) and carbon dioxide ($CO_2$) by EPA Method 3C.
- ***Vapor Monitoring Points*** – two vapor monitoring events were conducted using CMT multilevel sampling systems. The first vapor-sampling event was conducted approximately eight weeks after installation. A second vapor-sampling event was conducted at a later date to account for seasonal fluctuations in ground water (within approximately six to twelve months). The vapor samples were submitted to a fixed laboratory for chemical analysis by EPA Method TO-15 for VOCs and $O_2$ and $CO_2$ by EPA Method 3C.

Vapor samples were submitted for analytical testing by EPA Method TO-15 to Columbia Analytical Services, Inc. (Columbia) located in Simi Valley, California. The 43-compound reporting list included the five chemicals of concern identified in the EPA ROD for groundwater (EPA, 1992)—benzene, toluene, ethylbenzene, 1,2-DCA, and methylene chloride. Other investigation specific analytes were added to the program including naphthalene, isopropanol, and helium. Naphthalene was included since it has been detected in groundwater at the Site. Isopropanol was added since it was used as the tracer compound for leak testing during each vapor sampling event. Helium was added as a replacement tracer compound for leak testing during a re-sampling event conducted in September 2007.

## 4.5 Laboratory Analytical Summary

The samples collected during this investigation were submitted for various analytical testing, which is summarized as follows:

| Analytical Laboratory | Sample Analysis | Matrix | Extraction and Analysis Method and Preservation | Holding Time | Sample Container | Reporting Limit |
|---|---|---|---|---|---|---|
| Columbia | VOCs<br>(43 compound list plus naphthalene and isopropanol) | Vapor | EPA Method TO-15 | 72 hours per DTSC (2003) | 6-Liter Summa Canister | 1.0 ug/m$^3$ (except acetone at 5.0 ug/m$^3$) |
| Columbia | Fixed Gases<br>$O_2$ and $CO_2$ | Vapor | EPA Method 3C | 14 days | 6-Liter Summa Canister | 1,000 ppm |
| PTS | TOC | Soil | EPA Method 9060 Walkley-Black<br>Cool to 4$^o$ C +/-2$^o$ C | 28 days | ½" OD Plug Core<br>Poly Cup Sealed with Screw Top | 100 mg/kg |
| PTS | Moisture Content | Soil | ASTM D2216<br>**do not use wet ice** | 14 days | ½" OD Plug Core<br>Poly Cup Sealed with Screw Top | Physical Property |
| PTS | Laser Grain Size Analysis | Soil | ASTM D4464m-85 | None | ½" OD Plug Core<br>Poly Cup Sealed with Screw Top | Physical Property |
| PTS | Total Porosity, Grain Density, Bulk Density Dry, Air Permeability, Hydrocarbon Saturation, Volumetric Vapor Content, Volumetric Water Content | Soil | API – RP40 | None | ½" OD Plug Core<br>Poly Cup Sealed with Screw Top | Physical Properties |
| Test America | Salinity | Soil | EPA Method 120.1 Modified | None | 500 mL Poly | 0.10 g/L |

Notes: Detection limits are dependent on sample volume and dilution factors.
ppm = parts per million.
mg/m$^3$ = microgram per cubic meter.
mg/kg = milligram per kilogram.
OD = outside diameter.

# 5.0 DATA EVALUATION

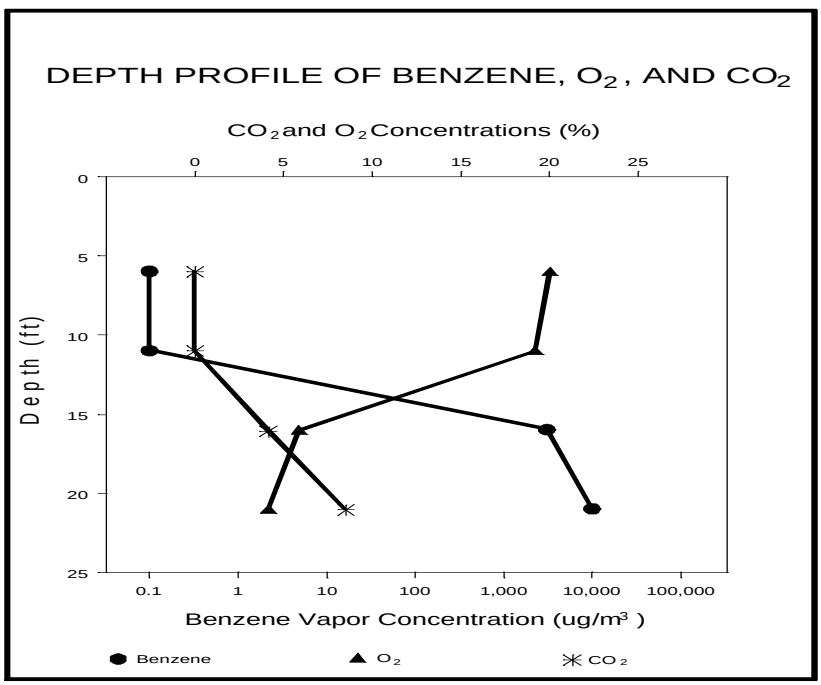
The soil vapor investigation was conducted to understand the potential for vapor migration above the dissolved benzene plumes. As such, the interpretation of soil vapor data proposed in the work plan was intended for the use of evaluating the potential for risk to human health.

Hay-Wilson et al. (2004) recommends the following steps to interpret soil gas data:

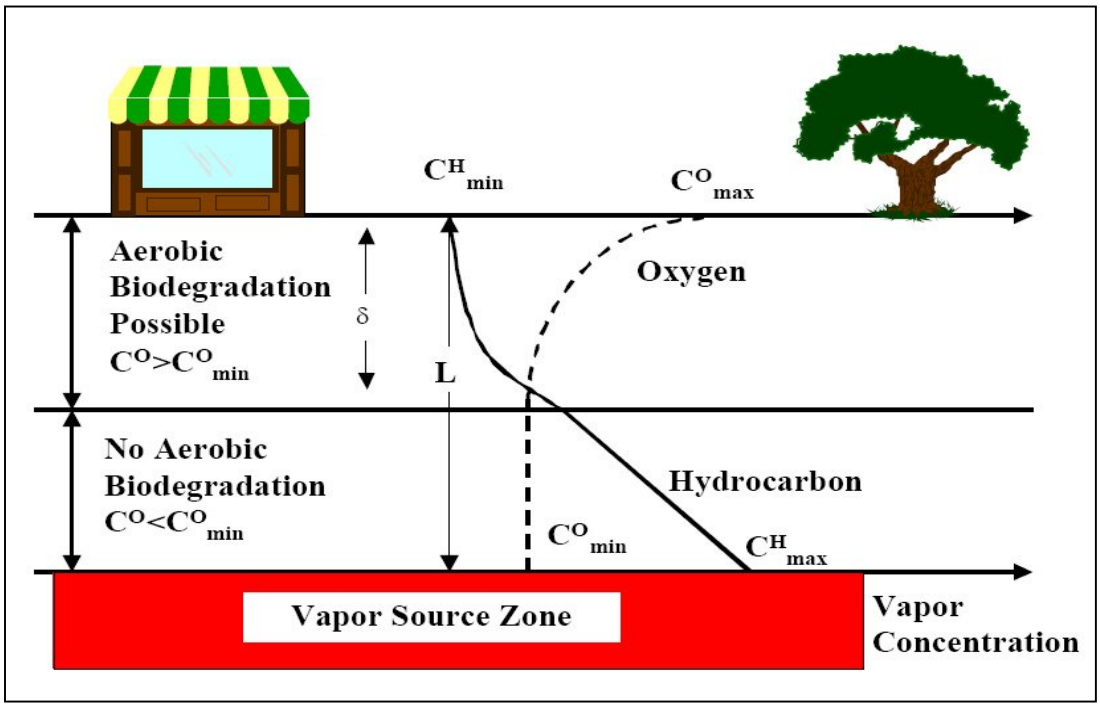
- Organize the soil vapor data in tables, graphs, and maps.
- Compare the data with the known conceptual migration models to determine the biodegradation zone.
- Identify applicable risk-based indoor air target concentrations, soil gas target levels, indoor background concentrations and ambient air concentrations for comparison to measured data.
- Identify whether additional data need to be collected.

## 5.1 VERTICAL PROFILES FOR SOIL VAPOR CONCENTRATIONS TO EVALUATE SUBSURFACE BIODEGRADATION

Soil vapor data generated during this investigation is presented in tables, maps, and graphs. Soil vapor maps were used to evaluate the spatial variation. Data is also plotted to illustrate the vertical profile for soil vapor. Plots for benzene, $O_2$, and $CO_2$ concentration with depth are used to understand the role of biodegradation. An idealized depth profile for benzene, $O_2$, and $CO_2$ is shown in the following graph (Davis, 2005).



Roggemans et al., 2001 (API Bulletin 15) use empirical soil vapor data to demonstrate the significance of aerobic biodegradation in controlling vapor migration. Application of the methods described in this reference requires an adequate data set of soil vapor concentrations. If the CMT sampling systems generate adequate data sets, methods may be applied to evaluate the presence of a biodegradation zone. Roggemans et al. (2001) provide conceptual models for four types of behavior (A – D). Numerous factors contribute to the concentration profile and biodegradation; the presence of $O_2$ is important. Other factors include soil moisture and porosity. Lithologic information is also needed in order to interpret concentration profiles. The conceptual model of Behavior A is shown in the following schematic.




The soil vapor concentrations measured in the CMT sampling systems may be compared to the conceptual models described by Roggemans et al. (2001) to determine the role of biodegradation in controlling vapor migration above the dissolved benzene plumes.

## 5.2 Evaluation of Potential for Vapor Intrusion to Indoor Air

Hay Wilson et al. (2005) describe an initial screening methodology to determine if the subsurface vapor-to-indoor-air pathway represents a potentially significant exposure pathway. As an initial step, they recommend the soil gas data review should include the following comparisons:

- If the concentrations of chemicals of concern in soil gas everywhere in the subsurface are below the risk-based indoor air target levels established for the site, then the exposure pathway does not contribute significantly to health risks for occupants of above-ground structures.

- If the concentrations of chemicals of concern in soil gas are above the indoor air target levels at one or more sample locations, determine if the concentrations decline (either laterally or vertically) to less than indoor air target levels between the vapor source and the building. If concentrations of chemicals of concern do not decline to less than the indoor air target levels, then further evaluation should be conducted to determine if the subsurface-vapor-to-indoor-air exposure pathway is likely to be significant.

The above approach is also consistent with the recent draft guidance issued by the EPA's Office of Solid Waste and Emergency Response, and the California EPA's Department of Toxic Substances Control (USEPA, 2002c, DTSC, 2004), in which a tiered approach is described for the evaluation of potential indoor air risk from subsurface contamination.

In the event that shallow subsurface soil gas samples from the two areas of study (SSA and NSA) do not document a decrease in the concentration of Site-related chemicals of concern to below risk-based indoor air target levels (i.e., CHHSLs), it was anticipated that the measured concentrations would be used to model the potential for vapor migration into nearby surface structures, using available site-specific data, as appropriate (e.g., EPA Vapor Intrusion Model; USEPA, 2003). The results of this modeling would be used to determine whether the potential for vapor migration into nearby structures might represent a significant health risk (requiring more detailed investigation and/or mitigation), or whether the subsurface vapor pathway presents insignificant health risks.

# 6.0 INVESTIGATIVE METHODS

The investigative methods used during this investigation in order of completion included preparing a site-specific health and safety plan, conducting subsurface utility clearance, obtaining the appropriate permits, sending public notification letters, continuous soil coring (hollow-stem auger), preliminary vapor sampling investigation (direct push rig), installing vapor monitoring points (CMTs), conducting a land survey, and disposing of investigation derived waste. The CMT well completions were designed based on information obtained during the continuous soil coring, preliminary vapor sampling investigation, and agency discussions. Work conducted during this investigation was performed under the direct supervision of a California State Professional Geologist. Investigation methods used to complete the wells in preparation for the two sampling events are described in the Well Installation Report (URS, 2007a). Methods used to collect vapor samples are discussed in the following sections.

## 6.1 VAPOR SAMPLING

The vapor monitoring points (direct push point and CMT) were purged using a portable vacuum pump. The preliminary vapor sampling (direct push) generally occurred following an equilibration time of approximately 20 to 30 minutes (DTSC, 2004). The CMT monitoring points were allowed to equilibrate for approximately two months prior to conducting the first vapor sampling event. Significant rainfall events were not encountered during either of the two vapor sampling events.

Purge volume versus contaminant concentration testing was considered, in accordance with DTSC/LARWQCB guidance (DTSC, 2003). However, to avoid excessive purging and provide a consistent purge volume if the data should be used for modeling, a standard procedure of three (3) purge volumes was implemented per EPA direction and guidance (EPA, 2002c). A “purge volume” was estimated from the volume summation of aboveground tubing attached to the sample connection (i.e., stopcock valve), tubing inside diameter, and annular space around the vapor sampling port. The sampling container (i.e., summa canister) was not included in the volume calculation.

The vapor monitoring point was purged with the portable vacuum pump at a rate of approximately 200 milliliters per minute (mL/min). The purge rate was monitored using an inline flow meter calibrated using a primary standard. The field parameters were recorded on field datasheets that are provided in Appendix D.

Once the required purge volume had been removed, the vapor samples were collected in summa canisters equipped with an inline flow regulator placed between the vapor monitoring point and summa canister. A leak test was conducted to verify that a proper surface connection was achieved using a common tracer compound (i.e. isopropanol, helium, etc). The tracer compound was placed inside an enclosure that surrounded the tubing/cement transition. The laboratory supplied summa canisters were individually certified clean and decontaminated according to appropriate agency guidelines prior to use during vapor sampling events. The vapor sample was collected at a rate of approximately 200 mL/min. Flow regulator

readings were recorded on a field datasheet to document the flow rate during vapor sampling. The final canister pressure was slightly negative (-3 to -4 inches Hg) to determine if a leak occurs during transport to the laboratory.

Upon completion, the flow control valve was closed in preparation for transport under chain-of-custody documentation to a fixed laboratory certified by the California Department of Health Services Environmental Laboratory Accreditation Program. The vapor samples were sent via the laboratory supplied courier to Columbia Analytical Services located in Simi Valley, California.

## 6.2 Field Methods

This section describes additional field methods that were implemented during this investigation.

### 6.2.1 Vapor Monitoring Equipment

A photoionization detector (PID) (or similar) was used to measure chemical parameters in the field during this investigation. The vapor monitoring equipment was calibrated daily against a known vapor standard (i.e., 100 parts per million [ppm] isobutylene) in accordance with manufacturer specifications as documented by field personnel in the field reports. The field personnel verified the calibration at the end of each day, recording the final measurements on the field calibration sheet.

### 6.2.2 Headspace Screening

Headspace readings were collected during this investigation to establish a qualitative record of soil vapor measurements from each soil sample submitted to the laboratory. The headspace readings were used as a screening tool to determine the location of potential hydrocarbon impacts within areas of historical operations. The headspace readings were recorded using the calibrated vapor monitoring equipment. The soil vapor headspace was obtained by placing the soil sample in a sealable plastic bag (zip lock type) and allowing vapors to equilibrate for approximately 15 minutes. The soil vapor headspace was measured by inserting the probe tip into the plastic bag. Vapor measurements were recorded on the soil boring log (Appendix D).

### 6.2.3 Labeling and Naming

Samples collected during the investigation were labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Each sample was assigned a unique number by a sample control software program. Printed labels (and chain-of-custody forms) contained the unique sample control number, date and time of collection, analytical parameter(s), and method of preservation. These data were entered in the sample control program prior to shipment to the laboratory.

Sample location, name, and depth are also entered into the sample control software program, and are keyed to the unique sample number. The sample name/depth was not revealed on the sample labels or

laboratory copies of the chain-of-custody forms. Sample names appeared only on copies of the chain-of-custody form retained by the project manager.

### 6.2.4 Chain-of-Custody

The samples collected during this investigation were transported to the laboratory under chain-of-custody documentation. A completed chain-of-custody accompanied each sample cooler. The chain-of-custody form identified the contents of each shipment and maintained the custodial integrity of the samples. The field personnel were responsible for relinquishing the samples directly to laboratory personnel. A completed form specified the date, time, and air bill number (if applicable). Upon completing the analytical testing, the original form accompanied the final laboratory report when submitted to the URS Project Manager.

# 7.0 RESULTS

The results of this investigation are presented in this section including a discussion of deviations from the work plan, stratigraphy and soil characteristics, photographic documentation of continuous soil coring, physical/geochemical soil analytical results, preliminary vapor sampling, vapor sampling, and quality assurance/quality control.

## 7.1 DEVIATIONS FROM THE WORK PLAN

This investigation was conducted in general accordance with the agency approved work plan with the following exceptions.

- Two vapor sampling depth were not obtained during the preliminary vapor sampling event. The difficult conditions encountered during drilling (i.e. gravel zone) precluded the seating of an expendable point from which vapor samples would have been collected at SSA-05 at 30 ft bgs and 40 ft bgs. However, the distribution of vapor analytical results obtained during the preliminary vapor sampling event was sufficient enough to present an acceptable well distribution for the CMTs. This was also deemed acceptable by the agency.
- Upon reviewing the cross-sectional profile it was determined that one monitoring probe (SSA-08) could be removed from the program. The agency agreed with the final well placements during a conference call held on November 11, 2006. Following the meeting the conclusions were documented in an e-mail to Holly Hadlock (USEPA) from Leslie Klinchuch (Chevron).
- A third sampling event (re-sampling for second vapor sampling event) was conducted to verify potential leaking ports using helium as a tracer gas in September 2007. The use of helium as a tracer gas was approved by the agency in an email correspondence sent from Holly Hadlock (EPA) to Leslie Klinchuch (Chevron) on September 10, 2007.
- Isopropanol detections at two locations were high enough to suspect that system connections may be compromised at SSA-07 (33 ft bgs) and SSA-11 (43 ft bgs). The leaks at these two locations were confirmed using helium as a tracer gas on September 13, 2007. Therefore, these two vapor monitoring probes are not considered representative of vapor concentrations present within subsurface soils at these two depths for the evaluation of vapor intrusion during the risk assessment.

## 7.2 STRATIGRAPHY AND SOIL CHARACTERISTICS

The stratigraphy encountered during this investigation was generally consistent with previous investigations. A geologic cross-section line for the southern sampling area is shown on Figure 7. The geologic cross section (A-A') for the southern sampling area is shown on Figure 8. The geologic descriptions within the northern sampling area are presented on the soil boring logs that are provided in Appendix D.

## 7.3 PHOTOGRAPHIC DOCUMENTATION

The photographic documentation (white light and ultra-violet) was conducted on continuous soil cores obtained during hollow-stem auger drilling at boring locations SSA-01, SSA-02, and NSA-01. The white light photography allows the documentation of soil core descriptions that are commonly recorded in the field including color, general classification of lithologic units (i.e., fine-grained versus coarse-grained), and an approximation of geologic structure. The ultra-violet light photography provides documentation of hydrocarbon fluorescence within the subsurface soils. A summary of hydrocarbon fluorescence is provided as follows:

| Well Id | Depth Interval (ft bgs) | Hydrocarbon Fluorescence under Ultra-Violet Photography | | |
|---|---|---|---|---|
| | | None | Slight | Moderate |
| SSA-01 | 0.0 to 44.1 | X | | |
| | 44.1 to 49.4 | | X | |
| | 49.4 to 57.2 | X | | |
| | 57.2 to 61.8 | | | X |
| SSA-02 | 0.0 to 38.4 | X | | |
| | 38.4 to 47.0 | | X | |
| | 47.0 to 54.1 | X | | |
| | 54.1 to 59.5 | | | X |
| NSA-01 | 0.0 to 91.0 | X | | |

The hydrocarbon fluorescence within the southern sampling area appears to indicate the potential presence of hydrocarbon impacts in the vadose zone, which is encountered at minimum depth of approximately 38.4 ft bgs in soil boring SSA-02. Moderate fluorescence just above the water table appears to be associated with impacts originating from the dissolved-phase groundwater plume.

Hydrocarbon fluorescence did not appear to be present in the continuous soil core collected at NSA-01. An electronic copy of the photographic documentation is provided in Appendix E.

## 7.4 PHYSICAL/GEOCHEMICAL ANALYTICAL RESULTS

Twenty-one (21) soil samples were collected for physical property testing from multiple depths at vapor monitoring probe locations SSA-01, SSA-02, and NSA-01. The analytical results for soil physical property testing are summarized in Table 4. The sampling locations are shown on Figure 2. The laboratory analytical reports for the soil physical property testing are provided in Appendix F.

The range of soil physical parameter results are summarized as follows:

| Physical Parameter | Range of Results |
|---|---|
| **Southern Sampling Area** | |
| Total Organic Carbon (mg/kg) | 700 (SSA-01 at 6 ft bgs) to 8,750 (SSA-01 at 43 ft bgs) |
| Moisture Content (% weight) | 7.0 (SSA-01 at 6 ft bgs) to 20.6 (SSA-02 at 56 ft bgs) |
| Total Porosity (% bulk volume) | 34.5 (SSA-01 at 43 ft bgs) to 47.5 (SSA-01 at 28 ft bgs) |
| Vapor Porosity (% bulk volume) | 9.0 (SSA-02 at 56 ft bgs) to 30.3 (SSA-02 at 8.7 ft bgs) |
| Bulk Density (g/cc) | 1.30 (SSA-01 at 28 ft bgs) to 1.66 (SSA-01 at 6 ft bgs) |
| Grain Density (g/cc) | 2.35 (SSA-02 at 35.5 ft bgs) to 2.63 (SSA-01 at 6 ft bgs) |
| Permeability to Air - Horizontal (millidarcy) | 952 (SSA-02 at 9 ft bgs) to 9,874 (SSA-01 at 21 ft bgs) |
| Permeability to Air - Vertical (millidarcy) | 49.1 (SSA-02 at 56 ft bgs) to 7,378 (SSA-01 at 21 ft bgs) |
| Pore Fluid Saturation – Water (percent pore volume) | 33.1 (SSA-02 at 9 ft bgs) to 64.1 (SSA-01 at 43 ft bgs) |
| Pore Fluid Saturation – NAPL (percent pore volume) | 5.8 (SSA-01 at 61 ft bgs) to 6.3 (SSA-02 at 56 ft bgs) |
| Salinity | ND at <1.0 |
| **Northern Sampling Area** | |
| Total Organic Carbon (mg/kg) | 1,200 (65 ft bgs) to 5,700 (90.5 ft bgs) |
| Moisture Content (% weight) | 13.0 (78 ft bgs) to 18.7 (65 ft bgs) |
| Total Porosity (% bulk volume) | 31.1 (78 ft bgs) to 49.3 (51.5 ft bgs) |
| Vapor Porosity (% bulk volume) | 8.0 (78 ft bgs and 90.5 ft bgs) to 30.5 (51.5 ft bgs) |
| Bulk Density (g/cc) | 1.31 (51.5 ft bgs) to 1.77 (78 ft bgs) |
| Grain Density (g/cc) | 2.32 (25 ft bgs) to 2.62 (65 ft bgs) |
| Permeability to Air - Horizontal (millidarcy) | 24.4 (78 ft bgs) to 5,011 (13 ft bgs) |
| Permeability to Air - Vertical (millidarcy) | 2.31 (65 ft bgs) to 4,436 (13 ft bgs) |
| Pore Fluid Saturation – Water (percent pore volume) | 38.0 (51.5 ft bgs) to 76.4 (65 ft bgs) |
| Pore Fluid Saturation – NAPL (percent pore volume) | ND at <0.1 |
| Salinity | ND at <1.0 |

## 7.5 Preliminary Vapor Sampling Event (Direct Push)

Eighteen (18) soil samples (including two duplicate samples) were collected during the preliminary vapor sampling event from multiple depths at vapor monitoring probe locations SSA-03, SSA-04, SSA-05, SSA-06, and NSA-02. The analytical results for the preliminary vapor sampling event are summarized in Table 5. The sampling locations are shown on Figure 2. The laboratory analytical reports for the preliminary vapor sampling event are provided in Appendix G.

### 7.5.1 Southern Sampling Area

The southern sampling area preliminary vapor analytical results (primarily benzene) were evaluated to determine the vertical/lateral placement of semi-permanent vapor monitoring probes (i.e., CMTs) based on vapor samples collected from SSA-03 through SSA-06. The two highest detectable benzene concentrations were detected in vapor samples collected at 20 ft bgs (190 µg/m$^3$) and 40 ft bgs (160 µg/m$^3$) from soil boring SSA-06. An elevated detection limit (2,000 µg/m$^3$) precluded the assessment of benzene vapor concentrations at 40 ft bgs from soil boring SSA-03. The elevated detection limit was the

result of matrix interference. The preliminary vapor analytical results indicated that the location of our study area is representative of the dissolved-phase benzene plume that migrated downgradient of the Site.

### 7.5.2 Northern Sampling Area

The northern sampling area preliminary vapor analytical results (primarily benzene) were evaluated to determine the vertical/lateral placement of semi-permanent vapor monitoring probes (i.e., CMTs) based on vapor samples collected from NSA-02. The highest detectable benzene concentration was detected in a vapor sample collected at 62 ft bgs (170 µg/m$^3$) from soil boring NSA-02. The preliminary vapor analytical results indicated that the location of our study area is representative of the dissolved-phase benzene plume that migrated downgradient of the Site.

## 7.6 VAPOR SAMPLING RESULTS

The vapor sampling was conducted during two seasonally opposite (winter and summer) events held in 2007. The first sampling event was considered representative of the winter season as conducted in March 2007. The second sampling event was considered representative of the summer season as conducted in August 2007. A third sampling event (re-sampling for second vapor sampling event) was conducted to verify potential leaking ports using helium as a tracer gas in September 2007. The vapor sampling results are summarized in Table 6. Only those constituents that had at least one detection above the reporting limit are included in the summary table. The laboratory analytical reports containing results for all 43 constituents analyzed for the vapor sampling events are provided in Appendix H. The SSA monitoring locations are shown on Figure 3. The NSA monitoring location is shown on Figure 4.

### 7.6.1 Southern Sampling Area

Eleven (11) VOCs were detected (not including isopropanol) in the southern sampling area during two vapor sampling events, which include (in increasing order of detection) dichloromethane, vinyl acetate, 2-hexanone, benzene, ethylbenzene, acetone, 2-butanone, carbon disulfide, m,p-xylene, o-xylene, and toluene. (ROD constituents methylene chloride and 1,2-DCA were not detected in the CMT soil vapor samples during either event.) The number of detectable constituents decreased during the second vapor sampling event (summer); however, this appears to be related to (1) the slightly higher reporting limits during the second event and (2) low detections present in the vadose zone within the southern sampling area.

Isopropanol was detected during each vapor sampling event at low concentrations that did not appear to be representative of potential leaks; however, detections at two locations were high enough to suspect that system surface connections may be compromised at SSA-07 (33 ft bgs) and SSA-11 (43 ft bgs). The leaks at these two locations were confirmed using helium as a tracer gas on September 13, 2007. Therefore, these two vapor monitoring probes are not considered representative of vapor concentrations present within subsurface soils at these two depths for the evaluation of vapor intrusion during the risk assessment.

### 7.6.2 Northern Sampling Area

Ten (10) VOCs were detected (not including isopropanol) in the northern sampling area during two vapor sampling events, which include (in increasing order of detection) naphthalene, ethylbenzene, o-xylene, vinyl acetate, acetone, carbon disulfide, 2-butanone, 2-hexanone, m,p-xylene, and toluene. The number of detectable constituents decreased during the second vapor sampling event (summer); however, this appears to be related to (1) the slightly higher reporting limits during the second event and (2) low detections present in the vadose zone within the northern sampling area.

Isopropanol was detected twice during the vapor sampling events at low concentrations that did not appear to be representative of potential leaks. The analytical results are considered representative of vapor concentrations present within subsurface soils for the evaluation of vapor intrusion during the risk assessment.

## 7.7 Quality Assurance / Quality Control

As part of the Quality Assurance / Quality Control (QA/QC) program, field soil replicate, equipment blanks, and trip blanks were collected each day. Analytical results for the field soil replicate samples showed some variability, as is expected with soil samples for volatile analysis that cannot be homogenized. The limited data validation report is provided in Appendix I.

# 8.0 EVALUATION OF NATURAL ATTENUATION AND RISK

The vapor analytical results obtained during this investigation were evaluated against criteria discussed in Section 5.0. The most applicable method appears to be the preparation of vertical profiles for soil vapor concentrations to evaluate subsurface biodegradation (Davis, 2005). A secondary evaluation of vapor concentrations was performed by comparing results against shallow soil gas human health screening levels (vapor intrusion) as provided in the California Human Health Screening Levels (DTSC, 2004) (CHSSLs).

## 8.1 EVALUATION OF NATURAL ATTENUATION

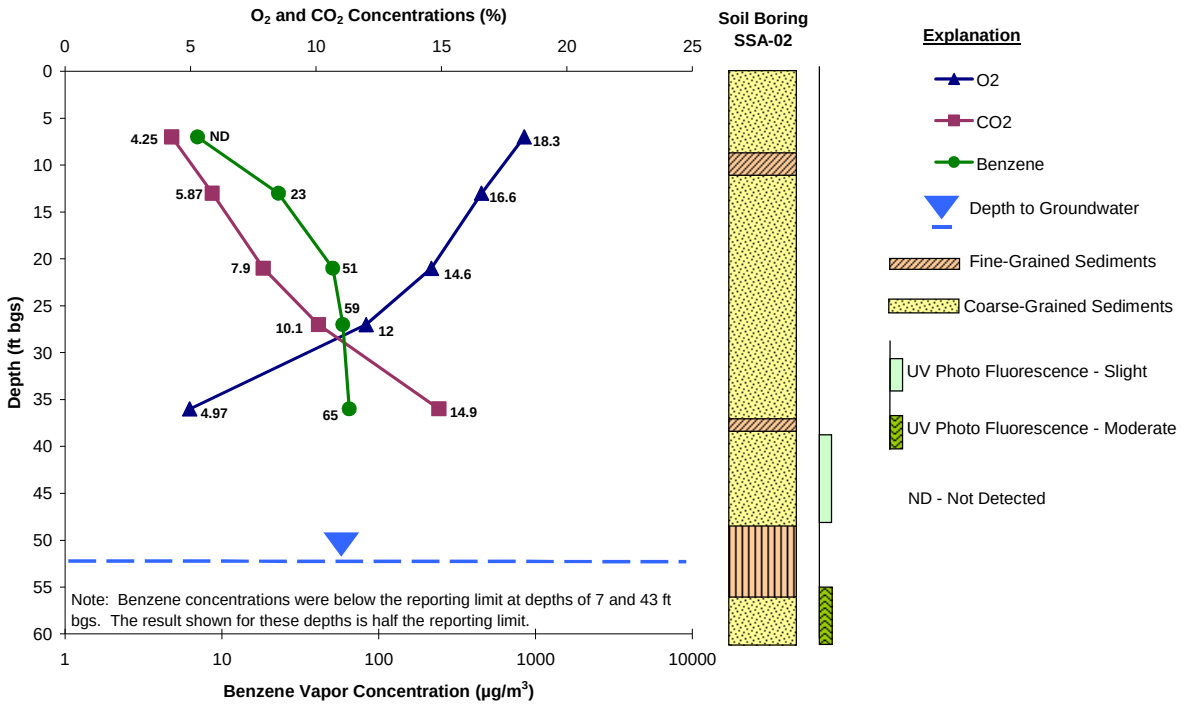
### 8.1.1 Southern Sampling Area

The southern sampling area vapor analytical results (primarily benzene) were used to evaluate vapor concentrations (primarily benzene) above the off-site dissolved-phase benzene plume located in the general vicinity of SSA-07, SSA-09, SSA-10, and SSA-11. A cross-sectional illustration of benzene vapor concentrations is shown on Figure 8. A vapor concentration profile (including general soil boring descriptions as well as the depth of hydrocarbon fluorescence) for the first vapor sampling event (March 2007) is shown on Figure 9 (SSA-07), Figure 10 (SSA-09), Figure 11 (SSA-10), and Figure 12 (SSA-11). A vapor concentration profile (including general soil boring descriptions as well as the depth of hydrocarbon fluorescence) for the second vapor sampling event (August 2007) is shown on Figure 13 (SSA-07), Figure 14 (SSA-09), Figure 15 (SSA-10), and Figure 16 (SSA-11).

The two most frequently detected compounds (xylene and toluene) are generally consistent with constituents commonly present within the southern dissolved-phase benzene plume. Benzene was detected above the laboratory reporting limit in six samples (out of 60) at concentrations ranging from 4.4 $\mu g/m^3$ (SSA-09 at 15 ft bgs on March 19, 2007) to 65 $\mu g/m^3$ (SSA-11 at 36 ft bgs on March 19, 2007). The limited presence of benzene appears to be related to degradation processes occurring in the vadose zone. The deepest samples in SSA-07, 09, and 10 were diluted by the laboratory to compensate for matrix interference, which increased detection limits.

The VOC analytical results from the southern sampling area were compared to biodegradation fixed gas indicators (oxygen and carbon dioxide) with depth in each vapor monitoring location. The four vapor monitoring locations are oriented perpendicular transect to the dissolved-phase benzene plume to determine potential lateral (as well as vertical) natural attenuation characteristics located within the vadose zone. The fixed gas concentration behavior with depth was generally as expected for a groundwater plume containing petroleum hydrocarbons. The oxygen concentrations generally increased in vapor ports located closer to the ground surface, while carbon dioxide concentrations increased with depth indicating respiration of the subsurface biological community within the vadose zone above the groundwater plume. An example (SSA-11 for March 2007) is shown for illustration purposes as follows:

Vertical Profile of Vapor Analytical Results for SSA-11 (March 2007)




The surface connections at two vapor monitoring probes appear to be compromised at SSA-07 (33 ft bgs) and SSA-11 (43 ft bgs). However, the remaining data collected from each vapor monitoring location are considered adequate for the evaluation of natural attenuation conditions within the vadose zone located above the dissolved phase benzene plume. In each case, the compromised vapor ports are completed at deeper zones with at least four ports available at the shallower near surface depths.

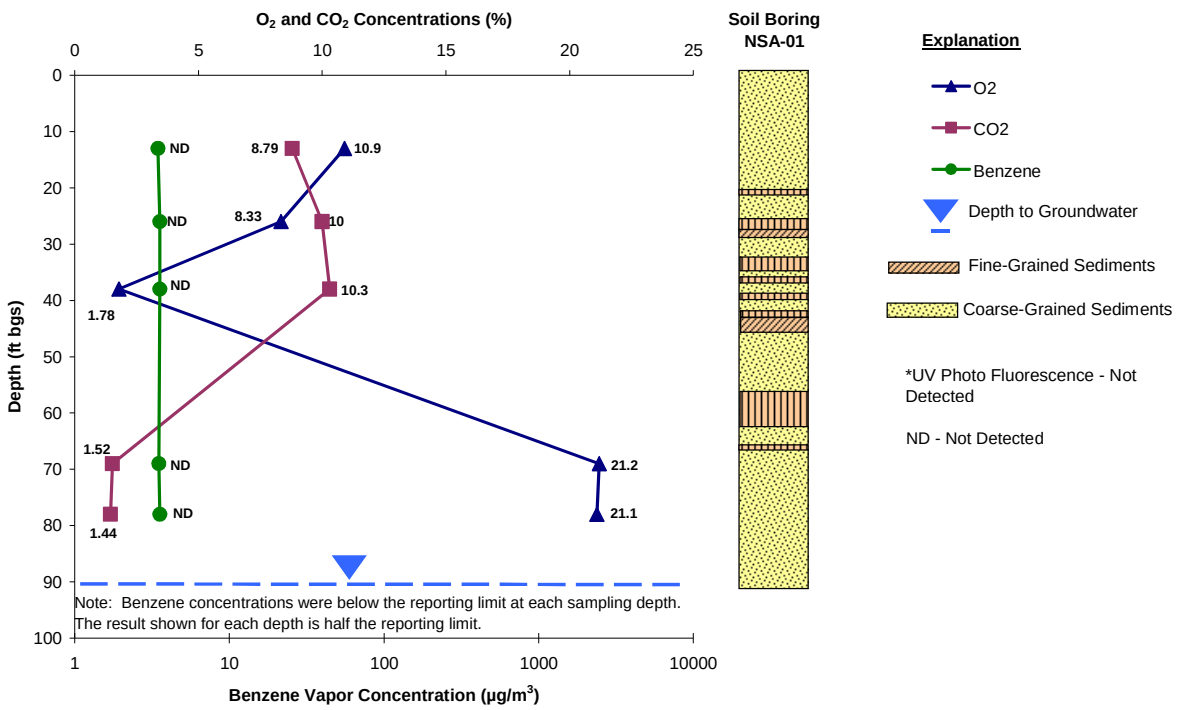
### 8.1.2 Northern Sampling Area

The northern sampling area vapor analytical results (primarily benzene) were used to evaluate vapor concentrations (primarily benzene) above the off-site dissolved-phase benzene plume located in the general vicinity of NSA-03. A vapor concentration profile (including general soil boring descriptions as well as the depth of hydrocarbon fluorescence) for the first vapor sampling event (March 2007) is shown on Figure 17. A vapor concentration profile (including general soil boring descriptions as well as the depth of hydrocarbon fluorescence) for the second vapor sampling event (August 2007) is shown on Figure 18.

The two most frequently detected compounds (xylene and toluene) are generally consistent with constituents commonly present within the northern dissolved-phase benzene plume. Benzene was not

detected above the laboratory reporting limit, which ranged from of <5.4 µg/m$^3$ (13 ft bgs) to <29 µg/m$^3$ (78 ft bgs). The absence of benzene appears to be related to degradation processes occurring in the vadose zone. The VOC analytical results were also compared to biodegradation fixed gas indicators (oxygen and carbon dioxide) with depth in each vapor monitoring location within the northern sampling area. One vapor monitoring location was placed generally above the dissolved-phase benzene plume to determine potential natural attenuation characteristics located within the vadose zone. An example (NSA-03 for August 2007) is shown for illustration purposes as follows:

Vertical Profile of Vapor Analytical Results for NSA-03 (August 2007)




The fixed gas concentration behavior with depth was generally as expected for a groundwater plume containing petroleum hydrocarbons, except for the two deeper probes located at 69 ft bgs and 78 ft bgs. The fixed gas behaved as expected to a depth of 40 ft bgs; however, the gases appear to be behaving as opposites within the deeper probes. The laboratory was consulted to verify if the results had possibly been switched, but it appeared the laboratory had not switched the canisters. Confirmation samples were collected, which verified the analytical results for each fixed gas concentration. It then appeared the construction had been compromised, but since the analytical results did not detect a tracer gas, the surface completion appeared to be of acceptable construction. A vacuum test was also performed to determine if a leak existed between vapor monitoring channels by measuring vacuum response in the adjacent channels while pumping on each vapor monitoring probe. The results of the vacuum testing also indicated the well was properly constructed and no surface connections were compromised.

A plausible explanation may be that an oxygen-rich environment currently exists within the deeper portions of the vadose zone as a remnant effect of a previous pilot study conducted using Oxygen Release Compound (ORC). The ORC was injected during an evaluation of alternate remedial technologies in February 2003 (England Geosystem, 2004) at a distance of approximately 50 feet east of NSA-03.

## 8.2 Evaluation of Human Health Risk

Table 6 shows a summary of detected VOCs in the SSA or NSA soil vapor samples. VOCs that were not detected in any of the samples (e.g., methylene chloride) are not shown in this table. The laboratory reports showing the results for all VOCs analyzed can be found in Appendix H. The foot of the table presents the available CHHSLs for residential and commercial land uses. The CHHSLs represent screening values for soil vapor at 5 feet or more below ground surface that would be protective of human health if the vapors migrated into indoor air spaces. CHHSLs are not available for some VOCs because these were not required by the California legislation nor identified by DTSC as common soil contaminants at remediation sites.

Concentrations of chemicals of concern in soil vapor at depths near the surface (i.e., 7 feet below ground surface) were not above the corresponding CHHSLs. As the analysis in Section 8.1 shows, higher VOC concentrations at deeper depths are naturally attenuated towards the ground surface. Based on the soil vapor sample results and the natural attenuation and human health risk evaluations, the subsurface vapor-to-indoor air exposure pathway is considered to be insignificant.

# 9.0 SUMMARY OF FINDINGS

- The hydrocarbon fluorescence within the southern sampling area was encountered at a minimum depth of approximately 38.4 ft bgs in soil boring SSA-02. Moderate fluorescence just above the water table appears to be associated with impacts originating from the dissolved-phase groundwater plume.
- Hydrocarbon fluorescence was not present within the northern sampling area in the continuous soil core collected at NSA-01.
- In the southern sampling area, the two most frequently detected compounds (xylene and toluene) are generally consistent with constituents commonly present within the southern dissolved-phase benzene plume. Benzene was detected above the laboratory reporting limit in six samples (out of 60) at concentrations ranging from 4.4 $\mu g/m^3$ (SSA-09 at 15 ft bgs on March 19, 2007) to 65 $\mu g/m^3$ (SSA-11 at 36 ft bgs on March 19, 2007). The deepest samples in SSA-07, 09, and 10 had no detections, but the detection limits were elevated by the laboratory to compensate for matrix interference. The limited presence of benzene appears to be related to degradation processes occurring in the vadose zone.
- In the southern sampling area, the fixed gas concentration behavior with depth was generally as expected for a groundwater plume containing petroleum hydrocarbons. The oxygen concentrations generally increased in vapor ports located closer to the ground surface, while carbon dioxide concentrations increased with depth indicating respiration of the subsurface biological community within the vadose zone above the groundwater plume.
- In the northern sampling area, the two most frequently detected compounds (xylene and toluene) are generally consistent with constituents commonly present within the northern dissolved-phase benzene plume. Benzene was not detected above the laboratory reporting limit, which ranged from of <5.4 $\mu g/m^3$ (13 ft bgs) to <29 $\mu g/m^3$ (78 ft bgs). The absence of benzene appears to be related to degradation processes occurring in the vadose zone.
- In the northern sampling area, the fixed gas concentration behavior with depth was generally as expected for a groundwater plume containing petroleum hydrocarbons, except for the two deeper probes located at 69 ft bgs and 78 ft bgs. The fixed gas behaved as expected to a depth of 40 ft bgs; however, the gases appear to be behaving as opposites within the deeper probes. A plausible explanation may be that an oxygen-rich environment currently exists within the deeper portions of the vadose zone as a remnant effect of a previous pilot study conducted using Oxygen Release Compound (ORC).
- Based on the soil vapor samples results and the natural attenuation and human health risk evaluations, the subsurface vapor-to-indoor air exposure pathway is considered to be insignificant.

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# Tables

**Table 1. Installation Summary**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| Identification | Completion Date | Purpose | Comments |
|---|---|---|---|
| **Southern Sampling Area (SSA)** | | | |
| SSA-01 | 10/16/06 | Soil Boring | Continuously cored to establish lithology - Soil sampling for physical/geochemical parameters |
| SSA-02 | 10/17/06 | Soil Boring | Continuously cored to establish lithology - Soil sampling for physical/geochemical parameters |
| SSA-03 | 10/23/06 | Preliminary Vapor Sampling | Vapor samples collected at 12, 21, 30, and 40 ft bgs |
| SSA-04 | 10/24/06 | Preliminary Vapor Sampling | Vapor samples collected at 10, 20, 30, and 40 ft bgs |
| SSA-05 | 10/24/06 | Preliminary Vapor Sampling | Vapor samples collected at 10 and 23 ft bgs - Deeper samples not obtained due to refusal |
| SSA-06 | 10/25/06 | Preliminary Vapor Sampling | Vapor samples collected at 10, 20, 30, and 40 ft bgs |
| SSA-07 | 01/16/07 | CMT | Vapor ports installed at 7, 13, 21, 28, 33, 43, and 60 ft bgs |
| SSA-08 | N/A | Proposed CMT | Installation not required by agency based on preliminary vapor sampling - Adequete delineation provided by other CMTs |
| SSA-09 | 01/17/07 | CMT | Vapor ports installed at 7, 15, 21, 28, 35, 44, and 60 ft bgs |
| SSA-10 | 01/18/07 | CMT | Vapor ports installed at 7, 13, 21, 28, 33, 42, and 60 ft bgs |
| SSA-11 | 01/20/07 | CMT | Vapor ports installed at 7, 13, 21, 27, 36, 43, and 60 ft bgs |
| **Northern Sampling Area (NSA)** | | | |
| NSA-01 | 10/18/06 | Soil Boring | Continuously cored to establish lithology - Soil sampling for physical/geochemical parameters |
| NSA-02 | 10/26/06 | Preliminary Vapor Sampling | Vapor samples collected at 10, 30, 50, and 62 ft bgs |
| NSA-03 | 01/23/07 | CMT | Vapor ports installed at 13, 26, 38, 53, 69, 78, and 95 ft bgs |

**Notes:**
CMT = Continuous Multichannel Tubing
ft bgs = Feet Below Ground Surface
N/A - not applicable

**Table 2. Well Construction Details**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| Identification | Completion Date | Boring Depth (ft bgs) | Port Number | Hydrated Bentonite Chip Seal Interval (ft bgs) | Dry Bentonite Crumbles (ft bgs) | Filter Pack Interval (ft bgs) | Well Screen Interval (ft bgs) |
|---|---|---|---|---|---|---|---|
| **Southern Sampling Area (SSA)** | | | | | | | |
| SSA - 07 | 01/16/07 | 62.0 | 1 | 2.0 - 5.5 | 5.5 - 6.5 | 6.5 - 7.5 | 6.75 - 7.25 |
| | | | 2 | 7.5 - 11.5 | 11.5 - 12.5 | 12.5 - 13.5 | 12.75 - 13.25 |
| | | | 3 | 13.5 - 19.5 | 19.5 - 20.5 | 20.5 - 21.5 | 20.75 - 21.25 |
| | | | 4 | 21.5 - 26.5 | 26.5 - 27.5 | 27.5 - 28.5 | 27.75 - 28.25 |
| | | | 5 | 28.5 - 31.5 | 31.5 - 32.5 | 32.5 - 33.5 | 32.75 - 33.25 |
| | | | 6 | 33.5 - 41.5 | 41.5 - 42.5 | 42.5 - 43.5 | 42.75 - 43.25 |
| | | | 7 | 43.5 - 59.5 | N/A | 59.5 - 62.0 | 59.75 - 60.25 |
| SSA - 09 | 01/17/07 | 61.0 | 1 | 2.0 - 5.5 | 5.5 - 6.5 | 6.5 - 7.5 | 6.75 - 7.25 |
| | | | 2 | 7.5 - 13.5 | 13.5 - 14.3 | 14.3 - 15.5 | 14.75 - 15.25 |
| | | | 3 | 15.5 - 19.5 | 19.5 - 20.5 | 20.5 - 21.5 | 20.75 - 21.25 |
| | | | 4 | 21.5 - 26.5 | 26.5 - 27.5 | 27.5 - 28.5 | 27.75 - 28.25 |
| | | | 5 | 28.5 - 33.5 | 33.5 - 34.5 | 34.5 - 35.5 | 34.75 - 35.25 |
| | | | 6 | 35.5 - 42.5 | 42.5 - 43.5 | 43.5 - 44.5 | 43.75 - 44.25 |
| | | | 7 | 44.5 - 57.0 | N/A | 57.0 - 61.0 | 59.75 - 60.25 |
| SSA - 10 | 01/18/07 | 61.0 | 1 | 2.0 - 5.5 | 5.5 - 6.5 | 6.5 - 7.5 | 6.75 - 7.25 |
| | | | 2 | 7.5 - 11.5 | 11.5 - 12.5 | 12.5 - 13.5 | 12.75 - 13.25 |
| | | | 3 | 13.5 - 19.5 | 19.5 - 20.4 | 20.4 - 21.6 | 20.75 - 21.25 |
| | | | 4 | 21.6 - 26.5 | 26.5 - 27.3 | 27.3 - 28.5 | 27.75 - 28.25 |
| | | | 5 | 28.5 - 31.5 | 31.5 - 32.4 | 32.4 - 33.5 | 32.75 - 33.25 |
| | | | 6 | 33.5 - 40.6 | 40.6 - 41.5 | 41.5 - 42.7 | 41.75 - 42.25 |
| | | | 7 | 42.7 - 58.0 | N/A | 58.0 - 61.0 | 59.75 - 60.25 |
| SSA - 11 | 01/20/07 | 61.0 | 1 | 2.0 - 5.5 | 5.5 - 6.5 | 6.5 - 7.6 | 6.75 - 7.25 |
| | | | 2 | 7.6 - 11.5 | 11.5 - 12.3 | 12.3 - 13.5 | 12.75 - 13.25 |
| | | | 3 | 13.5 - 19.5 | 19.5 - 20.3 | 20.3 - 21.6 | 20.75 - 21.25 |
| | | | 4 | 21.6 - 25.5 | 25.5 - 26.3 | 26.3 - 27.6 | 26.75 - 27.25 |
| | | | 5 | 27.6 - 34.5 | 34.6 - 35.4 | 35.4 - 36.6 | 35.75 - 36.25 |
| | | | 6 | 36.6 - 41.5 | 41.5 - 42.2 | 42.2 - 43.7 | 42.75 - 43.25 |
| | | | 7 | 43.7 - 56.9 | N/A | 56.9 - 61.0 | 59.75 - 60.25 |
| **Northern Sampling Area (NSA)** | | | | | | | |
| NSA - 03 | 01/23/07 | 97.0 | 1 | 2.0 - 11.5 | 11.5 - 12.5 | 12.5 - 13.5 | 12.75 - 13.25 |
| | | | 2 | 13.5 - 24.5 | 24.5 - 25.5 | 25.5 - 26.5 | 25.75 - 26.25 |
| | | | 3 | 26.5 - 36.5 | 36.5 - 37.5 | 37.5 - 38.6 | 37.75 - 38.25 |
| | | | 4 | 38.6 - 51.5 | 51.5 - 52.5 | 52.5 - 53.5 | 52.75 - 53.25 |
| | | | 5 | 53.5 - 67.5 | 67.5 - 68.5 | 68.5 - 69.6 | 68.75 - 69.25 |
| | | | 6 | 69.6 - 76.5 | 76.5 - 77.3 | 77.3 - 78.5 | 77.75 - 78.25 |
| | | | 7 | 78.5 - 93.7 | N/A | 93.7 - 97.0 | 94.75 - 95.25 |

**Notes:**
ft bgs = feet below ground surface
N/A = not applicable

**Table 3. Sampling Summary**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| Soil Boring | Sampling Depth (ft bgs) | Soil Samples | | | | | | | | | | | Preliminay Vapor Sampling Event | | First Vapor Sampling Event (March 2007) | | Second Vapor Sampling Event (August 2007) | | Second Vapor Sampling Event - Resampling (September 2007) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPA Method 9060 Walkley-Black | ASTM D2216 | ASTM D4464m | API - RP40 | | | | | | | EPA Method 120.1m | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C |
| | | Total Organic Carbon | Moisture Content | Laser Grain Size Analysis | Total Porosity | Bulk Density | Grain Density | Air Permeability (H and V) | Hydrocarbon Saturation | Volumetric Vapor Content | Volumetric Water Content | Salinity | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2, CO2, Helium) |
| | | Stainless Steel / Brass Sleeve, (Remaining Sample Volume) | | | | | | | | | | | Summa Canister | | Summa Canister | | Summa Canister | | Summa Canister | |
| **Southern Sampling Area (SSA)** | | | | | | | | | | | | | | | | | | | | |
| SSA-01 | 6 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 11 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 21 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 28 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 35.5 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 43 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 61 | X | X | X | X | X | X | X | X | X | X | X (dup) | -- | -- | -- | -- | -- | -- | -- | -- |
| SSA-02 | 9 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 14 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 21 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 28 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 35.5 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 43 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 56 | X | X | X | X | X | X | X | X | X | X | X (dup) | -- | -- | -- | -- | -- | -- | -- | -- |
| SSA-03 | 12 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 21 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 30 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| SSA-04 | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 30 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| SSA-05 | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 23 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 30 | Vapor sample not obtained due to difficult sampling conditions - multiple attempts. | | | | | | | | | | | | | | | | | | |
| | 40 | Vapor sample not obtained due to difficult sampling conditions - multiple attempts. | | | | | | | | | | | | | | | | | | |
| SSA-06 | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 30 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 40 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (dup) | X (dup) | -- | -- | -- | -- | -- | -- |

**Table 3. Sampling Summary**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| Soil Boring | Sampling Depth (ft bgs) | Soil Samples | | | | | | | | | | | Preliminay Vapor Sampling Event | | First Vapor Sampling Event (March 2007) | | Second Vapor Sampling Event (August 2007) | | Second Vapor Sampling Event - Resampling (September 2007) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPA Method 9060 Walkley-Black | ASTM D2216 | ASTM D4464m | API - RP40 | | | | | | | EPA Method 120.1m | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C |
| | | Total Organic Carbon | Moisture Content | Laser Grain Size Analysis | Total Porosity | Bulk Density | Grain Density | Air Permeability (H and V) | Hydrocarbon Saturation | Volumetric Vapor Content | Volumetric Water Content | Salinity | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2, CO2, Helium) |
| | | Stainless Steel / Brass Sleeve, (Remaining Sample Volume) | | | | | | | | | | | Summa Canister | | Summa Canister | | Summa Canister | | Summa Canister | |
| SSA-07 | 7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 13 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 21 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (dup) | X (dup) | X | X | -- | -- |
| | 28 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 33 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | X | X |
| | 43 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | X | X |
| | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SSA-09 | 7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 15 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 21 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 28 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 35 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 44 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X (dup) | X (dup) | -- | -- |
| | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SSA-10 | 7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 13 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 21 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | X | X |
| | 28 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (dup) | X (dup) | X (dup) | X (dup) | -- | -- |
| | 33 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 44 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SSA-11 | 7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 13 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 21 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 27 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 36 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 43 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | X | X |
| | 60 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Northern Sampling Area** | | | | | | | | | | | | | | | | | | | | |
| NSA-01 | 13 | X (dup) | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 25 | X (dup) | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 35 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 51.5 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 65 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 78 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |
| | 90.5 | X | X | X | X | X | X | X | X | X | X | X | -- | -- | -- | -- | -- | -- | -- | -- |

**Table 3. Sampling Summary**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| | | Soil Samples | | | | | | | | | | | Preliminay Vapor Sampling Event | | First Vapor Sampling Event (March 2007) | | Second Vapor Sampling Event (August 2007) | | Second Vapor Sampling Event - Resampling (September 2007) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPA Method 9060 Walkley-Black | ASTM D2216 | ASTM D4464m | API - RP40 | | | | | | | EPA Method 120.1m | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C | EPA Method TO-15 | EPA Method 3C |
| Soil Boring | Sampling Depth (ft bgs) | Total Organic Carbon | Moisture Content | Laser Grain Size Analysis | Total Porosity | Bulk Density | Grain Density | Air Permeability (H and V) | Hydrocarbon Saturation | Volumetric Vapor Content | Volumetric Water Content | Salinity | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2 and CO2) | VOCs | Fixed Gasses (O2, CO2, Helium) |
| | | Stainless Steel / Brass Sleeve, (Remaining Sample Volume) | | | | | | | | | | | Summa Canister | | Summa Canister | | Summa Canister | | Summa Canister | |
| NSA-02 | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (dup) | X (dup) | -- | -- | -- | -- | -- | -- |
| | 30 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 50 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| | 62 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- | -- | -- | -- | -- | -- |
| NSA-03 | 13 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (dup) | X (dup) | X (dup) | X (dup) | -- | -- |
| | 26 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 38 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 53 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NS | NS | NS | NS | -- | -- |
| | 69 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 78 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X | X | -- | -- |
| | 95 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Notes:
EPA = Environmental Protection Agency
VOCs = Volatile Organic Compounds
ft bgs = feet below ground surface
X = indicates a sample will be collected for chemical analysis
dup = indicates a replicate sample will be collected for chemical analysis
H and V = Sample orientation was Horizontal and Vertical
NS = Not sampled due to vacuum exceeding 10 inHg
Aqueous quality control samples (equipment/trip blanks) were analyzed by EPA Method 8260 for VOC's

**Table 4. Summary of Soil Physical Parameters**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| Soil Boring | Sample ID | Sample Date | Depth (ft bgs) | EPA Method 9060 Walkley-Black TOC (mg/kg) | ASTM D2216 Moisture Content (% weight) | ASTM D422/D4464m Grain Size Analysis | API - RP40 Porosity (% Vb) Total | Porosity (% Vb) Vapor | Density (g/cc) Bulk | Density (g/cc) Grain | Air Permeability (millidarcy) Horizontal | Air Permeability (millidarcy) Vertical | Pore Fluid Saturation (% Pv) Water | Pore Fluid Saturation (% Pv) NAPL | EPA Method 120.1m Salinity (g/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Southern Sampling Area (SSA)** | | | | | | | | | | | | | | | |
| SSA-01 | SSA-01-06 | 10/24/2006 | 6 | **700** | **7.0** | Gravel with Sand | **36.7** | **25.0** | **1.66** | **2.63** | **4,220** | **4,019** | **31.7** | <0.1 | <1.0 |
| | SSA-01-11 | 10/24/2006 | 11 | **2,750** | **10.1** | Gravel with Sand | **40.3** | **24.9** | **1.52** | **2.55** | **3,701** | **2,046** | **38.1** | <0.1 | <1.0 |
| | SSA-01-21 | 10/24/2006 | 21 | **3,700** | **11.7** | Gravel with Sand | **40.0** | **22.5** | **1.49** | **2.49** | **9,874** | **7,378** | **43.6** | <0.1 | <1.0 |
| | SSA-01-28 | 10/24/2006 | 28 | **2,650** | **14.5** | Gravel with Sand | **47.5** | **28.5** | **1.30** | **2.48** | **4,799** | **2,890** | **39.8** | <0.1 | <1.0 |
| | SSA-01-35.5 | 10/24/2006 | 35.5 | **3,050** | **17.6** | Gravel with Sand | **43.0** | **18.2** | **1.41** | **2.46** | **4,963** | **98.5** | **57.4** | <0.1 | <1.0 |
| | SSA-01-43 | 10/24/2006 | 43 | **8,750** | **13.9** | Gravel with Sand | **34.5** | **12.3** | **1.59** | **2.43** | **3,610** | **5,782** | **64.1** | <0.1 | <1.0 |
| | SSA-01-61 | 10/24/2006 | 61 | **3,100** | **19.2** | Sand (fine-coarse) | **42.1** | **13.7** | **1.45** | **2.49** | **3,969** | **1,099** | **61.6** | **5.8** | <1.0 |
| | SSA-01-61D | 10/24/2006 | 61 (dup) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <1.0 |
| SSA-02 | SSA-02-09 | 10/26/2006 | 9 | **3,300** | **10.9** | Silty Fine Sand | **45.4** | **30.3** | **1.39** | **2.55** | **952** | **366** | **33.1** | <0.1 | <1.0 |
| | SSA-02-14 | 10/26/2006 | 14 | **2,000** | **13.1** | Gravel with Sand | **41.3** | **22.0** | **1.48** | **2.53** | **3,131** | **2,223** | **46.6** | <0.1 | <1.0 |
| | SSA-02-21 | 10/26/2006 | 21 | **3,450** | **16.7** | Gravel with Sand | **40.3** | **16.2** | **1.44** | **2.42** | **5,723** | **2,564** | **59.5** | <0.1 | <1.0 |
| | SSA-02-28 | 10/26/2006 | 28 | **4,200** | **15.0** | Gravel with Sand | **41.1** | **19.7** | **1.42** | **2.40** | **8,954** | **6,491** | **51.7** | <0.1 | <1.0 |
| | SSA-02-35.5 | 10/26/2006 | 35.5 | **4,000** | **16.3** | Gravel with Sand | **40.2** | **17.3** | **1.41** | **2.35** | **3,723** | **1,979** | **56.6** | <0.1 | <1.0 |
| | SSA-02-43 | 10/26/2006 | 43 | **7,500** | **12.7** | Gravel with Sand | **38.0** | **18.5** | **1.53** | **2.46** | **7,869** | **2,160** | **51.1** | <0.1 | <1.0 |
| | SSA-02-56 | 10/26/2006 | 56 | **3,100** | **20.6** | Gravel with Sand | **40.8** | **9.0** | **1.52** | **2.57** | **1,605** | **49.1** | **71.7** | **6.3** | <1.0 |
| | SSA-02-56D | 10/26/2006 | 56 (dup) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <1.0 |
| **Northern Sampling Area (NSA)** | | | | | | | | | | | | | | | |
| NSA-01 | NSA-01-13 | 10/27/2006 | 13 | **4,000** | **13.6** | Gravel with Sand | **38.0** | **17.5** | **1.50** | **2.42** | **5,011** | **4,436** | **53.9** | <0.1 | <1.0 |
| | NSA-01-13D | 10/27/2006 | 13 (dup) | **3,300** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | NSA-01-25 | 10/27/2006 | 25 | **5,300** | **15.5** | Gravel with Sand | **40.9** | **19.6** | **1.37** | **2.32** | **4,477** | **2,791** | **52.0** | <0.1 | <1.0 |
| | NSA-01-25D | 10/27/2006 | 25 (dup) | **3,900** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | NSA-01-35 | 10/27/2006 | 35 | **4,700** | **16.5** | Gravel | **41.0** | **17.8** | **1.40** | **2.37** | **4,602** | **2,069** | **56.5** | <0.1 | <1.0 |
| | NSA-01-51.5 | 10/27/2006 | 51.5 | **1,700** | **14.3** | Silty Fine Sand | **49.3** | **30.5** | **1.31** | **2.59** | **876** | **1,111** | **38.0** | <0.1 | <1.0 |
| | NSA-01-65 | 10/27/2006 | 65 | **1,200** | **18.7** | Silty Fine Sand | **39.2** | **9.2** | **1.59** | **2.62** | **43.1** | **2.31** | **76.4** | <0.1 | <1.0 |
| | NSA-01-78 | 10/27/2006 | 78 | **3,650** | **13.0** | Gravel with Sand | **31.1** | **8.0** | **1.77** | **2.57** | **24.4** | **32.4** | **74.1** | <0.1 | <1.0 |
| | NSA-01-90.5 | 10/27/2006 | 90.5 | **5,700** | **15.2** | Gravel with Sand | **33.7** | **8.0** | **1.69** | **2.56** | **712** | **27.3** | **76.3** | <0.1 | <1.0 |

Notes:
ft bgs = Feet Below Ground Surface
ASTM = American Society of Testing Materials
API = American Petroleum Institute
EPA = United States Environmental Protection Agency
TOC = Total Organic Carbon
g/L = Grams per Liter
g/cc = Grams per Cubic Centimeter
% Vb = Percent by Volume
% Pv = Percent Pore Volume
NAPL = Non-Aqueous Phase Liquid
mg/kg = Milligrams per Kilogram
dup = Replicate soil sample
< = Analyte not detected at or above laboratory reporting limit

**Table 5. Summary of Preliminary Vapor Monitoring using Direct Push Rig**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| Soil Boring | Sample ID | Sample Date | Depth (ft bgs) | VOCs (EPA TO-15) µg/m$^3$ | | | | | | | | | | | | | | | | | | | Fixed Gasses (EPA 3C) ppmv | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Acetone | 2-Propanol (Isopropyl Alcohol) | Dichloromethane | Carbon Disulfide | Vinyl Acetate | 2-Butanone (MEK) | Benzene | Trichloroethene | 4-Methyl-2-pentanone | Toluene | 2-Hexanone | Ethylbenzene | *m,p*-Xylenes | Styrene | o-Xylene | 1,4-Dichlorobenzene | Naphthalene | Total BTEX | Total VOCs | Oxygen + Argon | Carbon Dioxide |
| **Southern Sampling Area (SSA)** | | | | | | | | | | | | | | | | | | | | | | | | |
| SSA-03 | F06-10-001 | 10/23/06 | 12 | **360** | **100** | <13 | **13** | **36** | **66** | **42** | **40** | <13 | **75** | <13 | **28** | **36** | <13 | <13 | <13 | <13 | **181** | **696** | **144,000** | **67,300** |
| | F06-10-003 | 10/23/06 | 21 | **420** | **120** | <4.7 | **17** | **11** | **92** | **40** | <4.7 | **29** | **73** | **8.6** | **18** | **56** | **13** | **18** | <4.7 | <4.7 | **205** | **796** | **194,000** | **23,800** |
| | F06-10-005 | 10/23/06 | 30 | **550** | **860** | <4.9 | **9.5** | **11** | **86** | **50** | <4.9 | **58** | **85** | **15** | **14** | **45** | **7.5** | **13** | <4.9 | **7.1** | **207** | **951** | **74,100** | **111,000** |
| | F06-10-007 | 10/23/06 | 40 | <9900 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | <2000 | **ND** | **ND** | **10,000** | **85,000** |
| SSA-04 | F06-10-002 | 10/23/06 | 10 | **170** | **97** | <4.9 | **5.1** | **13** | **36** | **6** | <4.9 | **24** | **32** | <4.9 | **9.2** | **26** | **5.0** | **6.8** | <4.9 | <4.9 | **80** | **333** | **123,000** | **107,000** |
| | F06-10-004 | 10/23/06 | 20 | **440** | **440** | <4.8 | **15** | **49** | **98** | **31** | <4.8 | **59** | **55** | **12** | **11** | **26** | **7.5** | **7.0** | **5.0** | <4.8 | **130** | **816** | **107,000** | **124,000** |
| | F06-10-006 | 10/23/06 | 30 | **400** | **140** | <4.7 | **5** | **20** | **86** | **18** | <4.7 | **41** | **53** | **12** | **9.5** | **25** | **9.2** | **6.3** | <4.7 | <4.7 | **112** | **685** | **82,800** | **134,000** |
| | F06-10-008 | 10/24/06 | 40 | **930** | **170** | <140 | **150** | <140 | **220** | <140 | <140 | <140 | <140 | <140 | <140 | <140 | <140 | <140 | <140 | <140 | **ND** | **1,300** | **19,200** | **136,000** |
| SSA-05 | F06-10-009 | 10/24/06 | 10 | **590** | **140** | <9.5 | **16** | **40** | **140** | **100** | <9.5 | **26** | **130** | **14** | **28** | **56** | <9.5 | **18** | <9.5 | <9.5 | **332** | **1,158** | **164,000** | **63,300** |
| | F06-10-011 | 10/24/06 | 23 | **440** | **130** | **11** | **10** | **18** | **65** | **21** | <7.8 | **62** | **42** | **11** | **11** | **23** | **8.6** | <7.8 | <7.8 | <7.8 | **97** | **723** | **121,000** | **102,000** |
| | --- | 10/24/06 | 30 | **vapor sample not obtained due to difficult sampling conditions - multiple attempts** | | | | | | | | | | | | | | | | | | | | |
| | --- | 10/24/06 | 40 | **vapor sample not obtained due to difficult sampling conditions - multiple attempts** | | | | | | | | | | | | | | | | | | | | |
| SSA-06 | F06-10-010 | 10/24/06 | 10 | **3,500** | **120** | <8.2 | **13** | **76** | **410** | **24** | <8.2 | **35** | **210** | **39** | **76** | **260** | **21** | **82** | <8.2 | <8.2 | **652** | **4,746** | **218,000** | **2,440** |
| | F06-10-012 | 10/24/06 | 20 | **2,600** | **110** | <8.3 | **24** | **130** | **550** | **190** | <8.3 | **62** | **280** | **32** | **50** | **64** | **38** | **20** | <8.3 | <8.3 | **604** | **4,040** | **145,000** | **84,100** |
| | F06-10-015 | 10/24/06 | 30 | **680** | **130** | <7.9 | **8.7** | **55** | **170** | **33** | <7.9 | **82** | **49** | **18** | **11** | **18** | **9.7** | <7.9 | <7.9 | <7.9 | **111** | **1,134** | **112,000** | **110,000** |
| | F06-10-016 | 10/25/06 | 40 | **4,200** | **110** | <45 | <45 | <45 | **1,800** | **160** | <45 | <45 | **290** | **360** | <45 | **150** | <45 | <45 | <45 | <45 | **600** | **6,960** | **193,000** | **20,500** |
| | F06-10-017 | 10/25/06 | 40 (dup) | **1,900** | **85** | <50 | <50 | <50 | **1,400** | **86** | <50 | <50 | **310** | **330** | **53** | **190** | <50 | <50 | <50 | <50 | **639** | **4,269** | **193,000** | **21,800** |
| **Northern Sampling Area (NSA)** | | | | | | | | | | | | | | | | | | | | | | | | |
| NSA-02 | F06-10-018 | 10/25/06 | 10 | **260** | **37** | <9.8 | **24** | **29** | **57** | **50** | <9.8 | **17** | **64** | **21 J** | **22** | **26** | **35** | <9.8 | <9.8 | <9.8 | **162** | **584** | **93,200** | **95,900** |
| | F06-10-019 | 10/25/06 | 10 (dup) | **200** | **26** | <3.8 | **13** | **16** | **40** | **25** | <3.8 | **12** | **39** | <3.8 | **17** | **21** | **26** | **6.7** | <3.8 | <3.8 | **109** | **416** | **93,400** | **96,000** |
| | F06-10-020 | 10/25/06 | 30 | **450** | **110** | <14 | <14 | <14 | **110** | **32** | <14 | **74** | **31** | <14 | <14 | **17** | **25** | <14 | <14 | <14 | **80** | **739** | **56,600** | **105,000** |
| | F06-10-021 | 10/26/06 | 50 | **710** | **340** | <17 | **19** | <17 | **240** | **26** | <17 | <17 | **75** | <17 | **42** | **110** | **55** | **53** | <17 | <17 | **306** | **1,330** | **14,300** | **73,300** |
| | F06-10-022 | 10/26/06 | 62 | **2,000** | **73** | <28 | **29** | <28 | **1,500** | **170** | <28 | **30** | **190** | **250** | **42** | **99** | **59** | <28 | <28 | <28 | **501** | **4,369** | **83,300** | **67,600** |

Notes:
ft bgs = Feet Below Ground Surface
VOCs = Volatile Organic Compounds
EPA = United States Environmental Protection Agency
µg/m$^3$ = Micrograms per Cubic Meter
ppmv = Parts per Million by Volume
dup = Duplicate vapor sample
ND = Analyte not detected
< = Analyte not detected at or above laboratory reporting limit

**Table 6. Summary of CMT Vapor Probe Monitoring**
**Chevron PCPL Superfund Site**
**Fillmore, California**

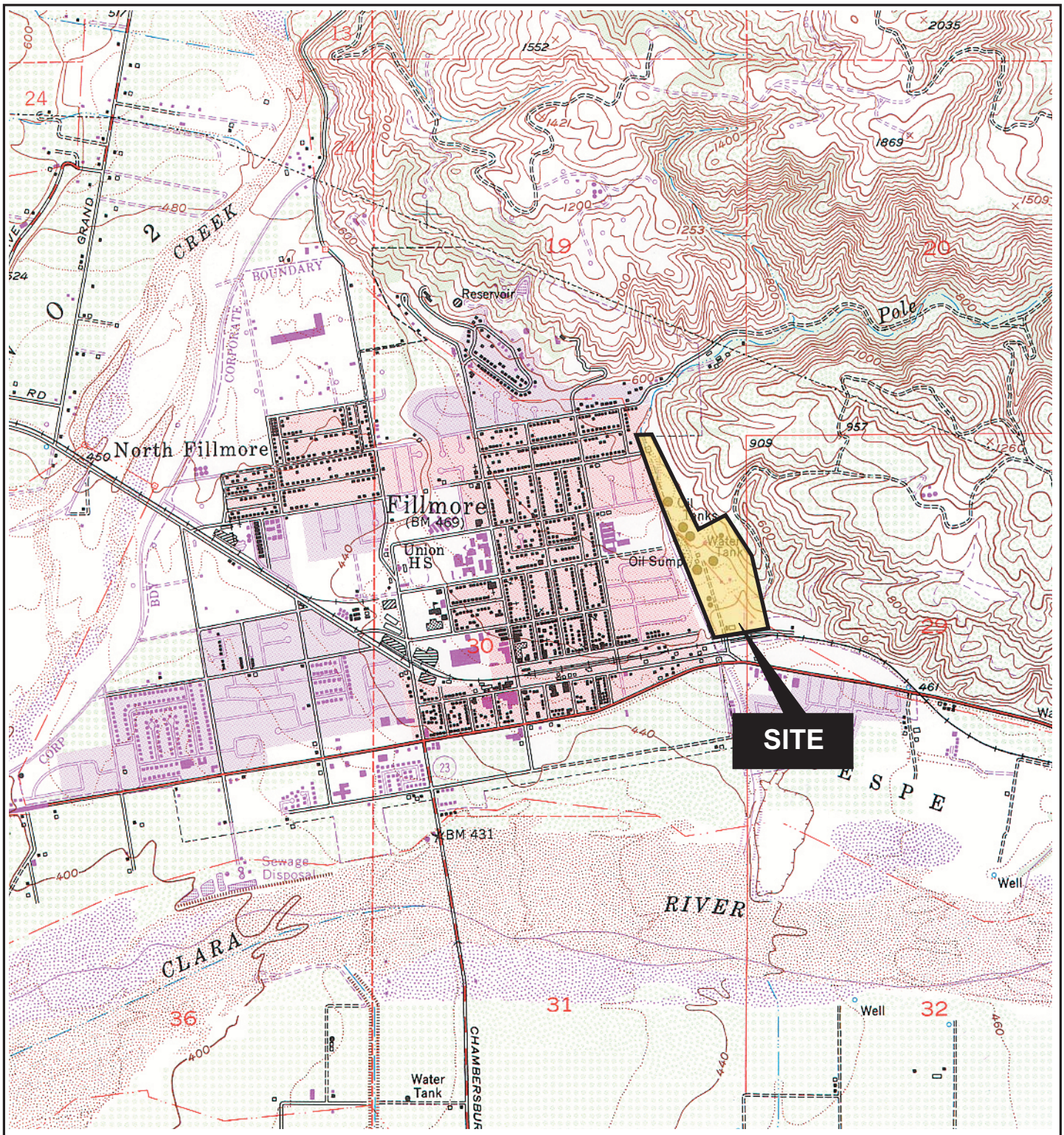
| Soil Boring | Depth (ft bgs) | Sample Date | Sample ID | VOCs (EPA TO-15) ug/m$^3$ | | | | | | | | | | | | | | Fixed Gases (EPA 3C M) % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2-Butanone | 2-Hexanone | 2-Propanol | Acetone | Benzene | Carbon Disulfide | Dichloromethane | Ethylbenzene | m,p-Xylenes | Naphthalene | o-Xylene | Toluene | Vinyl Acetate | Total BETX | Helium | Carbon Dioxide | Oxygen + Argon |
| **Southern Sampling Area (SSA)** | | | | | | | | | | | | | | | | | | | | |
| SSA-07 | 7 | 03/20/07 | F07-03-020 | <14 | <14 | <14 | <71 | <14 | <14 | <14 | <14 | 31 | <14 J | <14 | 26 | <14 | 57 | --- | 3.33 | 19.2 |
| | | 08/06/07 | F07-08-221 | <7.2 | <7.2 | <7.2 | <36 | <7.2 | <7.2 | <7.2 | <7.2 | 7.6 | <7.2 | <7.2 | <7.2 | <14 | 7.6 | --- | 4.25 | 17.9 |
| | 13 | 03/20/07 | F07-03-021 | <14 | <14 | <14 | <68 | <14 | 29 | <14 | <14 | 40 | <14 | <14 | 36 | <14 | 76 | --- | 5.42 | 17.1 |
| | | 08/06/07 | F07-08-222 | 7.5 | <3.7 | 32 | 23 | <3.7 | 21 | <3.7 | <3.7 | 14 | <3.7 | 4.4 | 8.8 | 8.6 | 27 | --- | 6.08 | 16.0 |
| | 21 | 03/20/07 | F07-03-022 | <17 | <17 | <17 | <85 | <17 | <17 | <17 | <17 | 49 | <17 | <17 | 45 | <17 | 94 | --- | 8.03 | 14.7 |
| | Dup | 03/20/07 | F07-03-024 | <10 | <10 | <10 | <52 | <10 | 20 | <10 | <10 | 30 | <10 | <10 | 27 | <10 | 57 | --- | 5.38 | 17.2 |
| | | 08/06/07 | F07-08-223 | <28 | <28 | <28 | <140 | <28 | <28 | <28 | <28 | <28 | <28 | <28 | <28 | <56 | ND | --- | 8.02 | 14.0 |
| | 28 | 03/20/07 | F07-03-023 | 15 | <14 | 21 | 79 | <14 | 33 | <14 | <14 | 47 | <14 | <14 | 52 | <14 | 99 | --- | 9.91 | 12.8 |
| | | 08/06/07 | F07-08-224 | <28 | <28 | <28 | <140 | <28 | <28 | <28 | <28 | <28 | <28 | <28 | 32 | <57 | 32 | --- | 9.81 | 11.9 |
| | 33 | 03/20/07 | F07-03-025 | 21 | <14 | 14000 | 730 | <14 | <14 | <14 | <14 | 35 | <14 | <14 | 51 | <14 | 86 | --- | 6.34 | 15.0 |
| | | 08/06/07 | F07-08-225 | <95 | <95 | 2800 | <480 | <95 | <95 | <95 | <95 | <95 | <95 | <95 | <95 | <190 | ND | --- | 9.72 | 10.6 |
| | RS | 09/13/07 | F07-09-100 | <13 | <13 | <13 | <67 | <13 | <13 | <13 | <13 | 38 | <13 | <13 | 36 | <67 | 74 | 3,100 | 11.7 | 9.8 |
| | 43 | 03/20/07 | F07-03-026 | <4600 | <4600 | <4600 | <23000 | <4600 | <4600 | <4600 | <4600 | <4600 | <4600 | <4600 | <4600 | <4600 | ND | --- | 11.5 | 1.19 |
| | | 08/07/07 | F07-08-226 | <1300 | <1300 | 5600 | <6600 | <1300 | <1300 | <1300 | <1300 | <1300 | <1300 | <1300 | <1300 | <1300 | ND | --- | 6.36 | 10.6 |
| | RS | 09/13/07 | F07-09-101 | <1900 | <1900 | <1900 | <9300 | <1900 | <1900 | <1900 | <1900 | <1900 | <1900 | <1900 | <1900 | <9300 | ND | <35 | 13.1 | 1.07 |
| SSA-09 | 7 | 03/19/07 | F07-03-013 | <7.3 | <7.3 J | <7.3 | <37 | <7.3 | <7.3 | <7.3 | <7.3 | 23 | <7.3 | 7.4 | 16 | <7.3 | 46 | --- | 6.29 | 16.4 |
| | | 08/06/07 | F07-08-214 | <7.2 | <7.2 | <7.2 | <36 | <7.2 | <7.2 | <7.2 | <7.2 | 10 | <7.2 | <7.2 | <7.2 | <14 J | 10 | --- | 7.53 | 15.5 |
| | 15 | 03/19/07 | F07-03-015 | <2.9 | <2.9 | <2.9 | <14 | 4.4 | 24 | <2.9 | 3.5 | 14 | <2.9 | 3.7 | 22 | <2.9 | 48 | --- | 8.96 | 13.9 |
| | | 08/06/07 | F07-08-215 | <15 | <15 | 340 | <73 | <15 | 62 | 16 | <15 | 26 | <15 | <15 | 17 | 33 | 43 | --- | 10.4 | 12.9 |
| | Dup | 08/06/07 | F07-08-215 | 15 | <15 | 340 | <73 | <15 | 65 | <15 | <15 | 26 | <15 | <15 | 17 | <29 | 43 | --- | --- | --- |
| | 21 | 03/19/07 | F07-03-016 | <14 | <14 | <14 | <71 | <14 | <14 | <14 | <14 | 54 | <14 | 15 | 44 | <14 | 113 | --- | 10.5 | 12.6 |
| | | 08/06/07 | F07-08-216 | <7.1 | <7.1 | <7.1 | <35 | <7.1 | 9.9 | <7.1 | <7.1 | 29 | <7.1 | 12 | 16 | <14 | 57 | --- | 11.2 | 12.1 |
| | 28 | 03/20/07 | F07-03-017 | <14 | <14 | <14 | <69 | <14 | <14 | <14 | <14 | 49 | <14 | <14 | 47 | <14 | 96 | --- | 11.9 | 11.2 |
| | | 08/06/07 | F07-08-217 | <6.5 | <6.5 | <6.5 | <33 | <6.5 | 16 | <6.5 | <6.5 | 24 | <6.5 | 7.5 | 14 | <13 | 46 | --- | 12.0 | 10.8 |
| | Dup | 08/06/07 | F07-08-217 | <6.5 | <6.5 | <6.5 | <33 | <6.5 | 12 | <6.5 | <6.5 | 21 | <6.5 | <6.5 | 12 | <13 | 33 | --- | --- | --- |
| | 35 | 03/20/07 | F07-03-018 | <14 | <14 | 30 | <70 | 15 | 57 | <14 | 16 | 56 | <14 J | 20 | 68 | <14 | 175 | --- | 13.1 | 9.99 |
| | | 08/06/07 | F07-08-218 | <7.3 | <7.3 | <7.3 | <37 | <7.3 | 12 | 7.5 | <7.3 | 21 | <7.3 | 15 | 20 | <15 | 56 | --- | 13.1 | 9.58 |
| | 44 | 03/20/07 | F07-03-019 | <4500 | <4500 | <4500 | <23000 | <4500 | <4500 | <4500 | <4500 | <4500 | <4500 | <4500 | <4500 | <4500 | ND | --- | 14.9 | 1.18 |
| | | 08/06/07 | F07-08-219 | <730 | <730 | <730 | <3700 | <730 | <730 | <730 | <730 | <730 | <730 | <730 | <730 | <1500 | ND | --- | 15.5 | 1.37 |
| | Dup | 08/06/07 | F07-08-220 | <1400 | <1400 | <1400 | <7100 | <1400 | <1400 | <1400 | <1400 | <1400 | <1400 | <1400 | <1400 | <2800 | ND | --- | 14.7 | 2.00 |
| SSA-10 | 7 | 03/19/07 | F07-03-007 | <9.3 | <9.3 | 43 | <46 | <9.3 | <9.3 | <9.3 | <9.3 | 23 | <9.3 | 13 | 17 | <9.3 | 53 | --- | 3.44 | 18.9 |
| | | 08/06/07 | F07-08-207 | <36 | <36 | <36 | <180 | <36 | <36 | <36 | <36 | <36 | <36 | <36 | <36 | <72 | 0 | --- | 4.42 | 18.4 |
| | 13 | 03/19/07 | F07-03-008 | <13 | 110 | <13 | <67 | <13 | 28 | <13 | <13 | 21 | <13 | <13 | 21 | <13 | 42 | --- | 5.87 | 16.2 |
| | | 08/06/07 | F07-08-208 | <37 | <37 | <37 | <180 | <37 | <37 | <37 | <37 | <37 | <37 | <37 | <37 | <73 | ND | --- | 6.44 | 16.1 |
| | 21 | 03/19/07 | F07-03-009 | 18 | 190 | 74 | 110 | <14 | <14 | <14 | <14 | 24 | <14 | <14 | 30 | <14 | 54 | --- | 7.63 | 15.1 |
| | | 08/06/07 | F07-08-209 | <26 | <26 | 2900 | <130 | <26 | <26 | <26 | <26 | <26 | <26 | <26 | <26 | <52 J | ND | --- | 4.83 | 17.6 |
| | RS | 09/13/07 | F07-09-102 | <15 | <15 | <15 | <75 | <15 | 15 | <15 | <15 | 40 | <15 | <15 | 51 | <75 | 91 | <37 | 8.88 | 14.7 |
| | 28 | 03/19/07 | F07-03-010 | 31 | 280 J | 170 J | 230 | <14 | 20 | <14 | <14 | 45 | <14 J | 20 | 43 | <14 | 108 | --- | 10.3 | 12.4 |
| | Dup | 03/19/07 | F07-03-011 | 22 | <15 J | <15 J | 170 | <15 | <15 | <15 | <15 | 28 | <15 | <15 | 36 | <15 | 64 | --- | 10.5 | 12.3 |
| | | 08/06/07 | F07-08-210 | <30 | <30 | <30 | <150 | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <60 J | ND | --- | 9.90 | 12.6 |
| | Dup | 08/06/07 | F07-08-212 | <29 | <29 | <29 | <150 | <29 | <29 | <29 | <29 | <29 | <29 | <29 | <29 | <59 J | ND | --- | 9.82 | 12.7 |
| | 33 | 03/19/07 | F07-03-012 | <29 | <29 J | <29 | 230 | <29 | <29 | <29 | <29 | 35 | <29 | <29 | 43 | <29 | 78 | --- | 13.5 | 7.84 |
| | | 08/06/07 | F07-08-211 | <57 | <57 | <57 | <280 | <57 | <57 | <57 | <57 | <57 | <57 | <57 | <57 | <110 J | ND | --- | 12.6 | 9.13 |
| | Dup | 08/06/07 | F07-08-211 | <57 | <57 | <57 | <280 | <57 | <57 | <57 | <57 | <57 | <57 | <57 | <57 | <110 | ND | --- | --- | --- |
| | 42 | 03/19/07 | F07-03-014 | <2800 | <2800 | <2800 | <14000 | <2800 | <2800 | <2800 | <2800 | <2800 | <2800 | <2800 | <2800 | <2800 | ND | --- | 10.7 | 0.903 |
| | | 08/06/07 | F07-08-213 | <2800 | <2800 | <2800 | <14000 | <2800 | <2800 | <2800 | <2800 | <2800 | <2800 | <2800 | <2800 | <5500J | ND | --- | 11.0 | 2.03 |
| SSA-11 | 7 | 03/19/07 | F07-03-001 | <14 | <14 | <14 | <69 | <14 | <14 | <14 | 14 | 46 | <14 | <14 | 35 | <14 | 95 | --- | 4.25 | 18.3 |
| | | 08/06/07 | F07-08-200 | <19 | <19 | <19 | <97 | <19 | <19 | <19 | <19 | <19 | <19 | <19 | <19 | <39 | ND | --- | 4.65 | 18.2 |
| | 13 | 03/19/07 | F07-03-002 | <13 | <13 | <13 | <65 | 23 | <13 | <13 | 16 | 55 | <13 | 15 | 42 | <13 | 151 | --- | 5.87 | 16.6 |
| | | 08/06/07 | F07-08-201 | <17 | <17 | <17 | <86 | <17 | <17 | <17 | <17 | <17 | <17 | <17 | <17 | <34 | ND | --- | 6.39 | 16.6 |
| | 21 | 03/19/07 | F07-03-003 | 26 | <14 | <14 | 140 | 51 | <14 | <14 | 25 | 73 | <14 | 25 | 69 | <14 | 243 | --- | 7.90 | 14.6 |
| | | 08/06/07 | F07-08-202 | <35 | <35 | <35 | <170 | <35 | <35 | <35 | <35 | <35 | <35 | <35 | <35 | <70 | ND | --- | 7.70 | 14.9 |
| | Dup | 08/06/07 | F07-08-202 | <35 | <35 | <35 | <170 | <35 | <35 | <35 | <35 | <35 | <35 | <35 | <35 | <70 | ND | --- | --- | --- |
| | 27 | 03/19/07 | F07-03-004 | 41 | <15 | <15 | 250 | 59 | 17 | <15 | 28 | 92 | <15 | 25 | 76 | <15 | 280 | --- | 10.1 | 12.0 |
| | | 08/06/07 | F07-08-204 | <27 | <27 | 36 | <140 | <27 | <27 | <27 | <27 | 30 | <27 | <27 | <27 | <54 J | 30 | --- | 9.44 | 12.9 |
| | 36 | 03/19/07 | F07-03-005 | 48 | <19 | <19 | 320 | 65 | <19 | <19 | 34 | 92 | <19 | 23 | 78 | <19 | 292 | --- | 14.9 | 4.97 |
| | | 08/06/07 | F07-08-205 | <54 | <54 | <54 | <270 | <54 | <54 | <54 | <54 | 61 | <54 | <54 | <54 | <110 J | 61 | --- | 13.9 | 6.63 |
| | 43 | 03/19/07 | F07-03-006 | <28000 | <28000 | <28000 | <140000 | <28000 | <28000 | <28000 | <28000 | <28000 | <28000 | <28000 | <28000 | <28000 | ND | --- | 2.59 | 0.991 |
| | | 08/06/07 | F07-08-206 | <930 | <930 | 4900 | <4700 | <930 | <930 | <930 | <930 | <930 | <930 | <930 | <930 | <1900 | ND | --- | 3.99 | 9.06 |
| | RS | 09/13/07 | F07-09-103 | <10000 | <10000 | <10000 | <51000 | <10000 | <10000 | <10000 | <10000 | <10000 | <10000 | <10000 | <10000 | <51000 | ND | 9,300 | 7.16 | 4.04 |
| DTSC CHHSLs - Shallow Soil Gas Human Health Screening Levels - Vapor Intrusion (µg/m$^3$) | | | | | | | | | | | | | | | | | | | | |
| Residential Land Use (µg/m$^3$) | | | | --- | --- | --- | --- | 36.2 | --- | --- | --- | 319,000 | 31.9 | 315,000 | 135,000 | --- | --- | --- | --- | --- |
| Commercial/Industrial Land Use (µg/m$^3$) | | | | --- | --- | --- | --- | 122 | --- | --- | --- | 887,000 | 106 | 879,000 | 378,000 | --- | --- | --- | --- | --- |

**Table 6. Summary of CMT Vapor Probe Monitoring**
**Chevron PCPL Superfund Site**
**Fillmore, California**

| Soil Boring | Depth (ft bgs) | Sample Date | Sample ID | VOCs (EPA TO-15) ug/m$^3$ | | | | | | | | | | | | | | Fixed Gases (EPA 3C M) % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2-Butanone | 2-Hexanone | 2-Propanol | Acetone | Benzene | Carbon Disulfide | Dichloromethane | Ethylbenzene | m,p-Xylenes | Naphthalene | o-Xylene | Toluene | Vinyl Acetate | Total BETX | Helium | Carbon Dioxide | Oxygen + Argon |
| **Northern Sampling Area (NSA)** | | | | | | | | | | | | | | | | | | | | |
| NSA-03 | 13 | 03/20/07 | F07-03-027 | **39** | **83** | <6.9 | **52** | <6.9 | **44** | <6.9 | **6.9** | **32** | **17 J** | **11** | **35** | <6.9 | **85** | --- | **8.02** | **11.5** |
| | Dup | 03/20/07 | F07-03-029 | **30** | **69** | <5.4 | **39** | <5.4 | **44** | <5.4 | **5.5** | **24** | <5.4 J | **8.1** | **28** | <5.4 | **66** | --- | **8.02** | **11.5** |
| | | 08/07/07 | F07-08-227 | **10** | **42** | <6.9 | <35 | <6.9 | **8.5** | <6.9 | <6.9 | **9.6** | <6.9 | <6.9 | **18** | <6.9 | **28** | --- | **8.79** | **10.9** |
| | Dup | 08/07/07 | F07-08-230 | **7.2** | **31** | <7.0 | <35 | <7.0 | <7.0 | <7.0 | <7.0 | **7.7** | <7.0 | <7.0 | **15** | <7.0 | **23** | --- | **8.80** | **11.0** |
| | 26 | 03/20/07 | F07-03-028 | **93** | **190** | **25** | **110** | <9.1 | **15** | <9.1 | <9.1 | **35** | <9.1 | **10** | **54** | <9.1 | **99** | --- | **10.4** | **8.00** |
| | | 08/07/07 | F07-08-228 | **16** | **74** | <7.1 | <36 | <7.1 | <7.1 | <7.1 | <7.1 | **14** | <7.1 | <7.1 | **28** | <7.1 | **42** | --- | **10.0** | **8.33** |
| | 38 | 03/20/07 | F07-03-030 | **57** | **110** | <5.6 | **69** | <5.6 | **8.7** | <5.6 | <5.6 | **12** | <5.6 | <5.6 | **25** | <5.6 | **37** | --- | **9.80** | **1.53** |
| | | 08/07/07 | F07-08-229 | **26** | **110** | <7.1 | <35 | <7.1 | **8.6** | <7.1 | <7.1 | **16** | <7.1 | <7.1 | **32** | **9.2** | **48** | --- | **10.3** | **1.78** |
| | 69 | 03/20/07 | F07-03-031 | **240** | **400** | <14 | **380** | <14 | **25** | <14 | <14 | **33** | <14 | <14 | **85** | <14 | **118** | --- | **1.28** | **20.5** |
| | | 04/23/07 | F07-04-001 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | ND | --- | **1.32** | **20.4** |
| | | 08/07/07 | F07-08-233 | **54** | **140** | <7.0 | **58** | <7.0 | **10** | <7.0 | <7.0 | **20** | <7.0 | <7.0 | **40** | **12** | **60** | --- | **1.52** | **21.2** |
| | 78 | 03/20/07 | F07-03-032 | **250** | **410** | <29 | **380** | <29 | <29 | <29 | <29 | **29** | <29 | <29 | **88** | <29 | **117** | --- | **0.913** | **20.2** |
| | | 04/23/07 | F07-04-002 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | ND | --- | **1.04** | **20.6** |
| | | 08/07/07 | F07-08-232 | **60** | **180** | **93** | **61** | <7.1 | **10** | <7.1 | **7.4** | **20** | <7.1 | <7.1 | **48** | **8.8** | **75** | --- | **1.44** | **21.1** |
| DTSC CHHSLs - Shallow Soil Gas Human Health Screening Levels - Vapor Intrusion (µg/m$^3$) | | | | | | | | | | | | | | | | | | | | |
| Residential Land Use (µg/m$^3$) | | | | --- | --- | --- | --- | 36.2 | --- | --- | --- | 319,000 | 31.9 | 315,000 | 135,000 | --- | --- | --- | --- | --- |
| Commercial/Industrial Land Use (µg/m$^3$) | | | | --- | --- | --- | --- | 122 | --- | --- | --- | 887,000 | 106 | 879,000 | 378,000 | --- | --- | --- | --- | --- |

Notes:
ft bgs = Feet Below Ground Surface
VOCs = Volatile Organic Compounds
EPA = United States Environmental Protection Agency
µg/m$^3$ = Micrograms per Cubic Meter
% = % by volume
Dup = Duplicate vapor sample
NA = Not analyzed.
< = Analyte not detected at or above laboratory reporting limit
J = Estimated value per data validation memorandum
RS = Vapor monitoring probe re-sampled using helium as a tracer gas.
The detected analytes are summarized on this table. A complete list of analytical results is provided in the laboratory analytical reports in the appendix of the report.
DTSC - Department of Toxic Substances Control
CHHSLs - Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties dated January 2005.
--- indicates screening level not provided in CHHSLs

# Figures




REFERENCE: USGS 7.5 Minute Series Fillmore, CA Quad, Photorevised 1988

N

0 1/2

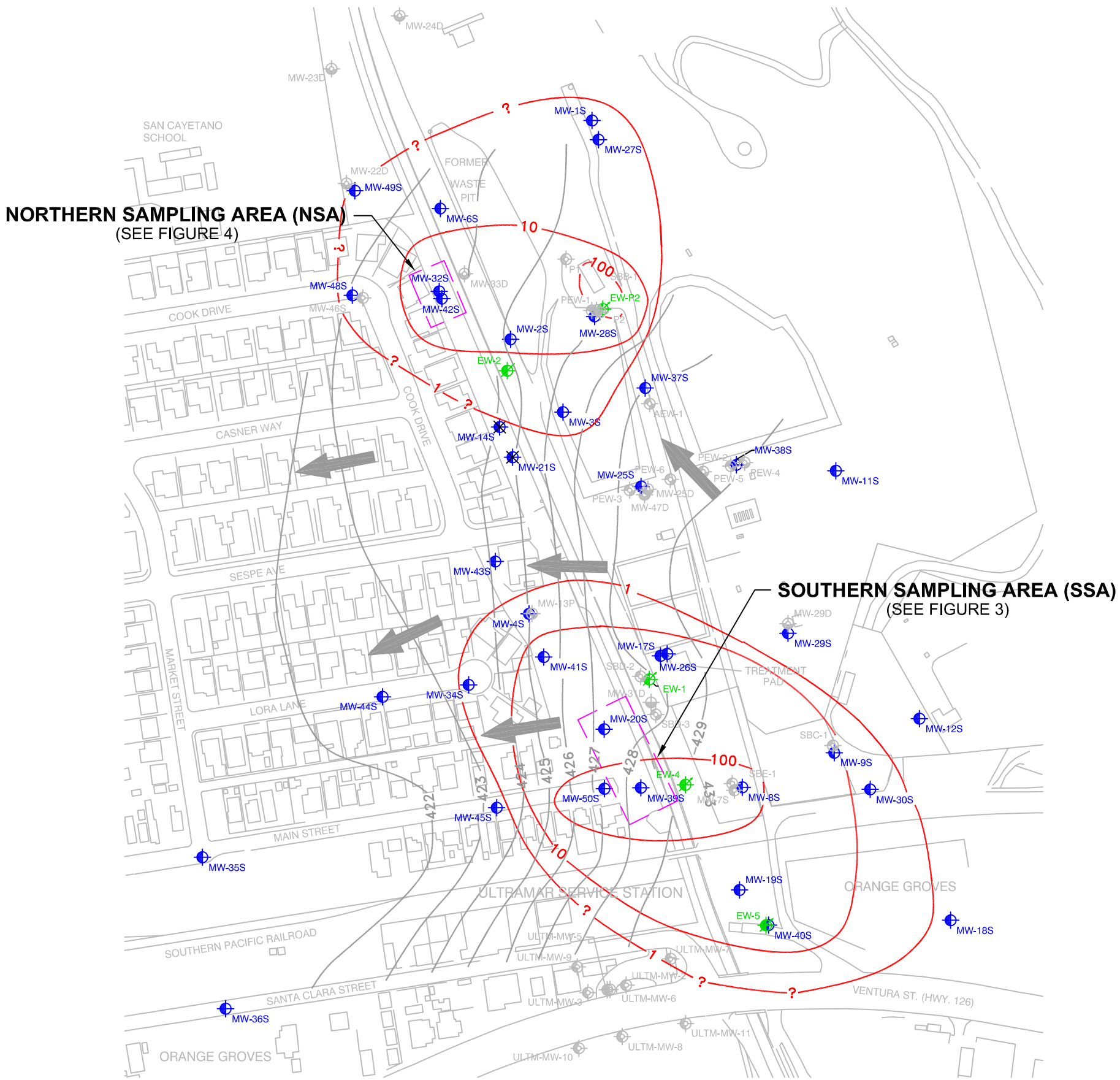
Scale in Miles

## SITE LOCATION MAP

| Project No.: 29869533 | Date: AUGUST 2005 | Project: CHEVRON PCPL (FILLMORE REFINERY) | Figure 1 |
|---|---|---|---|

L:/chevron/fillmore site loc.fh11 8/05

URS




## EXPLANATION:

| | |
|---|---|
| MW-11S | EXISTING AQUIFIER I MONITORING WELL |
| EW-1 | EXISTING AQUIFIER & EXTRACTION/MONITORING WELL |
| PEW-1 | DESTROYED MONITORING WELLS |
| 100 ? | BENZENE ISOCONCENTRATION CONTOUR, DASHED WHERE INFERRED, QUERIED WHERE UNCERTAIN |
| 433 ? | GROUNDWATER ELEVATION CONTOUR DASHED WHERE INFERRED, QUERIED WHERE UNCERTAIN |
| | INVESTIGATION AREAS (APPROXIMATE) |
| | GROUNDWATER FLOW DIRECTION (APPROXIMATE) |

NOTES:
1. GROUNDWATER CONCENTRATION AND ELEVATION DATA - 2nd QUARTER 2007.
2. BENZENE CONCENTRATIONS IN MICROGRAMS PER LITER ( µg/L).
3. GROUNDWATER ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL.

N

0 125 250 500

SCALE: IN FEET

**URS Corporation**

Site Plan With Investigation Areas

| | | |
|---|---|---|
| Proj. No.: 29869787 | | Date: NOVEMBER 2007 |
| Project: CHEVRON PCPL (Fillmore, CA) | | Figure: 2 |
| Drawn by: JS | Checked by: BP | |

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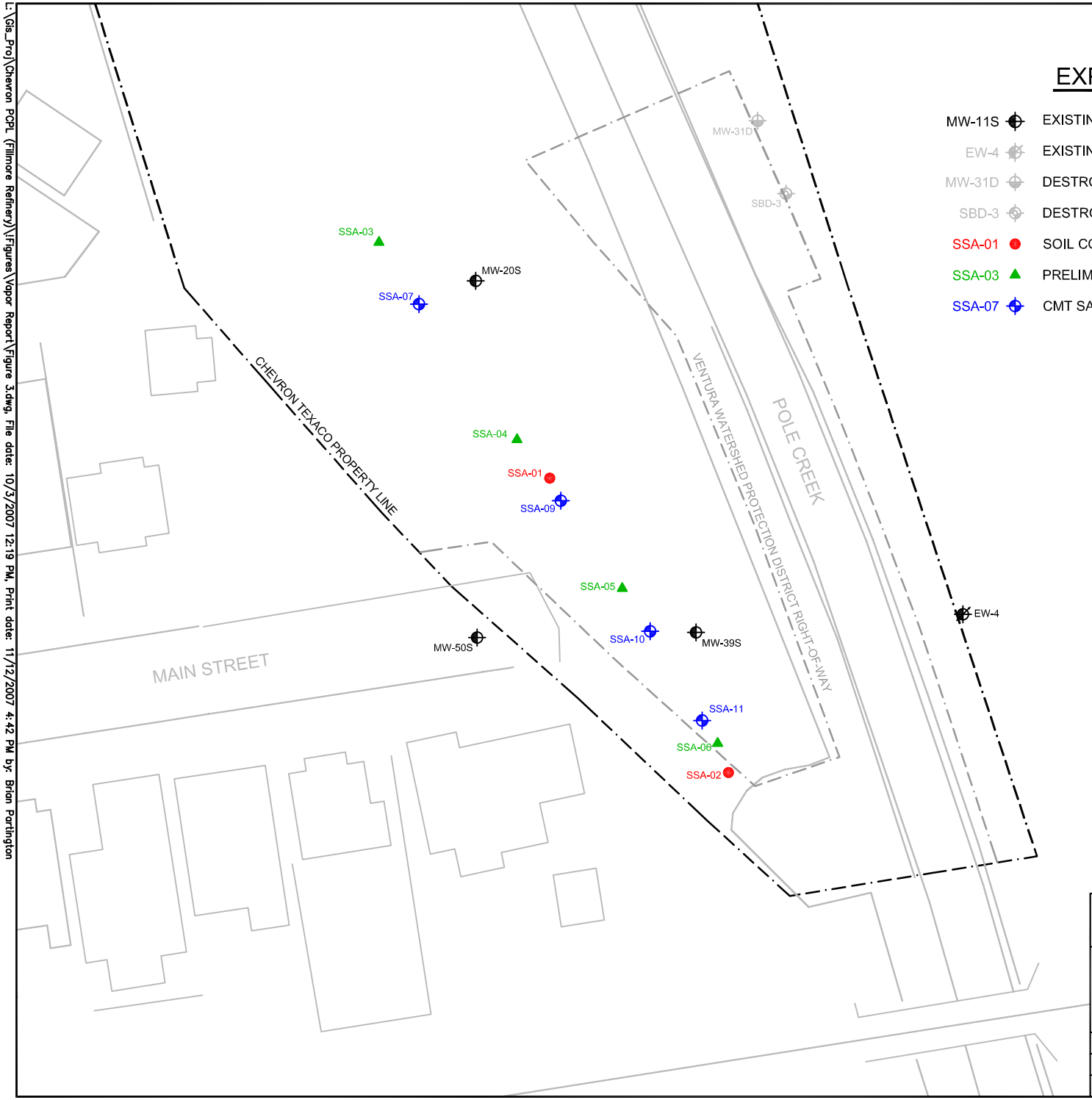


## EXPLANATION

| | |
|---|---|
| MW-11S | EXISTING AQUIFIER I MONITORING WELL |
| EW-4 | EXISTING AQUIFER & EXTRACTION/MONITORING WELL |
| MW-31D | DESTROYED AQUIFER MONITORING WELL |
| SBD-3 | DESTROYED PERCHED MONITORING WELL |
| SSA-01 | SOIL CORING LOCATION (URS, 2006) |
| SSA-03 | PRELIMINARY VAPOR SAMPLING LOCATION (URS, 2006) |
| SSA-07 | CMT SAMPLING SYSTEM LOCATION (URS, 2007) |

**URS Corporation**

Well Installations
Southern Sampling Area (SSA)

| | | | |
|---|---|---|---|
| Proj. No.: 29869787 | | Date: NOVEMBER 2007 | |
| Project: CHEVRON PCPL (Fillmore, CA) | | Figure: 3 | |
| Drawn by: GN | Checked by: JS | | |

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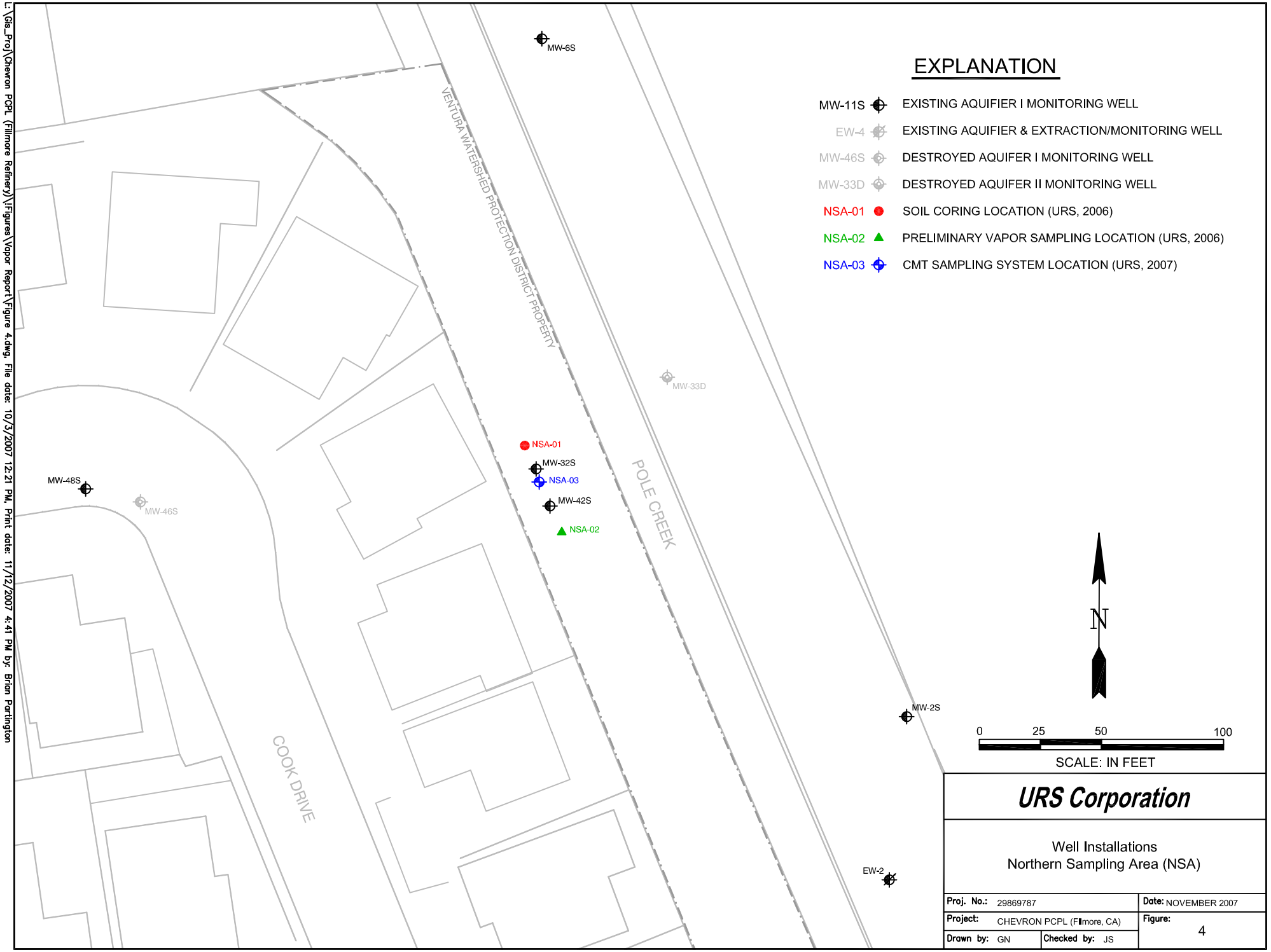


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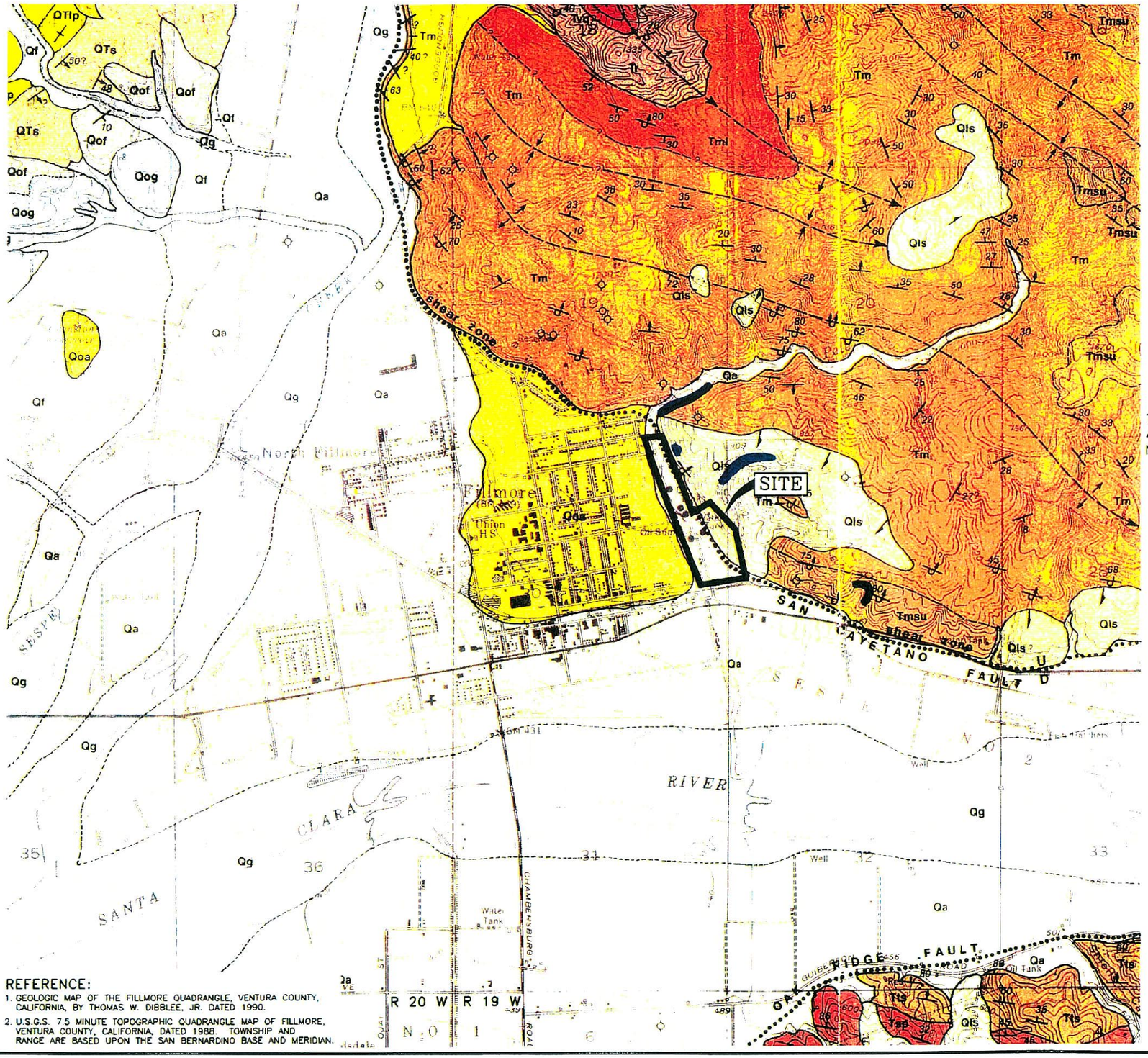



## EXPLANATION

| | | | |
|---|---|---|---|
| SURFICAL SEDIMENTS | Qg / Qf / Qa | Qg.... | Stream channel deposits, mostly gravel and sand |
| | | Qf.... | Alluvial fan boulder–cobble gravel |
| | | Qa.... | Alluvium: unconsolidated floodplain deposits of silt, sand and gravel |
| LANDSLIDE AND TALUS DEBRIS | Qls | Qls... | Landslide and Talus Debris, includes slopewash of sandstone detritus |
| OLDER DISSECTED SURFICIAL SEDIMENTS | Qoa | Qoa... | Youngest, lowest gravel terraces |
| | Qog | Qog... | Intermediate, higher gravel terraces |
| | Qof | Qof... | Oldest, hightest, gravel terraces |
| SAUGUS FORMATION | QTs | QTs... | Weakly consolidated brown alluvial cobble–boulder conglomerate of poorly sorted detritus |
| LOS POSAS SAND | QTlp | QTlp.. | Friable fine grained sandstone and sandy siltstone, commonly with shell fragments |
| MONTEREY FORMATION | Tmsu | Tmsu.. | Upper sandstone, thick bedded arkosic sandstone |
| | Tm | Tm.... | Upper shale unit, Mohnian stage |
| | Tml / Tmss | Tmss.. | Lower sandstone member, similar to Tmsu |
| | | Tml... | Lower shale unit, Luisian to uppermost saucesian stage |
| RINCON SHALE | Tr | Tr.... | Clay shale and siltstone, contains occasional gray dolomitic concretions |
| TOPANGA SANDSTONE | Tts | Tts... | Semi–friable, vaguely bedded arkosic sandstone; exposed south of Oak Ridge Fault |
| VAQUEROS SANDSTONE | Tvq | Tvq... | Fine grained sandstone, locally calcareous |
| SESPE FORMATION | Tsp | Tsp... | In northern area, mostly hard bedded sandstone, lowest part is thick bedded hard sandstone and conglomerate with pebbles of granitic rocks, andesitic porphyries and quartzite |

Naturally occurring Monterey Formation oil and tar sands in outcrop near the site location

0 2000 4000 FEET
APPROXIMATE SCALE

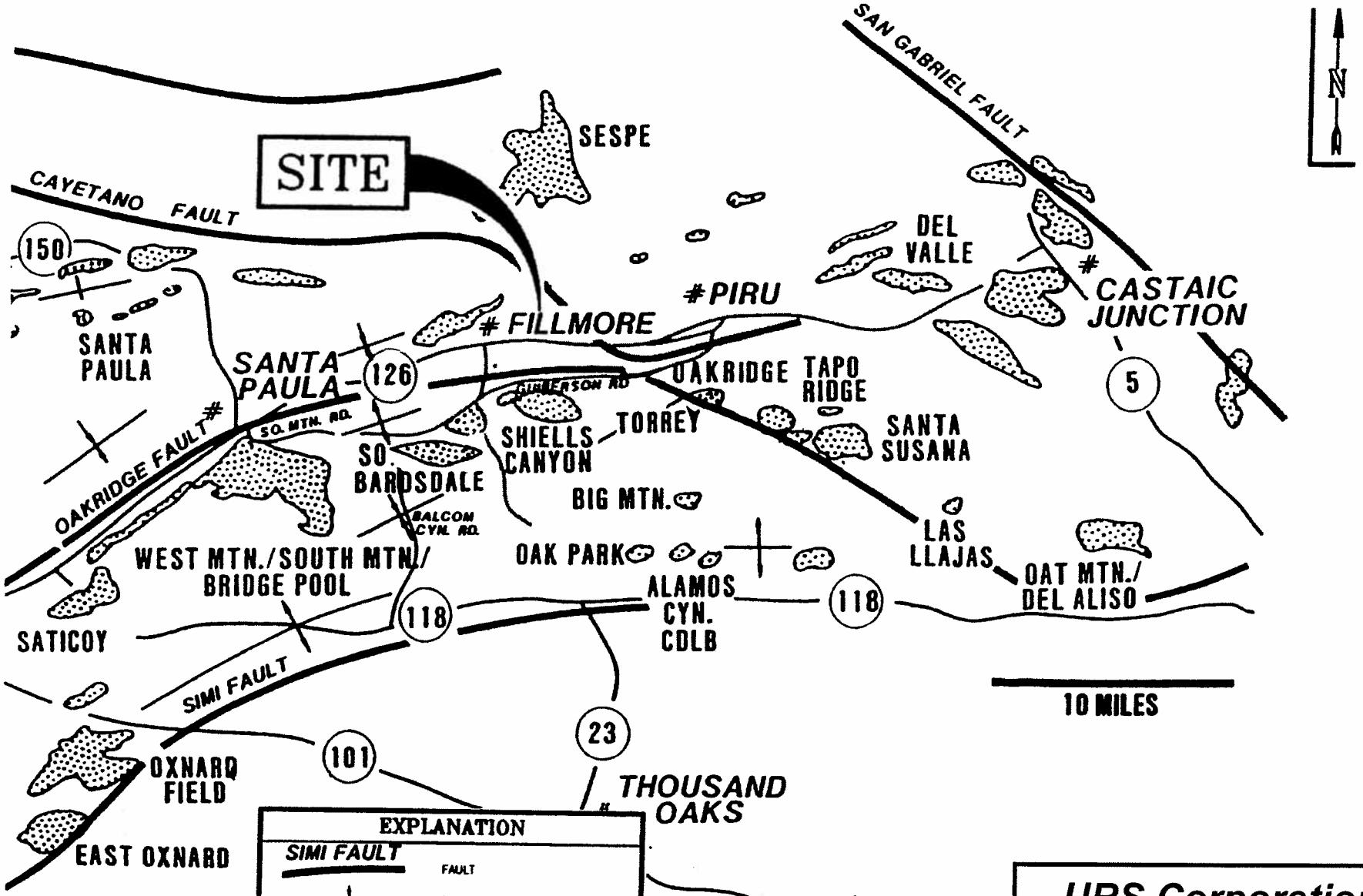
**REFERENCE:**

1. GEOLOGIC MAP OF THE FILLMORE QUADRANGLE, VENTURA COUNTY, CALIFORNIA, BY THOMAS W. DIBBLEE, JR. DATED 1990.
2. U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP OF FILLMORE, VENTURA COUNTY, CALIFORNIA, DATED 1988. TOWNSHIP AND RANGE ARE BASED UPON THE SAN BERNARDINO BASE AND MERIDIAN.

**URS Corporation**

Regional Geology

| | | |
|---|---|---|
| Project No. 29869787 | | Date: JULY 2007 |
| Project: Chevron PCPL (Fillmore, Ca) | | Figure: 5 |
| Drawn by: BP | Checked by: JS | |



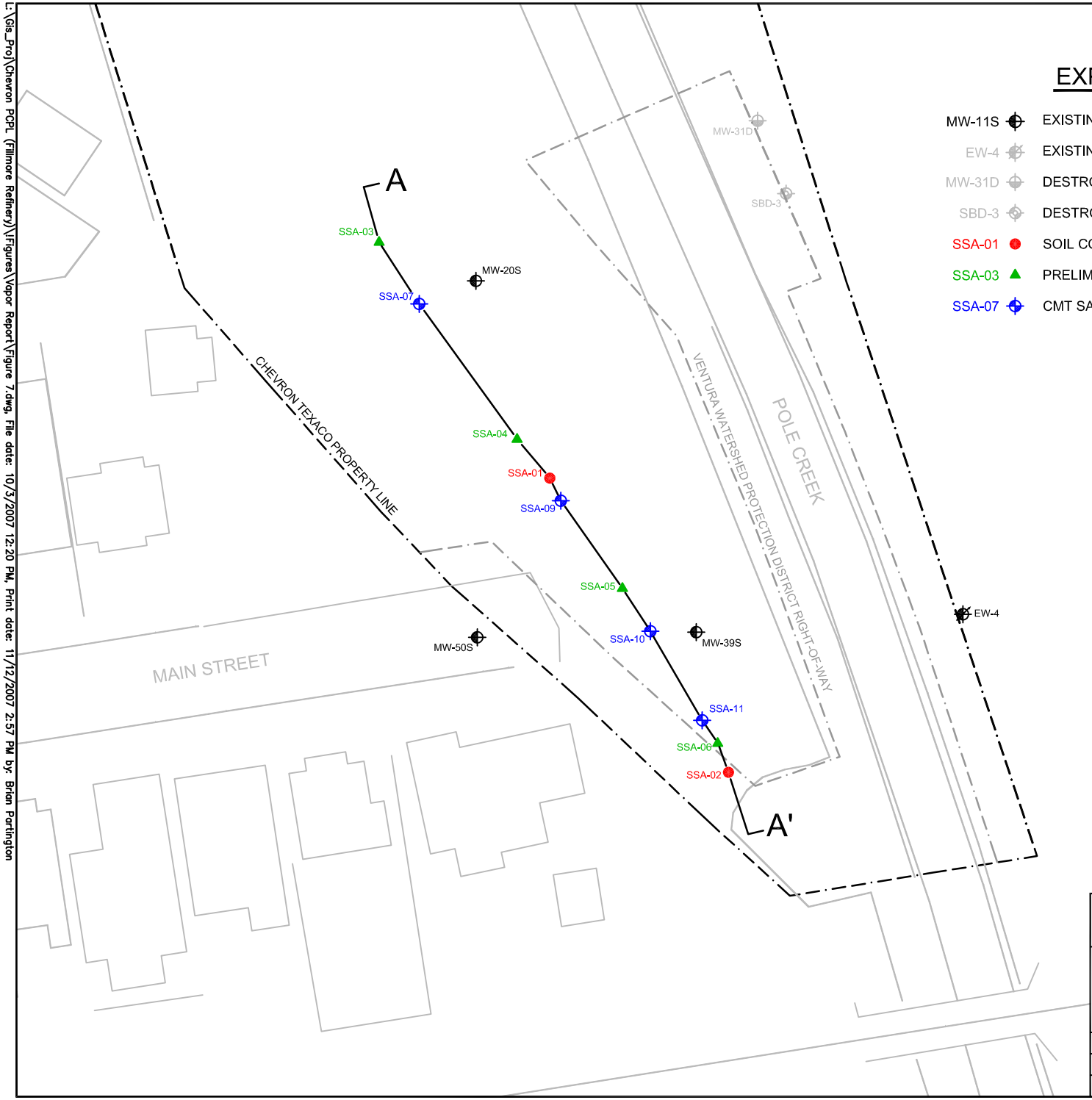


**REFERENCE:**
SYLVESTER, A.G. AND BROWN, G.C., 1988, SANTA BARBARA AND VENTURA BASINS – TECTONICS, STRUCTURE, SEDIMENTATION, OIL FIELDS ALONG AN EAST–WEST TRANSECT. COAST GEOLOGICAL SOCIETY FIELD GUIDE NO. 64, 166 P


**URS Corporation**

Eastern Ventura Basin Oil Fields

| | | |
|---|---|---|
| Project No. 29669787 | | Date: JULY 2007 |
| Project: Chevron PCPL (Fillmore, Ca) | | Figure: 6 |
| Drawn by: BP | Checked by: JS | |




## EXPLANATION

| | |
|---|---|
| MW-11S | EXISTING AQUIFIER I MONITORING WELL |
| EW-4 | EXISTING AQUIFIER & EXTRACTION/MONITORING WELL |
| MW-31D | DESTROYED AQUIFER MONITORING WELL |
| SBD-3 | DESTROYED PERCHED MONITORING WELL |
| SSA-01 | SOIL CORING LOCATION (URS, 2006) |
| SSA-03 | PRELIMINARY VAPOR SAMPLING LOCATION (URS, 2006) |
| SSA-07 | CMT SAMPLING SYSTEM LOCATION (URS, 2007) |

N

0 25 50 100

SCALE: IN FEET

**URS Corporation**

Geologic Cross-Section Line Location for Southern Sampling Area (SSA)

| | | | |
|---|---|---|---|
| Proj. No.: 29869787 | | Date: NOVEMBER 2007 | |
| Project: CHEVRON PCPL (Fillmore, CA) | | Figure: 7 | |
| Drawn by: GN | Checked by: JS | | |

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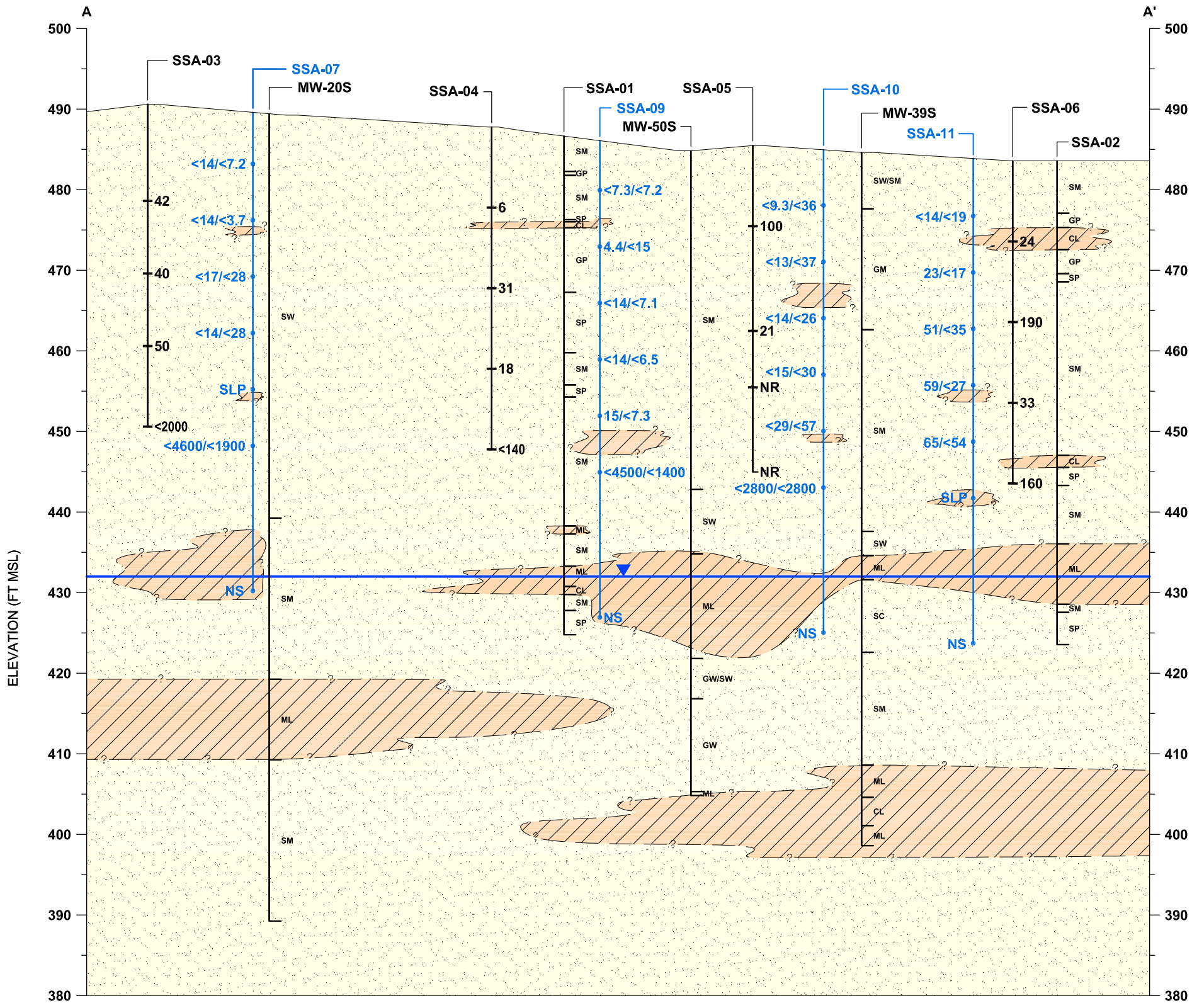


## EXPLANATION:

GROUNDWATER LEVEL

**SSA-03**
5 — PRELIMINARY VAPOR MONITORING LOCATIONS DIRECT PUSH BENZENE VAPOR CONCENTRATION MICROGRAMS PER CUBIC METER

**SSA-01**
SOIL BORING ILLUSTRATING TOTAL BORING DEPTH. GEOLOGIC ABBREVIATIONS AS FOLLOWS:

| | |
|---|---|
| GP | POORLY GRADED GRAVEL |
| GW | WELL GRADED GRAVEL |
| SP | POORLY GRADED SAND |
| SW | WELL GRADED SAND |
| SM | SILTY SAND |
| ML | SILT |
| CL | CLAY |

**SSA-07**
<14/<19 — CMT PORT DEPTH LOCATIONS BENZENE VAPOR CONCENTRATIONS SHOWN IN MICROGRAMS PER CUBIC METER (MARCH 2007 / AUGUST 2007)
NS

COARSE-GRAINED SOIL (GP, GW, SP, SW, SM)

FINE-GRAINED SOIL (ML, CL)

FT MSL = FEET ABOVE MEAN SEA LEVEL
NR = NO RECOVERY
SLP = SUSPECTED LEAKY PROBE
NS = NOT SAMPLED

NOTES:
1. PROPOSED CMT LOCATION SSA-08 NOT INSTALLED BASED PRELIMINARY VAPOR DATA OBTAINED DURING DIRECT PUSH INVESTIGATION.
2. PRELIMINARY VAPOR ANALYTICAL RESULTS (SSA-03, SSA-04, SSA-05, AND SSA-06) WERE USED TO DETERMINE THE PLACEMENT OF CMT WELL (SSA-07, SSA-09, SSA-10, AND SSA-11).

VERTICAL SCALE, ft: 15, 7.5, 0
APPROXIMATE HORIZONTAL SCALE, ft: 15, 30

**URS Corporation**

GEOLOGIC CROSS SECTION A-A' FOR SOUTHERN SAMPLING AREA (SSA)

| | | | |
|---|---|---|---|
| Proj. No.: 29869787 | | Date: | NOVEMBER 2007 |
| Project: CHEVRON PCPL | | CAD ID.: | Prelim X-Section |
| Drawn by: GN | Checked by: JS | Figure: | 8 |

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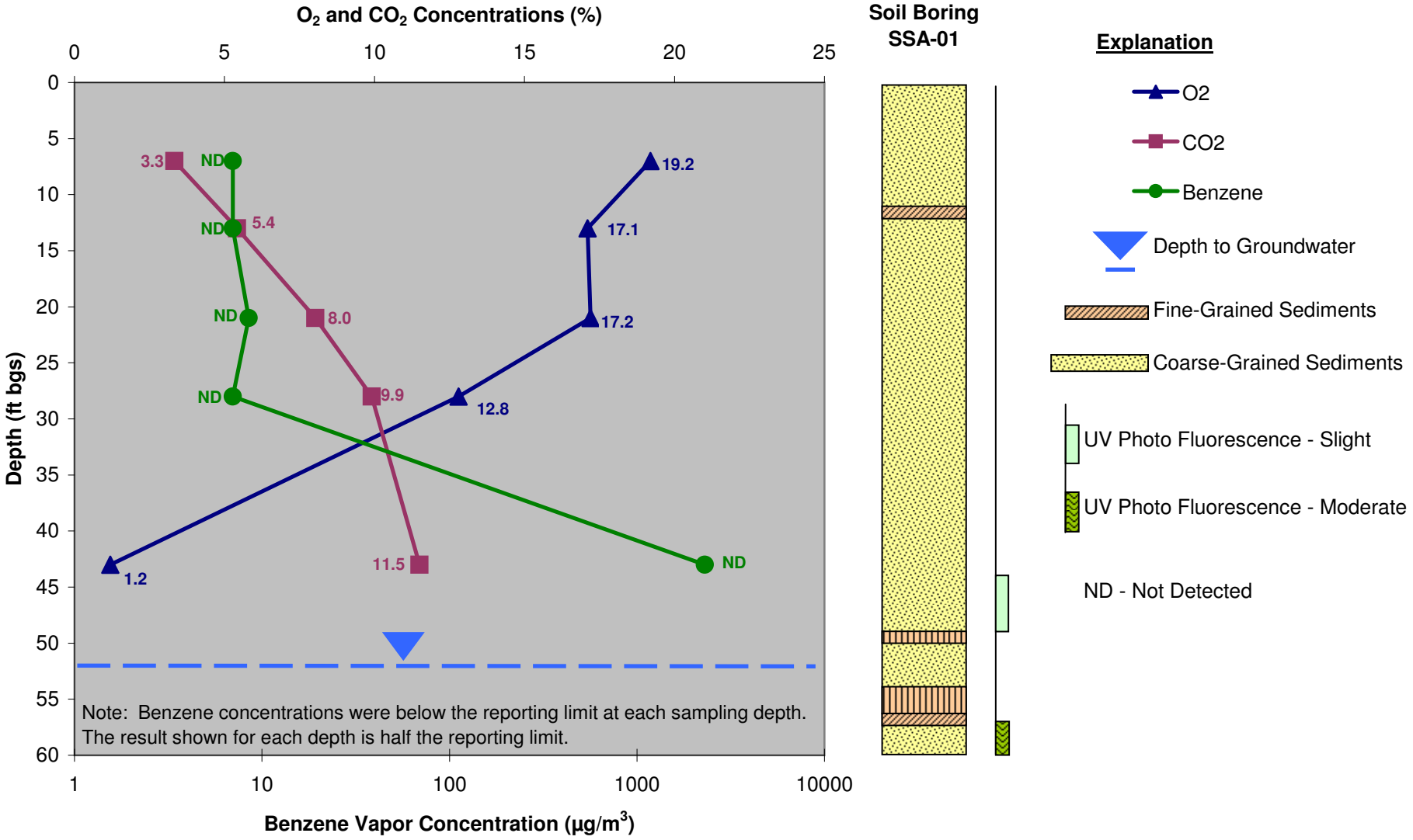
**FIGURE 9**

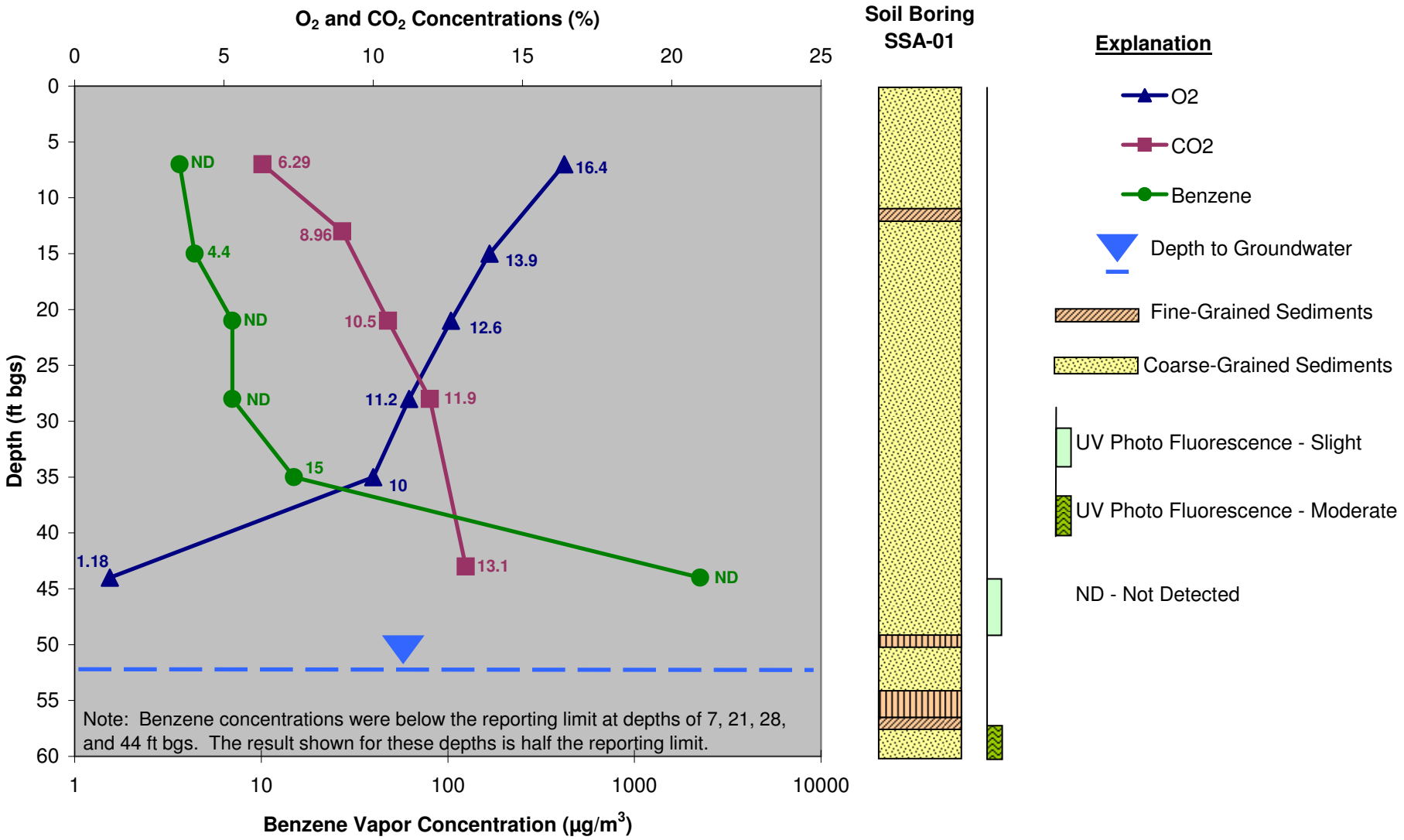
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-07 (March 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd1 (final - v2) Graph SSA-07

**FIGURE 10**

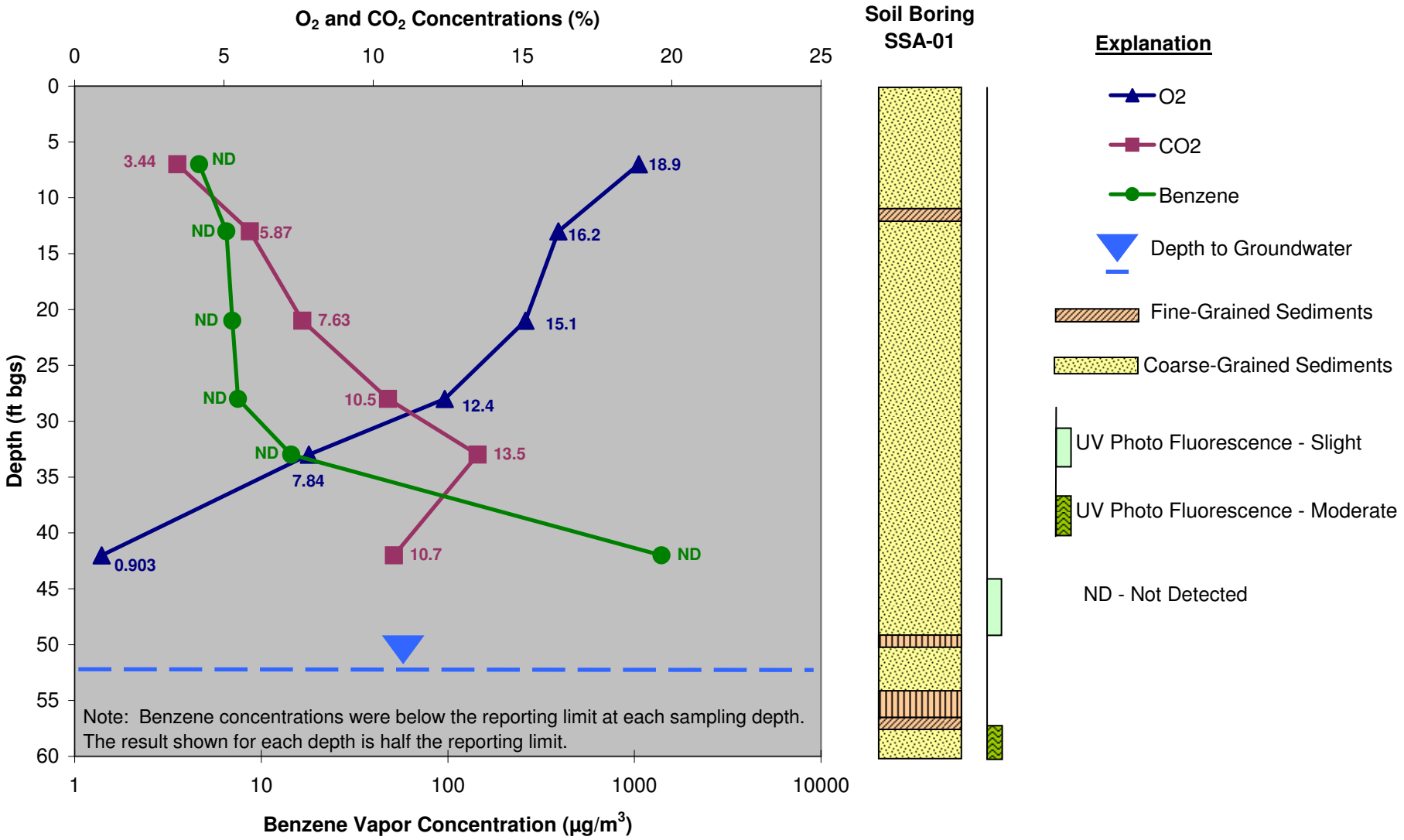
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-09 (March 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd1 (final - v2) Graph SSA-09

**FIGURE 11**

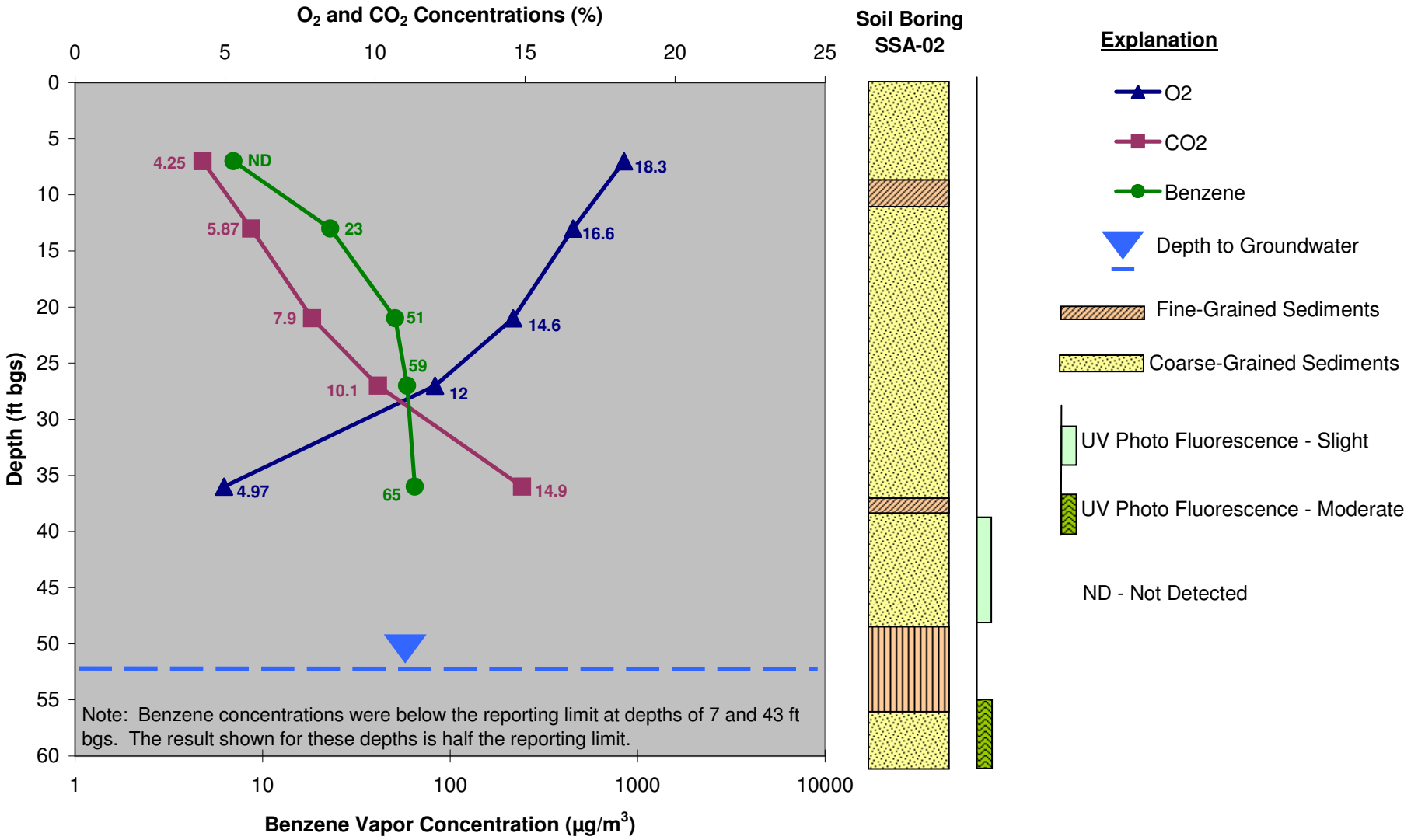
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-10 (March 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd1 (final - v2) Graph SSA-10

**FIGURE 12**

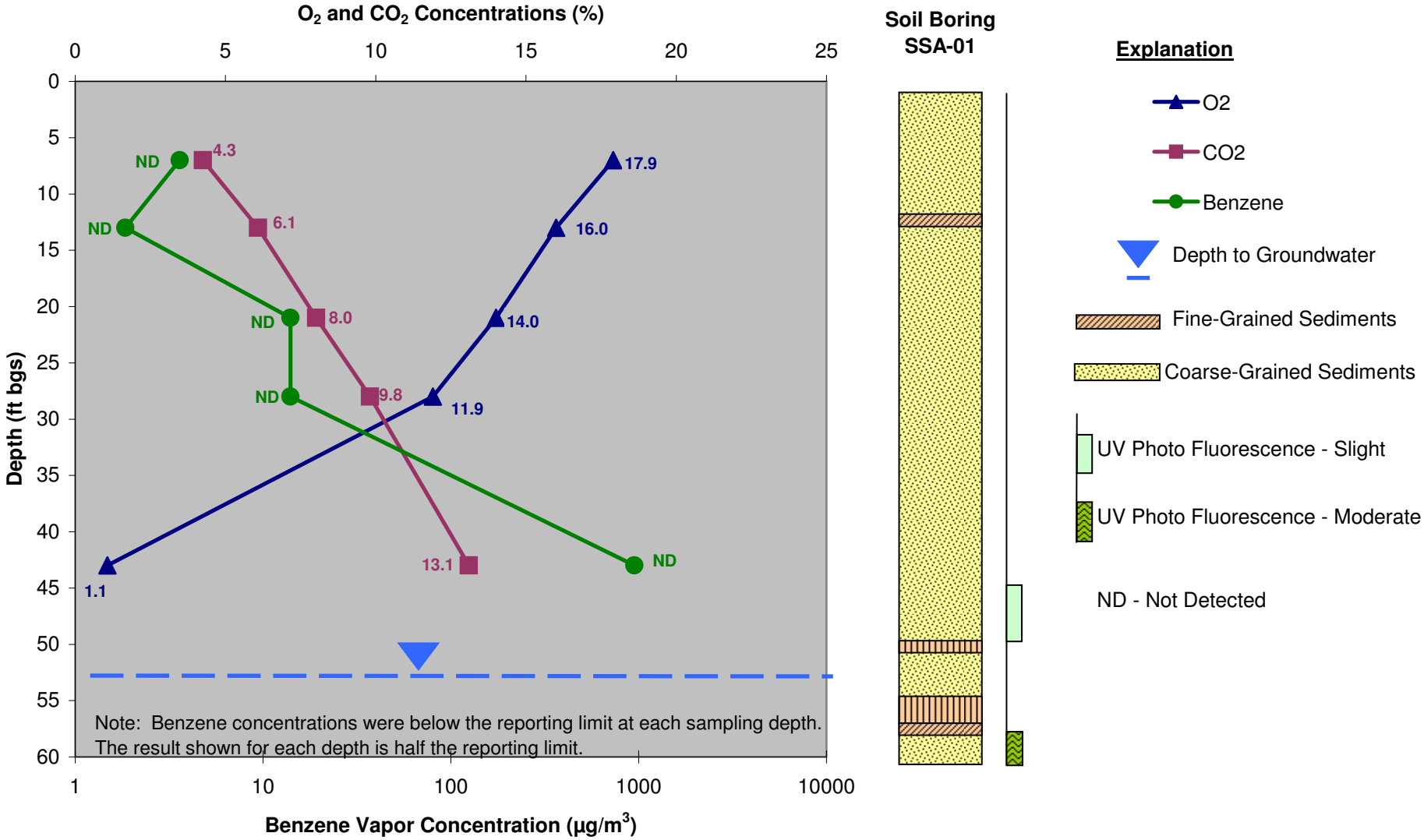
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-11 (March 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd1 (final - v2) Graph SSA-11

**FIGURE 13**

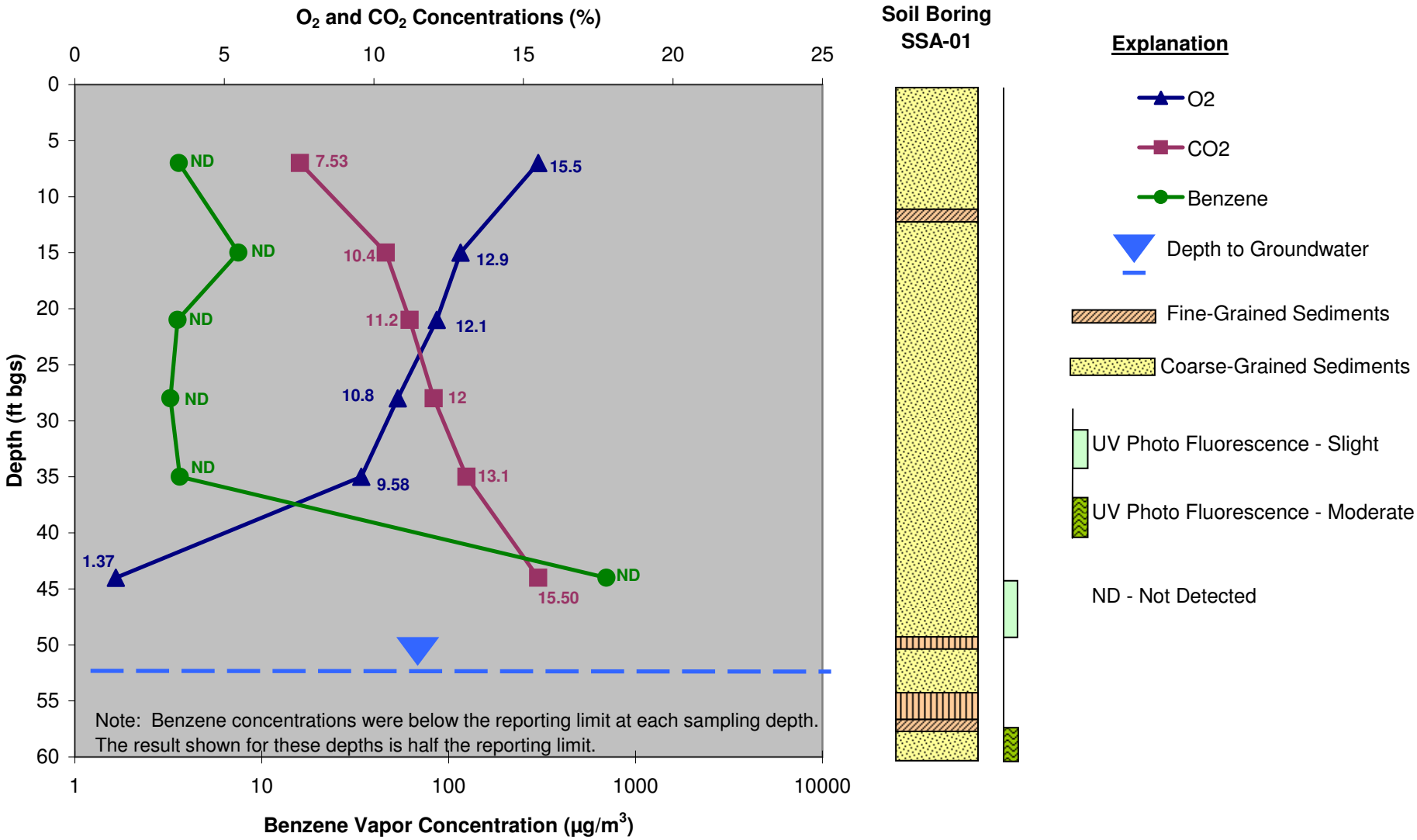
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-07 (August 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd2 (final - v2) Graph SSA-07

**FIGURE 14**

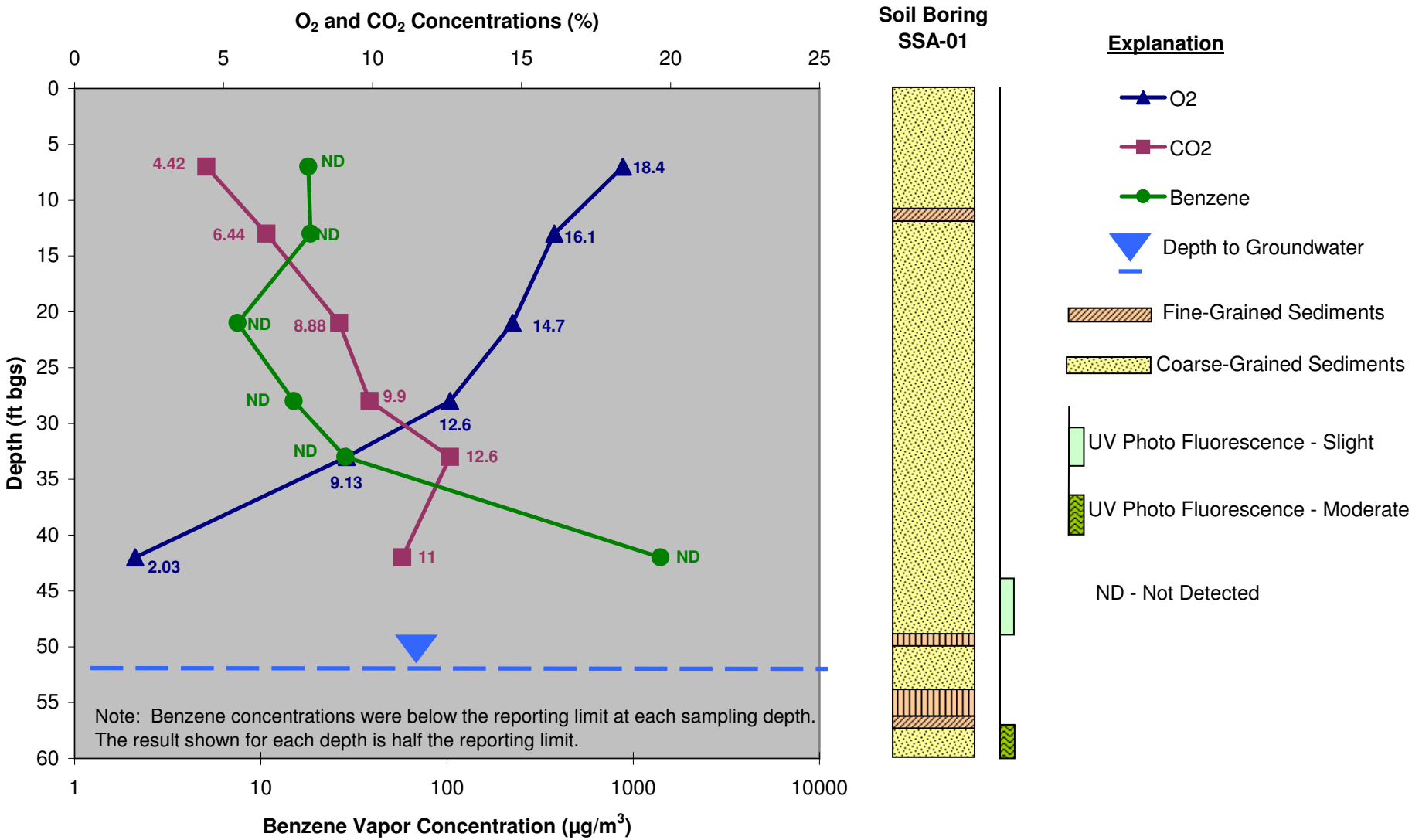
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-09 (August 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd2 (final - v2) Graph SSA-09

**FIGURE 15**

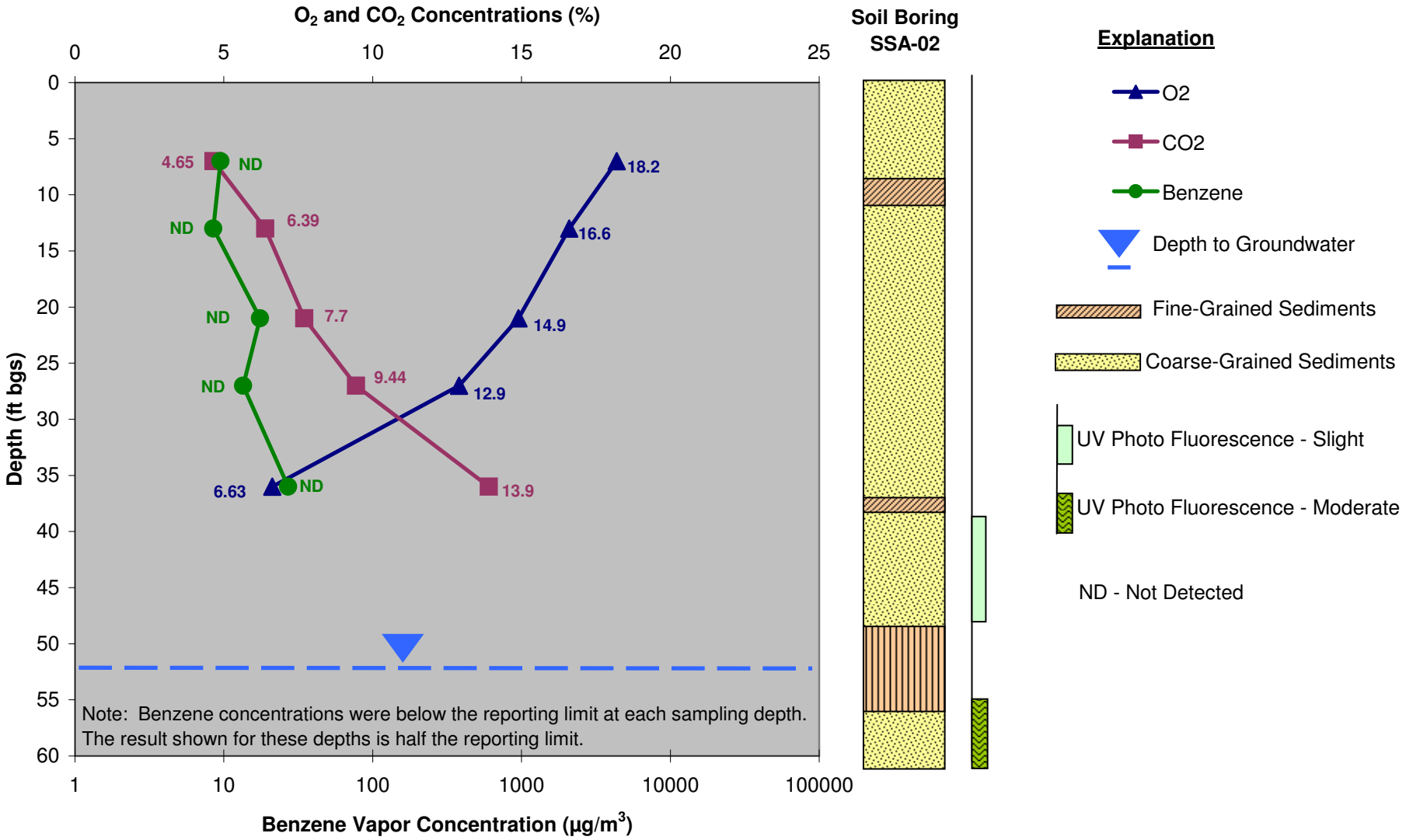
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-10 (August 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd2 (final - v2) Graph SSA-10

**FIGURE 16**

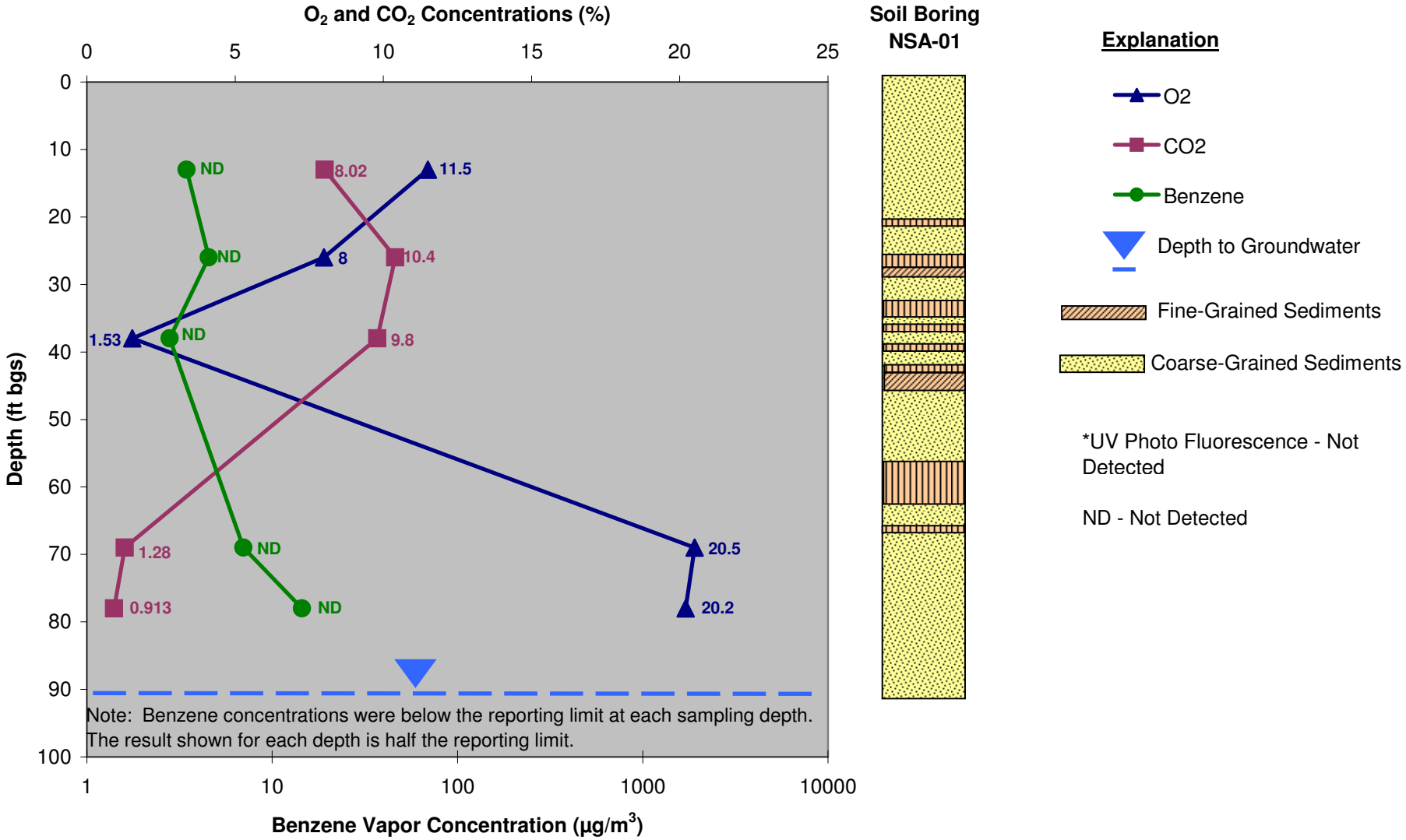
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location SSA-11 (August 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd2 (final - v2) Graph SSA-11

**FIGURE 17**

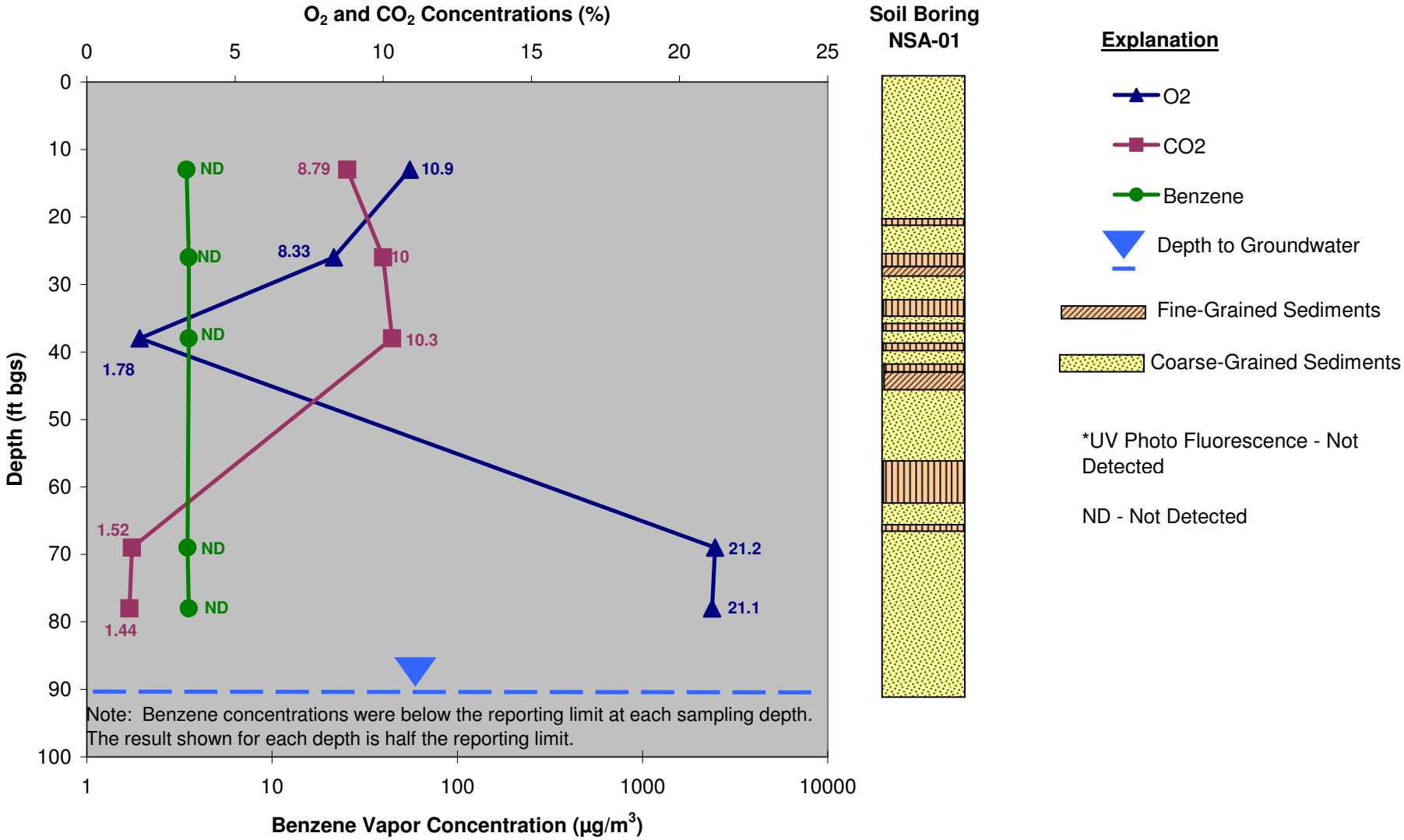
Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location NSA-03 (March 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd1 (final - v2) Graph NSA-03

**FIGURE 18**

Depth Profile of Benzene, O2, and Co2
CMT Vapor Probe Location NSA-03 (August 2007)
Chevron PCPL - Fillmore, California




T:\2004\Chevron PCPL (Fillmore Refinery)\Deliverables (Finals in El Seg)\Reports\Vapor Report\Depth Profile - Benzene Rd2 (final - v2) Graph NSA-03

# Appendix A

# Agency Communications

OPTIONAL FORM 99 (7-90)

**FAX TRANSMITTAL** # of pages ▶ 10

| | |
|---|---|
| To Leslie Klinchuch | From Holly Hadlock, EP |
| Dept./Agency Chevron | Phone # 415-972-3171 |
| Fax # (661) 654-7431 | Fax # |

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

UNITED STATES ENVIRONM
REGI
75 Hawtho
San Francisco, CA 94105-3901

August 28, 2006

MEMORANDUM

SUBJECT: Revised Sampling and Analysis Plan for Natural Attenuation Characteristics and Soil Vapor Characteristics Above Dissolved-Phase Benzene Plumes, Pacific Coast Pipeline (PCPL) Superfund Site, Filmore, California (QA Office Document Control Number [DCN] J6CA0005SV3)

FROM: Mathew Plate, Environmental Scientist
Quality Assurance Office, MTS-3

THROUGH: Eugenia McNaughton, Manager
Quality Assurance Office, MTS-3

TO: Holly Hadlock, Remedial Project Manager
Site Clean Up Section 1, SFD-7-1

The above-mentioned Response to Comments on the Sampling and Analysis Plan (SAP), prepared for Chevron Environmental Management Company by England Geosystem, Inc., dated July 5, 2006, was reviewed. The review was based on guidance provided in the following USEPA documents, a July 5, 2006 Response to Comments, and November 2, 2005 and July 14, 2006 memoranda,:

- *Sampling and Analysis Plan (SAP) Guidance and Template (Version 2)* (R9QA/002.1, April 2000)
- *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA QA/R-5, March 2001)
- *Guidance for the Data Quality Objectives Process* (EPA QA/G-4, August 2000)
- *User's Guide for Evaluating Subsurface Vapor Intrusion Into Buildings* (USEPA Office of Emergency and Remedial Response, June 19, 2003)
- *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (USEPA OSWER, November 2002)
- *Collecting and Interpreting Soil Gas Samples from the Vadose Zone: A Practical Strategy for Assessing the Subsurface-Vapor-to-Indoor-Air Migration Pathway at Petroleum Hydrocarbon Sites* (American Petroleum Institute, October 2005)
- *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air, Interim Final*, (California Department of Toxic Substances Control, December 15, 2004/February 7, 2005)

The previous concerns have been addressed and this plan is approved. Please note one outstanding clarification in Major Concern 1 regarding precision quality objectives. Comments on the responses to the previous concerns are given below, with their corresponding dates, in bold faced text. Final comments follow in plain faced text.

Holly Hadlock
August 28, 2006

**Major Concerns**

11/2/05 1. **[Section 1.4, Purpose; Section 3.0, Sampling Rationale; Section 6.0, Data Quality Objectives; Section 8.0, Data Evaluation] The sampling objectives and site decisions contained in these four sections do not reflect a clear approach. These elements must be made consistent and clear. To do this it is recommended that the main objectives, decisions, data quantity and quality requirements, and decision rules with quantitative action levels be combined into one section using the EPA seven step data quality objectives process (DQO) or a similar approach. For example Section 6.0 notes a DTSC guidance for an attenuation factor to be used for soil vapor decision making, however Section 8.0 sites another guidance when discussing data interpretation which cites "indoor air target levels" without assigning an attenuation factor. It is also noted in Section 8.0 that the data will be used for modeling concentrations, however, if certain concentrations (well above screening levels) are found there should be a contingency for actions in addition to modeling. Also note, it is recommended that actions or decisions be provided in the form of ". . . if . . . then . . ." statements where possible.**

7/14/06 **The data quality objectives process presented in the response to comments helps to clarify the process that will be used to determine the potential for vapor intrusion. The approach of using a screening value to determine if modeling should be conducted is appropriate. However, the plan does not discuss how the model will be applied to this site. Information that should be considered in application of the model in addition to subsurface characteristics include: biodegradation including how depleted oxygen concentrations below slabs may decrease degradation rates, lateral changes in concentrations, representativeness of samples, building construction, and recent studies on the relationships between vapor intrusion and deeper soil vapor concentrations. As such, if modeling is required it is recommended that the model(s) proposed and inputs to the model, and proposed model input sensitivity testing be submitted to EPA and DTSC for review prior to modeling. The previous comment on concentrations well above the screening levels has not been addressed. While high concentrations of VOCs are not expected in shallow soil gas, contingencies should be developed in the case that they are encountered. Also it was noted that Section 1 of the DQOs noted that "our working hypothesis assumes an acceptably low vapor intrusion risk to buildings." While the reviewer agrees that the probability of significant vapor intrusion is low, it is**

**recommended that this sentence be revised or removed because it contradicts the scientific method as applied by EPA (in standard EPA environmental hypothesis testing we assume contamination is present and develop a data set that demonstrates that it is not present).**

This concern has been partially addressed. Outstanding concerns on modeling have been addressed and the plan has been modified to note that "prior to modeling, we would confer with EPA on appropriate application of the model." The plan also notes 100 times the acute exposure concentration for benzene in ambient air as an additional action level for soil vapor. However, the quality objectives were not translated into a precision criterion for field duplicates in either Section 6.1.1 or Section 7.2.1. In absence of a precision criterion, 35% relative percent difference should be used.

11/2/05 2. **[Section 3.1, Sampling Location and Depth; Section 8.0, Data Evaluation] The sampling design proposed evaluates contamination and degradation over the highest area of the groundwater plume. This approach does not seem to comprehensively answer the question of possible vapor intrusion from the site. In addition to the sampling proposed for the groundwater "hot-spots," the plan should consider; soil vapor migration from areas with residual soil contamination; soil conditions under structures where there is the potential for anaerobic conditions; and subsurface preferential pathways. If these factors have been evaluated they should be presented as part of a logical decision making process (See Major Concern 1).**

7/14/06 **See the response to Major Concern 1.**

This concern has been addressed by using a conservative screening approach for site decision making.

11/2/05 3. **[Section 6.0, Data Quality Objectives; Section 7.0, Quality Assurance/Quality Control] These sections note quality control (QC) samples and procedures that will be put into place. They should also include the QC criteria that will be used to evaluate these for acceptance. Where these criteria are for QC originating in that laboratory, the attached laboratory SOPs can be summarized or referenced.**

7/14/06 **The response notes that SOPs will be provided. These SOPs will be reviewed when they are received.**

SOPs have been provided for most of the methods, including the most critical analysis, benzene and other volatiles by method TO-15. It was noted that the holding times in the laboratory SOPs and those reported in Table 3-3 are different for the two canister analysis methods. In the case of TO-15 the plan indicates a 72 hour holding time should be used, based on State guidelines. However, the laboratory SOP notes a 30 day holding time. Because to the significant difference in these two holding times, if 72 hours is the holding time that will be used for this project the laboratory should be notified.

Concerns

11/2/05 1. **[Section 4.7, Vapor Sampling] Based on DTSC guidance the plan proposes to conduct a purge volume test. Performing this will not necessarily ensure that representative soil vapor samples are collected. Excessive purging may result in vapors being collected that are not representative of the zone being sampled. Rather than expending resources for this unnecessary test, purging should be set at 2 -3 purge volumes consistently throughout the sampling event.**

7/14/06 **The response notes that this is not consistent with the DTSC guidance document cited. The DTSC guidelines apply to soil screening. If the data will be used for modeling, consistent purge volumes is preferred. The use of a more conservative screening attenuation factor of 100 should mitigate any concerns DTSC has about the purging procedures.**

This concern has been addressed. Three purge volumes will be used.

11/2/05 2. **[Section 4.7, Vapor Sampling] This section notes the sampling rate for canister sampling of soil vapor. This section should also include the acceptable final canister pressures based on laboratory requirements and desired sample volume. It is also recommended that the final canister pressure be slightly negative, this will enable the laboratory and data reviewers to determine if there was a leak during canister shipping.**

7/14/06 **The response addresses this comment. However, a final canister pressure should be specified.**

A final canister pressure range is indicated in Section 4.7.

11/2/05 3. **[Section 4.9, Field Screening] This section notes that "field screening may also assist field personnel in selecting soil**

**samples for possible chemical analysis." This should be clarified with specific criteria for selection of samples for chemical analysis. Information about all methods proposed for soil sampling and analysis should be included as a part of this plan.**

**7/14/06** **This comment was addressed in the response to a related DTSC comment.**

This concern was addressed by the response to comments.

**11/2/05** **4.** **[Section 6.0, Data Quality Objectives] This section notes that a conservative screening attenuation factor for soil vapor detection limit requirements is 500, based on DTSC guidance. EPA disagrees that 500 times is conservative, at some sites attenuation between soil vapor and indoor air as low as 10 fold have been observed. Generally, EPA accepts the use of a 100 fold analytical attenuation factor for soil vapor data.**

**7/14/06** **This comment is addressed in the response. A 100-fold screening level was agreed to.**

As noted a 100-fold screening level is included in this plan.

**11/2/05** **5.** **[Section 6.2, Data Review and Validation] The validation approach noted in this section is a cursory review. If these data will be used for risk assessment, it is recommended that some level of full raw data validation be conducted.**

**7/14/06** **This comment is addressed. Ten percent full validation was agreed to in the response.**

Ten percent validation has been included in Section 6.2.

**11/2/05** **6.** **[Appendix B, Laboratory Standard Operating Procedures, TO-15] The Standard Operating Procedure for Method TO-15 does not include most of its pages. These pages contain laboratory method quality control criteria. The full procedure should be provided for review. Alternatively a data quality indicator (DQI) table could be included with the plan (see the EPA Region 9 QA website for DQI tables).**

**7/14/06** **The response notes a full SOP will be provided. The SOP will be reviewed when received.**

As noted in Major Concern 3, this SOP has been received.

| | | |
|---|---|---|
| **11/2/05** | 7. | **[Appendix B, Laboratory Standard Operating Procedures, Summa Canister Instructions] The Summa canister instructions provided in this appendix are not specifically written for soil vapor sampling. Because these procedures could be misleading it is recommended that they be removed from the plan.** |
| **7/14/06** | | **A summary procedure for vapor sample collection was included in this response. This procedure should also include the recommended final pressure, sampling flow rate and/or projected time for sample collection, and corrective actions to be taken if there are problems with the collection process.**<br><br>Collection procedures have been noted in the response to comments and in Section 4.7 of this plan. |

Questions or comments regarding this review should be referred to me at (415) 972-3799.

# Appendix B

# Permits

# County of Ventura
# WELL PERMIT
800 South Victoria Avenue; Ventura, CA 93009

| | Property Owner | Driller | Registered Inspector |
|---|---|---|---|
| Name | Chevron EMC | Water Development Corp. | Brian Partington |
| Address | 9525 Camino Media<br>Bakersfield, CA 93311 | 5566 Arrow Highway<br>Montclair, CA 91763 | 2020 E. First St., #400<br>Santa Ana, CA 92705 |
| Telephone | (661) 654-7269 | (530) 662-2829 | (714) 835-6886 |

| | | | | | |
|---|---|---|---|---|---|
| Type of Work | Monitoring Well – New (5)<br>Engineering Test Hole (2) | Sealing Zone | 1 | Main Use | Monitoring |
| SWN (Partial) | 04N19W30H<br>04N19W30J | ID | NA | APN | 053-0-030-230 |
| Fee | $440.00 | Receipt No. | 6459 | Prep by: | Barbara Council |

**Conditions**

1. Permit issue and expiration dates are as follows:

   **Issue Date:** 09/27/06
   **Expiration Date:** 03/27/07

**The Contractor shall keep a copy of this approved permit at the work site.**

2. Property Owner, Driller ("Contractor") and Registered Inspector shall comply with all provisions of Ventura County Well Ordinance No. 4184, and all applicable State of California and local regulations pertaining to well construction, repair, modification and destruction.

3. Work shall be performed by a licensed water well contractor (C-57), who must also be registered with the Water Resources Division ("Division").

4. All work shall be inspected by a licensed Civil Engineer, Registered Geologist or Certified Engineering Geologist, who must also be registered with the Water Resources Division ("Division").

5. Contractor shall retain all drilling fluids and groundwater discharges within the drilling site, unless an NPDES permit has been obtained from the California Regional Water Quality Control Board, Los Angeles Region. The NPDES permit shall be obtained prior to drilling operations.

6. Sealing Requirements (Monitoring Wells):

   a. Bentonite clay chips, neat cement or cement grout annular sealing material shall be placed **from the top of the perforations to 2 feet below ground surface.**

Bentonite chips shall be hydrated while placed and shall be placed by means of a grout pipe positioned within 2 feet of the base of the sealing zone. If the sealing depth is 25 feet or less, bentonite chips may be placed by free-fall method.

All cement sealing material shall be placed by means of a grout pipe positioned within 2 feet of the base of the sealing zone. For Sealing Zones 1 and 2, if the standing water level in the casing is below the base of the sealing zone and the sealing depth is 25 feet or less, a grout pipe will not be necessary.

   **b.** Diameter of the well bore shall be a minimum of 4 inches larger than the outside diameter of the casing for the full depth of seal.

   **c.** Neat cement or cement grout annular sealing material shall be placed **from a depth of 2 feet to ground surface.**

7. Borehole Destruction (Engineering Test Holes):

# County of Ventura
## WELL PERMIT
800 South Victoria Avenue; Ventura, CA 93009

a. Engineering test hole(s) shall be destroyed immediately upon completion of testing. Destruction method shall consist of the following:

Bentonite clay chips, neat cement or cement grout shall be placed from the base of the borehole to a depth of 5 feet below ground surface.

Bentonite chips shall be hydrated while placed and shall be placed by means of a grout pipe positioned within 2 feet of the base of the sealing zone. If the total borehole depth is 25 feet or less, bentonite chips may be placed by free-fall method.

All cement sealing material shall be placed by means of a grout pipe positioned within 2 feet of the base of the borehole. If there is no standing water in the borehole and the depth is 25 feet or less, a grout pipe will not be necessary.

b. Clean native soil or other suitable material shall be placed from a depth of 5 feet to ground surface.

7. Post Requirements:

a. Inspection Documents: **Engineering Test Hole(s);** Within 30 days after work is completed, Registered Inspector shall submit a Registered Inspector's Well Sealing Report. **Monitoring Wells;** Within 30 days after work is completed, Registered Inspector shall submit inspection documents consisting of a Registered Inspector's Well Sealing Report, a well location map, and a detailed well log for each monitoring well. The well log shall show lithology, well construction details, and any available information relating to water quality and quantity. **Mail to** County of Ventura – Watershed Protection District, Water Resources Division; Attn Barbara Council (Re: MW Documents); 800 South Victoria Avenue; Ventura, Ca. 93009-1600. **Failure to submit documents within 30 days will preclude Property Owner and Registered Inspector from obtaining future permits until report is received and may result in the issuance of a Notice of Non-Compliance.**

b. Monitoring Well Destruction: **Upon completion of the monitoring program, Property Owner shall take immediate action to obtain a separate well destruction permit and destroy all monitoring wells on this permit.**

8. The information contained in the Application for Well Permit becomes a part of this permit.

Manager, Water Resources Division David Parrau Date 9-28-06

# County of Ventura
# WELL PERMIT
800 South Victoria Avenue; Ventura, CA 93009

| | Property Owner | Driller | Registered Inspector |
|---|---|---|---|
| Name | Ventura County WPD | Water Development Corp. | Brian Partington |
| Address | 800 S. Victoria Ave #1600<br>Ventura, CA 93009-1600 | 5566 Arrow Highway<br>Montclair, CA 91763 | 2020 E. First St., #400<br>Santa Ana, CA 92705 |
| Telephone | (805) 654-2011 | (530) 662-2829 | (714) 835-6886 |

| | | | | | |
|---|---|---|---|---|---|
| Type of Work | Engineering Test Hole (3) | Sealing Zone | 1 | Main Use | Monitoring |
| SWN (Partial) | 04N19W30H | ID | NA | APN | 053-0-151-320 |
| Fee | $320.00 | Receipt No. | 6460 | Prep by: | Barbara Council |

**Conditions**

1. Permit issue and expiration dates are as follows:

   **Issue Date:** 09/27/06
   **Expiration Date:** 03/27/07

**The Contractor shall keep a copy of this approved permit at the work site.**

2. Property Owner, Driller ("Contractor") and Registered Inspector shall comply with all provisions of Ventura County Well Ordinance No. 4184, and all applicable State of California and local regulations pertaining to well construction, repair, modification and destruction.

3. Work shall be performed by a licensed water well contractor (C-57), who must also be registered with the Water Resources Division ("Division").

4. All work shall be inspected by a licensed Civil Engineer, Registered Geologist or Certified Engineering Geologist, who must also be registered with the Water Resources Division ("Division").

5. Contractor shall retain all drilling fluids and groundwater discharges within the drilling site, unless an NPDES permit has been obtained from the California Regional Water Quality Control Board, Los Angeles Region. The NPDES permit shall be obtained prior to drilling operations.

6. Borehole Destruction

   a. Engineering test hole(s) shall be destroyed immediately upon completion of testing. Destruction method shall consist of the following:

Bentonite clay chips, neat cement or cement grout shall be placed from the base of the borehole to a depth of 5 feet below ground surface.

Bentonite chips shall be hydrated while placed and shall be placed by means of a grout pipe positioned within 2 feet of the base of the sealing zone. If the total borehole depth is 25 feet or less, bentonite chips may be placed by free-fall method.

All cement sealing material shall be placed by means of a grout pipe positioned within 2 feet of the base of the borehole. If there is no standing water in the borehole and the depth is 25 feet or less, a grout pipe will not be necessary.

   b. Clean native soil or other suitable material shall be placed from a depth of 5 feet to ground surface.

7. Post Requirements:

   Registered Inspector's Well Sealing Report: Within 30 days after work is completed, Registered Inspector shall submit a Registered Inspector's Well Sealing Report for the engineering test hole(s). Mail to County of Ventura –

# County of Ventura
## WELL PERMIT
800 South Victoria Avenue; Ventura, CA 93009

Watershed Protection District, Water Resources Division; Attn Barbara Council (Re: ETH Sealing Report); 800 South Victoria Avenue; Ventura, Ca. 93009-1600. **Failure to submit documents within 30 days will preclude Property Owner and Registered Inspector from obtaining future permits until report is received and may result in the issuance of a Notice of Non-Compliance.**

8. The information contained in the Application for Well Permit becomes a part of this permit.

Manager, Water Resources Division David Parraro Date 9-28-06

WATERCOURSE PERMIT ☐ ENCROACHMENT PERMIT ☒

PUBLIC WORKS AGENCY
VENTURA COUNTY WATERSHED PROTECTION DISTRICT
800 South Victoria Avenue, Ventura, CA 93009
(805) 654-2001

| | | | |
|---|---|---|---|
| APPLICANT: | CHEVRON ENVIRONMENTAL MGMT COMPANY | PERMIT #: | 2006107 |
| ADDRESS: | P.O. BOX 1392, BAKERSFIELD, CA, 93302 | PROJECT #: | 8B761 |
| PHONE #: | (661) 654-7269 ZONE: 2 | MOD#: | |
| WATERCOURSE: | POLE CREEK | | |
| PURPOSE: | TO ALLOW THE DRILLING & ABANDONMENT OF SOIL AND VAPOR SAMPLING BORE HOLES AND THE INSTALLATION & MONITORING OF CMT SAMPLING SITES WITHIN THE DISTRICT'S RIGHTS-OF-WAY/EASEMENTS AT THE LOCATIONS SHOWN ON EXHIBIT "A". | | |

| | | | | | |
|---|---|---|---|---|---|
| PLAN CHECK DEPOSIT: | $860.00 | DATE: | 09/20/2006 | RECEIPT | 7345 |
| INSPECTION DEPOSIT: | $1,000.00 | DATE: | 09/25/2006 | RECEIPT | 7352 |
| APPL/RENEWAL FEE: | $140.00 | DATE: | 09/20/2006 | RECEIPT | 7345 |
| INVESTIGATION FEE: | | DATE: | | RECEIPT | |
| PLAN CHECK FEE: | | DATE: | | RECEIPT | |
| INSPECTION FEE: | | DATE: | | RECEIPT | |
| FACILITY USE FEE: | | DATE: | | RECEIPT | |
| PERFORMANCE SECURITY | | TYPE: | | | |

| | | | |
|---|---|---|---|
| ESTIMATED COMMENCEMENT DATE | 10/13/2006 | ESTIMATED COMPLETION DATE | 05/01/2007 |
| ISSUE DATE: | 10/06/2006 | FINAL INSPECTION: | |
| EXPIRATION DATE MAY 1, 2007 | | FILE CLOSING DATE: | |

For permits requiring plan check and inspection fee deposits, final fees are for actual costs. After completion of plan checking or construction, a refund will be processed or additional fees required. This permit authorizes only those permitted acts described hereon. All Standard Conditions on the reverse side of this permit and any Special Provisions on the attached addenda are a part of this permit. All modifications of this permit or of the approved plans must be approved by the Ventura County Watershed Protection District.

LEGAL DECLARATION
(WORKERS COMPENSATION DECLARATION)

I hereby affirm that I have a Certificate of Consent to self-insure, or a Certificate of Worker's Compensation Insurance, or a certified copy thereof (Sec. 3800 Labor Code), which is hereby furnished.

I, as permittee, am a licensed contractor, or I am exclusively contracting with licensed contractors to construct the project who will furnish the District evidence of Worker's Compensation Insurance prior to beginning work.

I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Worker's Compensation laws of California. (I acknowledge that, if, after making this certification, I should become subject to the Worker's Compensation provision of the Labor Code, I must forthwith comply with such provisions or this permit shall be deemed revoked.)

Applicant Signature: [signature] Date 09/18/06

Applicant (print name): BRIAN PARTINGTON Official of Company (print name): Chevron

I hereby acknowledge that the information above is correct, and that all permitted acts shall be in accordance with Ordinance No. FC 18 (for Watercourse Permit) and approved plans, if applicable. In consideration of the Ventura County Watershed Protection District issuing this permit. I agree to comply with all terms of this permit including Standard Conditions and Special Provisions. I also agree that all work specified herein shall be commenced within sixty (60) days after the permit is issued or by the date for commencement as set forth above, whichever is earlier, and that all work will be pursued to its completion with reasonable diligence. All work specified herein shall be completed by the date shown below, or if no date is specified, within one hundred eighty (180) days after the issuance of this permit. I understand that this permit may be revoked by the District at any time.

Date 9/15/06 Permittee's Signature Leslie Klinchuch

Permittee Official of Company Chevron Permittee's Name (print) Leslie Klinchuch

Date Issued 10-6-2006 By: [signature]
Engineer - Manager

Standard Conditions and Special Provisions on reverse side and/or attached

# SPECIAL CONDITIONS
## EP 2006-107

1. Work shall be completed in accordance with the plans and specifications attached and identified as Exhibit "A" (Proposed Monitoring Locations for the North and South Sampling Areas, Pacific Coast Pipeline Superfund Site, prepared by e2 Environmental, 2 Map Pages, and Sampling Analysis Plan for PCPL Superfund Site, dated May 26, 2005, prepared by England Geosystem, 7 Pages), and the Standard and Special Conditions of this permit.

2. This permit is for the purpose of allowing the drilling, installation and monitoring of temporary and longer-term investigative bore holes/wells for the Chevron Texaco Pacific Coast Pipeline Superfund Site along Pole Creek in Fillmore. The work consists of the temporary drilling and monitoring of a soil coring location (NSA-01) and preliminary vapor sampling location (NSA-02), as well as the installation and monitoring of a CMT Sampling System location (NSA-03) within the District's rights-of-way, APN 053-0-151-320, just north of Sespe Avenue within the Northern Sampling Area as shown on the maps provided. The new sampling will occur in the vicinity of the existing groundwater monitoring wells labeled MW-32S and MW-42S within the District's access road.

   The work consists of the following three drilling techniques to perform the investigation. A Continuous Soil Coring using a hollow stem auger rig with an 8-inch diameter auger will be used to collect soil cores to a depth of approximately 87 feet bgs. The Preliminary Vapor Sampling investigation will utilize a direct push sampling rig equipped with 1-1/2 inch diameter hardened steel rods which will be pneumatically advanced to a final depth of 70 feet bgs in approximately 20-foot intervals. The CMT (Continuous Multichannel Tubing) Multilevel Sampling System will be installed using a rotary sonic rig equipped with a 4-inch maximum diameter drive casing to a depth of 91 feet bgs in approximately 13-foot intervals and will require the construction of a flush-mount concrete well vault in the access road. This will be a more permanent installation and the site will require monitoring over a multiple year period.

3. The initial proposal is for one CMT Sampling location (NSA-03), but additional sampling sites may be required as determined by the site investigation. The installation of any additional investigative, sampling or monitoring locations requires approval from the District and a modification to this permit. Maps showing the additional locations shall be provided to the District for permit modification prior to initiating bore operations for either the Northern or the Southern Sample Areas.

4. This permit also shows the locations of the proposed investigative and sampling locations for the Southern Sampling Area just west of the channel in the vicinity of Main Street and within APN 053-0-030-230 owned by Texaco. Similar techniques and equipment is being utilized as described above for the Northern Sampling Area. The attached plans show the work currently outside the District's rights-of-way/easement; however, the close proximity particularly at the southern end may encroach into the District's easement.

5. The bore locations shall be delineated in the field (see page 22) for review by the District's inspector/representative prior to initiation of the drilling activities.

6. The drilling and abandonment of the Continuous Soil Coring location (NSA-01) and the Preliminary Vapor Sampling Investigation (NSA-02) will occur within the same operation and will not require subsequent monitoring or maintenance within the District's property.

7. Permits required by other agencies and consent of property owners shall be the responsibility of the Permittee.

8. Permittee is responsible for the design, installation, abandonment, monitoring and maintenance of the work authorized under this permit.

9. **Permittee shall notify the District of any changes that may impact the conditions or uses authorized under this permit.**

10. **The maintenance and monitoring of the sampling sites by Permittee within the District's rights-of-way/easement requires notification to the District and requires the Permittee to maintain a current District permit. Permittee is responsible for renewing the permit with the District prior to the expiration date of the current permit. The permit can be extended multiple times and the extensions are predicated on maintaining current insurance as described below.**

11. Permittee shall notify the Chief Inspector at (805) 654 -2033, **and fax** the attached Pre-Construction Meeting Form to (805) 654-2108, **at least 5 working days prior** to scheduling the pre-construction and final inspection meetings. Permittee is responsible for on-going coordination with the District Representative/Inspector for issues and conditions related to this permit.

12. Activities and uses authorized under this permit are subject to any instructions of the engineer - manager or his representative. All instructions must be strictly observed.

13. Permittee or Permittee's contractor shall notify the Chief Inspector at (805) 654 -2033 **at least 2 working days prior to commencement of each phase of work within the District's rights-of-way/easement**. Permittee shall keep the District inspector fully informed of the anticipated construction schedule. **Permittee shall also notify the Chief Inspector prior to performing the slurry backfill.**

14. Proof of Worker's Compensation and General Liability Insurance shall be submitted by the Permittee and/or Permittee's contractor(s) **prior to or at** the Pre-Construction Meeting. The coverage shall have the Ventura County Watershed Protection District named as an additional insured and a copy of the current policy shall be kept on file with the District for the duration of this permit. Work shall not commence within the District's rights-of-way/easement until all required insurance certifications have been provided to the District.

15. Permittee has indicated that the project implementation will be a multi-phase approach. Permittee shall submit a calendar or schedule to the District for the installation, sampling and anticipated monitoring of the site to ensure coordination of area activities and limit interference with District activities.

16. **The backfill operations and abandonment procedures including the bentonite or concrete slurry backfill into the investigative and sampling sites shall be performed in the presence of the District inspector.**

17. Permittee shall take appropriate measures to mitigate potential damage to the existing Ventura County Watershed Protection District facilities. Any damage caused to District's facilities during the exercise of this permit shall be repaired at the Permittee's expense, to the satisfaction of this District at its sole discretion. Permittee shall immediately restore to original conditions or better, all District facilities that are damaged or disturbed.

18. No modification, upgrading, repair or reconstruction of facilities covered by this permit is authorized without prior approval by District at its sole discretion.

19. The project site shall be secured at all times to prevent unauthorized entry into the District's rights-of-way and access roads.

20. The gate shall be locked at all times and opened only for entering and exiting. Permittee has installed their own padlock on the gate in conjunction with a previous permit for the purposes of maintenance and monitoring.

21. After completion of each phase of the project, borings and wells shall be abandoned per the County of Ventura's Well Permit No.6432 for bore locations NSA-01, NSA-02, NSA-03, and to the satisfaction of the District.

22. The entire bore hole excavated for each sampling or investigative location shall be back filled with an approved concrete slurry to within 12-inches of the finished access road grade. The remaining hole shall be filled with an approved CMB material at a minimum relative compaction of 95 % per District's standards. It is recommended that the Permittee carefully remove and reserve the existing CMB at each sample location site to be used to fill the last 12-inches of the bore hole; otherwise the CMB material must be reviewed and approved by the District prior to placement.

23. All excavated material, including drilling mud, shall be disposed of outside the District's rights-of-way/easement in accordance with all applicable local, state and federal guidelines.

24. No discharge of construction water or drilling mud to the downstream channel or within the District's rights-of-way/easement will be allowed.

25. No material shall be stockpiled within the District's rights-of-way or easement.

26. No dumping of material into the channel or District facilities is allowed. Violation will result in revocation of the permit and possible fines.

27. Any base access road used by the contractor shall be restored to the original condition. Additionally, damage or excessive wear shall be repaired by placing 2" of CMB over the full width of the access road as directed by the District's representative. The CMB

material shall be reviewed and approved by District staff prior to placement and shall be placed at a minimum relative compaction of 95 % per District's standards.

28. The access road should be unobstructed and kept passable for District staff at all times.

29. Permittee shall provide for dust and noise control and shall comply with all applicable local and state requirements.

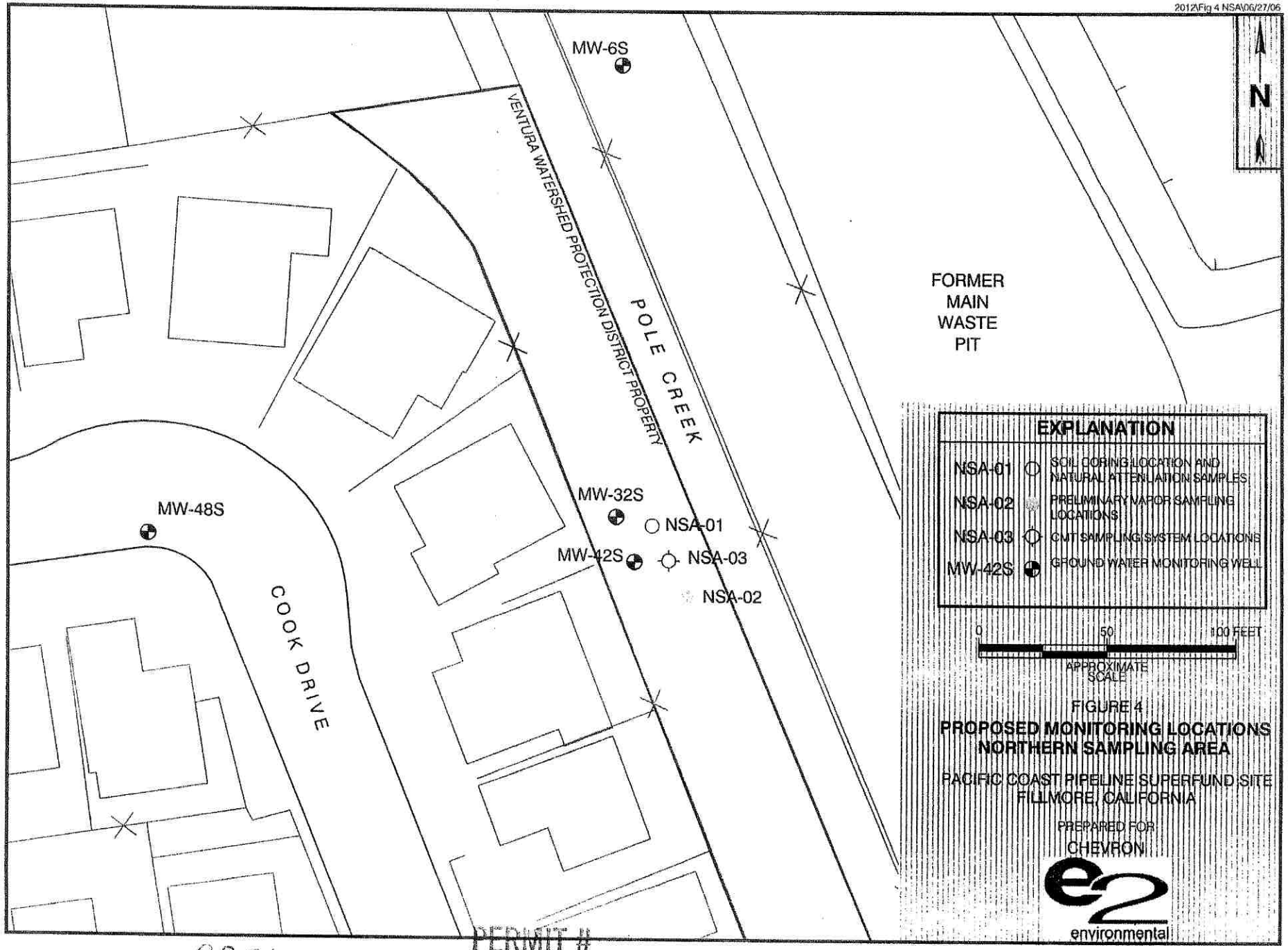
30. The Permittee shall comply with all conditions and requirements of the Ventura Countywide Stormwater Quality Management Program (VCSQMP), the Ventura Countywide Storm Water Permit, NPDES Permit No. CAS004002, as well as other applicable requirements of the Porter-Cologne Act and the Clean Water Act.

31. Permittee shall be able to employ temporary BMP's in the immediate work area to provide containment of and to assist in the prevention of the spread of spills or work product.

32. Any equipment or vehicles driven and/or operated within or adjacent to the channel and District's rights-of-way shall be checked and maintained daily to prevent leaks of material, which if introduced into the water environment, could be deleterious to aquatic life.

33. Stationary equipment such as motors, pumps and/or generators located within or adjacent to the channel shall be located over drip pans.

2012\Fig 4 NSA\06/27/06

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PERMIT #
EP2006-107

EXHIBIT "A"

2012\Fig 3 SSA\03/27/06

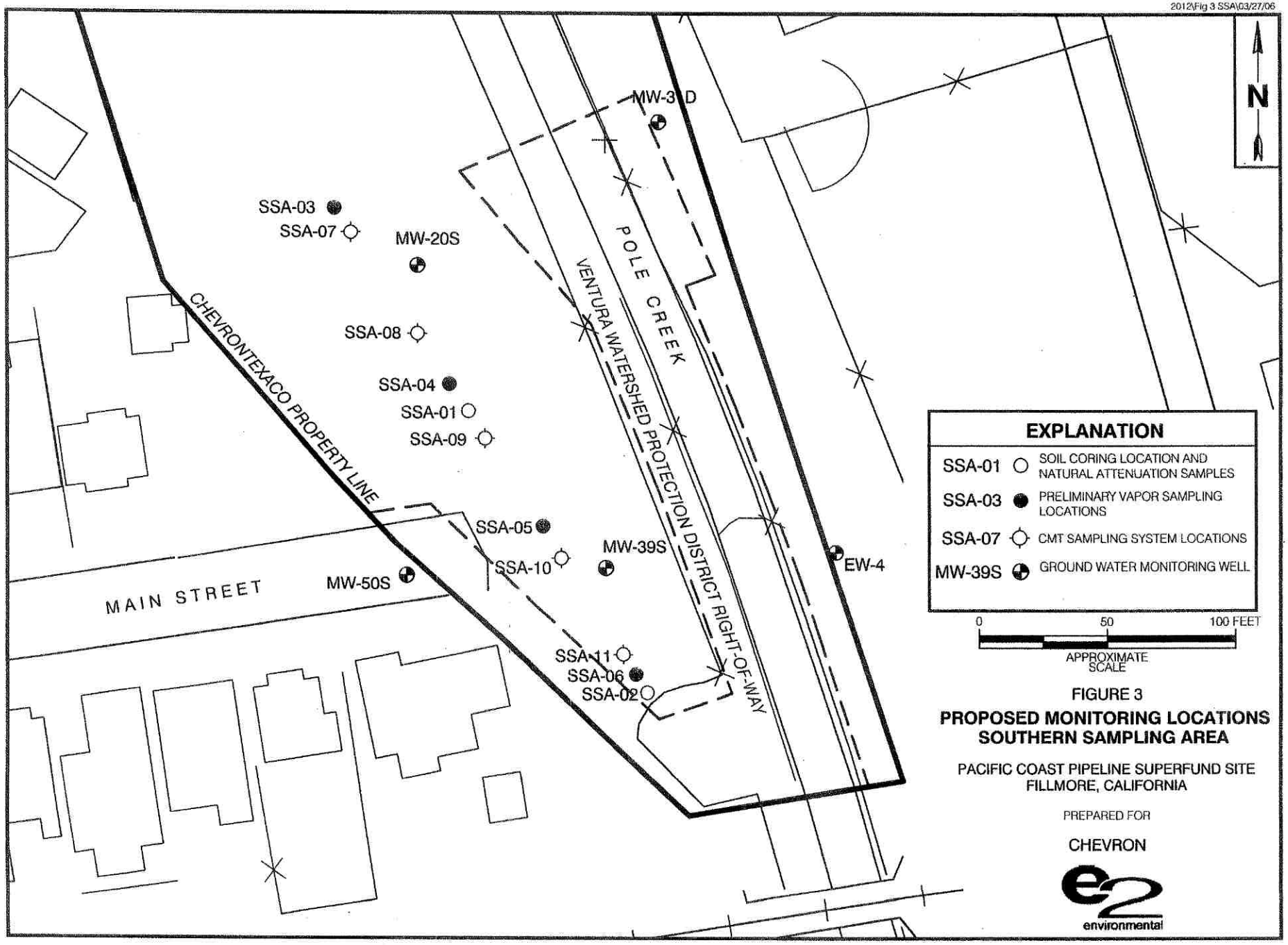


FIGURE 3

**PROPOSED MONITORING LOCATIONS SOUTHERN SAMPLING AREA**

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR

CHEVRON

# 3.0 SAMPLING RATIONALE

The sampling rationale for this program is based on a judgmental design process. The *Guidance on Choosing a Sampling Design for Environmental Data Collection for Use in Developing a Quality Assurance Project Plan* (USEPA, 2002a) indicates that for soil and soil vapor contamination investigations, judgmental sampling is appropriate for situations in which any of the following apply:

1. Relatively small-scale features or conditions are under investigation.
2. An extremely small number of samples will be selected for analysis/ characterization.
3. There is reliable historical and physical knowledge about the feature or condition under investigation.
4. The objective of the investigation is to screen an area(s) for the presence or absence of contamination at levels of concern, such as risk-based screening levels (note that if such contamination is found, follow-up sampling is likely to involve one or more statistical designs).
5. Schedule or emergency considerations preclude the possibility of implementing a statistical design.

The areas under investigation are located above the higher concentration off-site dissolved-phase benzene plumes that are well defined and there is prior knowledge regarding the dissolved benzene plume geometry. The sampling area locations have been selected so that a transect of vapor monitoring points will be installed approximately perpendicular to the groundwater flow direction. The applicable judgmental sampling guidelines for this program include criteria 1, 3 and 4 shown above.

The anticipated drilling methods listed in chronological order of completion include hollow-stem auger, direct push, and rotary sonic drilling.

1. The **hollow-stem auger rig** will be utilized to obtain continuous core samples from select boring locations for physical/geochemical testing. The continuous core samples will be processed for detailed subsurface soil descriptions, physical/geochemical testing, and photographic documentation under ultraviolet light for non-aqueous phase liquid occurrence.
2. The **direct-push rig** will be utilized during a preliminary vapor sampling investigation that will be conducted perpendicular to groundwater flow

direction to establish a preliminary vapor concentration profile within each investigation area. The preliminary vapor concentration profile will be used in conjunction with soil physical/geochemical results to determine the final placement of the vapor monitoring points.

3. The **rotary-sonic drilling** will provide additional continuous cores for soil descriptions as well as installation of continuous multichannel tubing (CMT) multilevel sampling systems manufactured by Solinst® Canada Ltd. The CMT sampling system will allow for the collection of soil vapor from seven discreet depths within the well (See Appendix A for further information on CMT multilevel sampling systems). The rotary sonic drilling method is capable of using a telescoping drive casing in order to prevent vertical migration within the most heavily impacted zones.

## 3.1 SAMPLING LOCATION AND DEPTH

The proposed sampling locations are based on the most current information regarding the occurrence of dissolved-phase benzene concentrations in ground water within the southern and northern plume areas (Figure 4). The anticipated fieldwork that will be completed during this investigation is summarized as follows:

### 3.1.1 Southern Sampling Area

The proposed sampling locations for the southern sampling area are shown on Figure 5. The sampling locations are situated in a line roughly perpendicular to ground water flow and near the ground water monitoring well with the highest concentration in the southern benzene plume. Following is a description of the proposed sampling locations.

- **Two soil borings will be continuously cored to verify subsurface conditions** present within the investigation area (SSA-01 and SSA-02). Select soil samples will be analyzed for physical/geochemical properties at depths commensurate with the vapor monitoring points. The physical/geochemical data will be used to determine the final placement of the vapor monitoring points.

- **Four preliminary vapor sampling locations** will be advanced at depth intervals of approximately 10-feet (10, 20, 30, and 40 ft bgs) (SSA-03, SSA-04, SSA-05, SSA-06). The vapor samples will be submitted to a fixed laboratory for chemical analysis. The preliminary vapor concentration profile will be used to determine the final placement of the CMT vapor monitoring points.

- **Up to five soil borings will be advanced to install CMT sampling systems** with vapor monitoring ports placed at depth intervals of approximately 7-feet (7, 14, 21, 28, 35, 42, and 56 ft bgs) (SSA-07, SSA-08, SSA-09, SSA-10, SSA-11). The proposed depth interval will allow vapor collection at equal distances between

ground surface and the anticipated current depth to ground water. This also includes one port (56 ft bgs) placed slightly below the current depth to ground water (50 ft bgs), which will be sampled during the second sampling event should groundwater levels decline from the current historical high. The estimated depth to ground water will be determined from nearby groundwater monitoring wells MW-39S, MW-20S, and MW-50S.

### 3.1.2 Northern Sampling Area

The proposed sampling locations for the NSA are shown on Figure 6. The sampling locations are near the ground water monitoring well with the highest concentration in the northern plume. Following is a description of the sampling locations.

- **One boring will be continuously cored to verify subsurface conditions** present within the investigation area (NSA-01). Select soil samples will be analyzed for physical/geochemical properties at depths commensurate with the vapor monitoring points. The physical/geochemical data will be used to determine the final placement of the vapor monitoring points.

- **One preliminary vapor sampling location** will be advanced at depth intervals of approximately 20-feet (10, 30, 50, and 70 ft bgs) (NSA-02). The vapor samples will be submitted to a fixed laboratory for chemical analysis. The preliminary vapor concentration profile will be used to determine the final placement of the CMT vapor monitoring point.

- **A minimum of one soil boring will be advanced to install a CMT sampling system** with vapor monitoring ports placed at depth intervals of approximately 13-feet (13, 26, 39, 52, 65, 78, and 91 ft bgs) (NSA-03). The proposed depth interval will allow vapor collection at equal distances between ground surface and the anticipated current depth to ground water. This also includes one port (91 ft bgs) placed slightly below the current depth to ground water (87 ft bgs), which will be sampled during the second sampling event should groundwater levels decline from the current historical high. The estimated depth to ground water will be determined from nearby groundwater monitoring wells MW-32S and MW-42S. Additional vapor monitoring points may be installed based on vapor monitoring results from the SSA as described below.

### 3.1.3 Investigation Timeline

This investigation will be implemented in a multi-phase approach in order to discuss investigation results with agency representatives at key milestones while conducting fieldwork. The investigation will commence by gathering preliminary data (physical/geochemical and soil vapor) within both investigation areas. Upon completion, the agency will be contacted to discuss preliminary data and determine appropriate work moving forward. The investigation will then

and the principal of San Cayetano School. The letter will notify residents that drilling activities will be conducted between 8:00AM – 5:00PM.

## 4.3 SUBSURFACE UTILITY CLEARANCE

As required by California state law, Underground Service Alert of Southern California (USA) will be contacted a minimum of two working days before initiating fieldwork. Prior to contacting USA, each boring location will be delineated with white spray paint thereby outlining the proposed limits of subsurface work. A ticket number will be obtained to request utility clearance by parties with underground utilities in the areas. Following notification, utility owners and/or representatives will mark the approximate location of each subsurface utility. Prior to conducting subsurface fieldwork, each location will be visually inspected to verify potential conflicts.

In addition to obtaining an USA ticket number, each location will be investigated further with the assistance of (1) an on-site facility representative, (2) a subsurface geophysical surveying company, and (3) hand auger clearance to approximately 6 feet bgs. The on-site representative will review facility plans for potential conflicts. Prior to conducting subsurface fieldwork, the on-site representative will approve each soil-boring location. A geophysical survey will be conducted to identify potential subsurface structures using specialty equipment that may include ground penetrating radar, electromagnetic induction, and a utility locator. Additional clearance may require the assistance of an air vacuum excavation rig to clear the entire boring diameter to approximately 6 feet bgs (rotary sonic and hollow stem auger).

## 4.4 CONTINUOUS SOIL CORING (HOLLOW-STEM AUGER)

Continuous soil coring will be conducted to establish stratigraphic profiles at each investigation area (NSA and SSA) using a hollow stem auger rig equipped with an approximate 8-inch diameter auger. We anticipate soil cores will be collected in lengths of between 18-inches and 60-inches, depending upon the ease of core recovery, from ground surface to the current depth of ground water. The soil borings will be continuously cored using a core-barrel secured within the augers during advancement. The soil core is maintained within a split-barrel coring apparatus generally containing acetate (or similar) liners.

Upon retrieval, the core liner will be extracted from the sample barrel, secured with plastic end caps (including Teflon sheets and non-volatile tape), and preserved by field personnel provided by Omni Laboratory. A transport trailer will be utilized by laboratory personnel, which will be chilled with dry ice to maintain soil core integrity and minimize hydrocarbon volatilization. The soil cores will be transported to the laboratory daily. Once at the laboratory, the soil cores will be temporarily placed in an oversized walk-in cooler, which will be maintained at a temperature of approximately 35 degrees Fahrenheit.

Initially, soil plugs will be collected for physical/geochemical analysis from select areas of the soil core using a specially manufactured drill press, capable of coring an approximate ½-inch outside diameter plug using liquid nitrogen vapor. Upon collection, the soil plugs will be wrapped in plastic wrap / aluminum foil (i.e. Saran Wrap), placed in a polyethylene cup with a screw top lid, and transported overnight in a cardboard box containing dry ice to Omni Laboratory located in Houston, Texas. The core will also be prepared for photographic documentation by splitting the core longitudinally to expose the inner portion. The inner portion will be scraped clean and examined under ultraviolet light for non-aqueous phase liquid occurrence.

After photographically documenting the soil core in the laboratory, a field geologist will provide a detailed soil description in accordance with the Unified Soil Classification System (USCS). The soil descriptions will be documented on a soil boring log (Appendix D).

Upon completion, the soil borings will be properly destroyed according to permitting agency requirements. The anticipated destruction material includes the use of cement grout slurry containing approximately six percent bentonite by weight. The augers will be used as a tremie in order to allow retraction grouting (bottom to top), thereby promoting a continuous seal. A constant head of grout will be maintained within the augers to ensure a complete seal is obtained.

## 4.5 Preliminary Vapor Sampling Investigation (Direct Push)

A preliminary vapor sampling investigation to assist in determining final vapor monitoring point spacing will be performed using a direct push (or similar) sampling rig equipped with approximate 1-½ inch outside diameter hardened steel rods. Prior to installation, additional utility clearance measures will be implemented at each location using a 2-¼ inch diameter (or similar) hand auger to approximately 6 feet bgs. Upon completion, the cleared boring will be back-filled and compacted with native soil to assist direct-push sampling rod penetration.

The direct-push rig utilizing hardened steel rods equipped with an expendable point assembly will pneumatically advance to the desired depth. Once the desired depth is achieved, the steel rods will be retracted slightly leaving behind the expendable point assembly and exposing native formation. A measured section of ¼-inch outside diameter semi-rigid nylon tubing (or similar) will be attached to a post run tubing adaptor prior to collecting the vapor sample. The vapor sample tubing will be pulled gently to verify a tight connection. Once the connection is verified, the vapor sampling procedure will be followed to collect a representative sample. This process will be repeated at each depth until achieving the final depth and/or difficult soil conditions are encountered (i.e. refusal).

## 4.6 CMT Multilevel Sampling System (Rotary Sonic)

The CMT multilevel sampling system will be installed using a rotary sonic rig equipped with a 4-inch outside diameter (maximum) drive casing. Prior to installation, additional utility

clearance measures will be implemented at each location using an air vacuum excavation rig, clearing the entire borehole diameter to approximately 6 feet bgs. The rotary sonic rig utilizes a dual casing system that provides borehole stability (outer casing) in combination with collecting continuous soil core samples (inner casing). The casings (inner and outer) are typically advanced nearly simultaneously pending soil conditions encountered during drilling. Once the desired depth is achieved, the inner casing will be removed leaving the outer casing in-place to provide borehole integrity. In order to minimize the potential for cross-communication, additional drive casings may be utilized in the most heavily impacted zones (i.e. telescoping).

The CMT sampling system will be designed based on the continuous soil cores (hollow stem auger and rotary sonic), physical/geochemical parameters (hollow stem auger), and field evaluations (direct push). The CMT is a multilevel sampling system consisting of a single construction polyethylene tubing (1.7-inch outside diameter) segmented into seven separate chambers. The chambers resemble a honeycomb structure consisting of six pie-shaped openings along the outside (7/16-inch inside diameter) and one hexagonal-shaped opening within the center (3/8-inch inside diameter). The vapor ports consist of an approximate 4-inch opening in the channel that is protected with a fine-mesh stainless steel screen secured in place with three stainless steel flush-mounted straps. An expansion plug is installed slightly below the vapor monitoring port to seal off the channel section below the vapor port. Once constructed, the CMT sampling system will be suspended within the drive casing in preparation for construction. The vapor monitoring point completion will consist of construction materials including annular filter pack, hydrated bentonite annular seal, and a flush-mount surface completion well vault.

The construction materials will be installed through the drive casing. The filter pack surrounding the vapor sampling ports will consist of Ready Mix Corporation #2/12 sand (or similar) introduced into the drive casing to approximately 4-inches above/below the vapor sampling port. The total filter pack will consist of approximately 12-inches. Following filter pack placement, small diameter tremie tubing will be inserted into the annual space within the drive casing to assist water placement for bentonite hydration. The bentonite placement will be conducted simultaneously as water is placed through the tremie tubing. The tremie tubing will be retracted slowly allowing a continuous supply of water to hydrate the bentonite annular seal. Bentonite hydration will commence approximately 12-inches above the filter pack leaving a dry portion of bentonite crumbles. This step will assist in preventing water migration into the vapor sampling zone during bentonite hydration. The remaining annular seal material will consist of medium bentonite chips (or similar).

The surface completion will be contained within a flush-mount well vault completed in rapid-set concrete raised slightly above the existing grade to avoid water accumulation during seasonal rainfall events. The CMT sampling system will be protected with an outer plastic shield. The plastic shield contains a pre-labeled numbering system allowing the identification of each channel. The vapor port designated numbering system will increase with depth (1 = shallowest/ 7 = deepest).

After completing the second vapor sampling event, the CMT sampling systems will be properly destroyed according to permitting agency requirements. The anticipated destruction method may include over-drilling the well materials to total depth. A cement grout slurry containing approximately six percent bentonite by weight will be used to backfill the boring. The augers will be used as a tremie in order to allow retraction grouting (bottom to top), thereby promoting a continuous seal. A constant head of grout will be maintained within the augers to ensure a complete seal is obtained.

## 4.7 VAPOR SAMPLING

The vapor monitoring points (direct push point and CMT) will be purged using a portable vacuum pump. The preliminary vapor sampling (direct push) will occur following an equilibration time of approximately 20 to 30 minutes (DTSC, 2004). The CMT monitoring points will be sampled no sooner than one week following installation to allow for equilibration. Vapor samples will not be collected for a period of two weeks following a significant rainfall event.

A purge volume versus contaminant concentration test will be conducted prior to the initial sampling event to establish an appropriate purge volume to ensure stagnant/ambient air is adequately purged from the sampling system. The purge volume test location will generally coincide as near as possible to the contamination source. A purge volume test will be conducted at each location (NSA and SSA) from one entire vapor monitoring system (excluding ports placed slightly below the current depth to ground water) to establish the appropriate purge requirements for each vapor sampling depth. Purge volumes of one (1), three (3), and seven (7) will be conducted; the sample yielding the highest concentration will determine the standard purge volume for the remainder of the project. If concentrations are not detected, a default of three (3) purge volumes will be implemented as a standard procedure. A "purge volume" will be estimated from the volume summation of aboveground tubing attached to the sample connection (i.e. stopcock valve), tubing inside diameter, and annular space around the vapor sampling port. The sampling container (i.e. summa canister) will not be included in the volume calculation. Pending sample volume requirements, the summa canister volume used for sample collection may exceed subsequent purge volumes (i.e. three, seven). Therefore, the purge volume testing will occur during three separate events with an approximate three-day equilibration period between each event.

Upon determining the required purge volumes, the vapor monitoring point will be purged with the portable vacuum pump at a rate of approximately 200 milliliters per minute (mL/min). The purge rate will be monitored using an inline flow meter calibrated using a primary standard. The field parameters will be recorded on a field datasheet.

Once the required purge volume has been removed, the vapor samples will be collected in summa canisters equipped with an inline flow regulator placed between the vapor monitoring point and summa canister. A leak test will be conducted to verify that a proper surface connection was achieved using a common tracer compound (i.e. isopropanol). The tracer

# Appendix C

## Soil Boring Logs and Well Construction Details

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Key to Log of Boring



| Elevation, feet | Depth, feet | SAMPLES | | | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type | Number | Inches Recovered | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

## COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet relative to mean sea level (MSL).

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number.

5 **Recovery:** Inches recovered versus inches driven.

6 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

7 **Material Description:** Description of material encountered; may include color, moisture, grain size, and density/consistency.

8 **Well Completion Log:** Schematic of well construction; materials are listed in header block; graphic symbols are explained below.

9 **OVA Headspace (ppm)** Organic vapor analyzer headspace reading in parts per million (ppm).

10 **OVA Background (ppm):** Organic vapor analyzer background reading in parts per million (ppm).

11 **Sample Time:** Drilling progress indicated in 24-hour clock or minutes per sample; refer to column head for units.

12 **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel.

## TYPICAL SOIL GRAPHIC SYMBOLS

SAND (SP)
Sand with silt (SP-SM)
Silty SAND (SM)
CLAY (CL)
Clayey SAND (SC)
SILT (ML)
Silty to clayey SAND (SC-SM)
GRAVEL (GP)

## TYPICAL WELL GRAPHIC SYMBOLS

Blank casing in concrete
Blank casing in Hydrated Bentonite Chips
Blank casing in Dry Bentonite Crumbles
Blank casing in RMC#2/12 filter sand
Slotted casing in RMC#2/12 filter sand

## TYPICAL SAMPLER GRAPHIC SYMBOLS

Sample Run
No Recovery

## OTHER GRAPHIC SYMBOLS AND ABBREVIATIONS

Change in material properties within a stratum

Visually identifiable change in lithology

Inferred contact between strata or gradational change in lithology

## GENERAL NOTES

1. Soil Classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

| | |
|---|---|
| **Project:** Chevron PCPL<br>**Project Location:** Fillmore, California<br>**Project Number:** 29869533.80000 | **Log of Boring SSA-01**<br>Sheet 1 of 3 |

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | 10/16/06 | Logged By | J. Sanks | Checked By | B. Partington |
| Drilling Method | Hollow-Stem Auger | Drilling Contractor | Water Development Corporation (Jorge) | Total Depth of Borehole (feet) | 62.5 |
| Drill Rig Type | CME 75 | Borehole Diameter (inches) | 8-inch | Approx. Surface Elevation (feet msl) | 486.4 |
| Approx. Depth Groundwater Encountered | 52.5 feet bgs | Sampler Type | Core Barrel (Continuous) | Borehole Backfill | Cement Grout (6%-by wt) |
| Comments | Air knife to 6 feet bgs. | | | | |

| Elevation, feet MSL | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 1 | 20/60 | | Light yellowish brown (10YR 6/4), Silty fine SAND (SM), moist, contains trace fine subangular gravel | 0 | 0 | 0954 | |
| 485 | | | | | | | | | | |
| | 5 | | 2 | 14/60 | | Dark yellowish brown (5YR 4/4), GRAVEL with fine to medium Sand (GP), moist, gravel to 4 inch diameter<br>Light yellowish brown (10YR 4/4), Silty fine to coarse SAND (SM), moist, gravel is fine to medium, subrounded to subangular | 0 | 0 | 1010 | |
| 480 | | | | | | | | | | |
| | 10 | | 3 | 23/30 | | 3-inch diameter Gravel fragment<br>Pale yellowish brown (10YR 6/2), fine to coarse SAND with fine Gravel (SP), moist, gravel is subangular<br>Dark yellowish brown (10YR 4/2), CLAY with fine subangular gravel (CL), moist | 0 | 0 | 1020 | |
| 475 | | | | | | | | | | |
| | | | 4 | 0/30 | | Dark yellowish brown (10YR 4/4), fine Gravel (GP) | 1 | 0 | 1030 | Rig chatter<br>Slow drilling |
| | 15 | | 5 | 0/30 | | | -- | -- | 1040 | |
| 470 | | | | | | | | | | |
| | | | 6 | 0/30 | | 3-inch Gravel fragments | -- | -- | 1045 | |
| | 20 | | | | | | | | | |

URS

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring SSA-01



| Elevation, feet MSL | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | | 7 | 19/30 | | Dark yellowish brown (10YR 4/4), fine to medium SAND with Gravel (SP), moist, gravel is fine subrounded to subangular, contains trace silt | 0 | 0 | 1054 | No chatter |
| 465 | | | | | | | | | | |
| | | | 8 | 24/30 | | 2-inch gravel fragment<br>Becomes fine sand, gravel not present (6-inches) | 0 | 0 | 1103 | |
| | 25 | | 9 | 23/30 | | Becomes dusky brown (5YR 2/2), 2-inch layer of clay<br>6-inch layer of Silty fine Sand (SM) | 0 | 0 | 1110 | |
| 460 | | | | | | | | | | |
| | | | 10 | 22/30 | | Dark yellowish brown (10YR 4/4), Silty fine to coarse SAND with Gravel (SM), moist, gravel is subrounded to subangular, gravel fragments to 2.5-inch diameter | 0 | 0 | 1115 | |
| | 30 | | 11 | 24/30 | | | 0 | 0 | 1120 | |
| 455 | | | | | | Light yellowish brown (10YR 4/4), Silty fine to coarse SAND with fine Gravel (SP), moist, contains trace silt, gravel is subangular | | | | |
| | | | 12 | 25/30 | | Light yellowish brown (10YR 4/4), Silty fine to medium SAND with fine Gravel (SM), moist, gravel is subrounded to subangular<br>3-inch Gravel fragment, 6-inch fine subangular gravel | 0 | 0 | 1130 | |
| | 35 | | 13 | 22/30 | | 4-inch Silt (ML) | 0 | 0 | 1132 | Rig chatter |
| 450 | | | | | | | | | | |
| | | | 14 | 26/30 | | Becomes dusky brown (5YR 2/2) (6-inches)<br>Becomes dusky brown (5Y 2/2), Silty (ML) and Clay (CL)<br>Silt (ML) above 2-inch Clay (CL) layer | 70 | 0 | 1145 | |
| | 40 | | 15 | 24/30 | | Becomes dark greenish gray (GLEY 4/1), 6-inch Silt (ML) layer with fine subangular gravel<br>2-inch fine to medium Sand (SP) layer | 385 | 0 | 1303 | |
| 445 | | | | | | | | | | |
| | | | | 30/30 | | | 1228 | 0 | 1310 | |

URS

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring SSA-01



| Elevation, feet MSL | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 16 | | | | | | | |
| | 45 | | | 24/30 | | 4-inch layer Silt with Sand (ML) | 935 | 0 | 1323 | |
| 440 | | | 17 | | | 3-inch diameter gravel fragment, decrease fines content | | | | |
| | | | | 26/30 | | Increase fines content | 60 | 0 | 1331 | |
| | | | 18 | | | Dark greenish gray (GLEY 4/1), SILT (ML), moist, contains trace fine subrounded to subangular gravel | | | | |
| | 50 | | | 24/30 | | Light yellowish brown (10YR 4/4), Silty fine SAND (SM), moist, contains trace fine subangular gravel | 40 | 0 | 1350 | |
| 435 | | | 19 | | | Becomes moderate brown (5YR 4/4) (4-inches) | | | | |
| | | | | 30/30 | | Becomes wet ∇ | 12 | 0 | 1400 | |
| | | | 20 | | | Dark greenish gray (GLEY 1 4/1), SILT with fine Sand (ML), moist | | | | |
| | 55 | | | 48/60 | | Becomes light yellowish brown (10YR 4/4), contains trace fine subangular gravel | 1700 | 0 | 1410 | |
| 430 | | | | | | Dark greenish gray (GLEY 1 4/1), CLAY (CL), moist | | | | |
| | | | 21 | | | Dark greenish gray (GLEY 1 4/1), Silty fine to coarse SAND with fine Gravel (SM), moist, gravel is subrounded to subangular | | | | |
| | | | | | | 3-inch Clay (CL) layer | | | | |
| | 60 | | | 20/30 | | Dark greenish gray (GLEY 1 4/1), fine to medium SAND (SP), wet, contains trace fine subrounded to subangular gravel | 1500 | 0 | 1420 | |
| 425 | | | 22 | | | | | | | |
| | | | | | | Completed boring to 62.5 feet bgs. | | | | |
| | 65 | | | | | | | | | |
| 420 | | | | | | | | | | |

URS

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| **Project:** Chevron PCPL<br>**Project Location:** Fillmore, California<br>**Project Number:** 29869533.80000 | **Log of Boring SSA-02**<br>Sheet 1 of 3 |

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | 10/17/06 | Logged By | J. Sanks | Checked By | B. Partington |
| Drilling Method | Hollow-Stem Auger | Drilling Contractor | Water Development Corporation (Jorge) | Total Depth of Borehole (feet) | 60.0 |
| Drill Rig Type | CME 75 | Borehole Diameter (inches) | 8-inch | Approx. Surface Elevation (feet msl) | 482.5 |
| Approx. Depth Groundwater Encountered | 52.5 feet bgs | Sampler Type | Core Barrel (Continuous) | Borehole Backfill | Cement Grout (6%-by wt) |
| Comments | Air knife to 6 feet bgs. | | | | |

| Elevation, feet MSL | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 1 | 0/60 | | Light yellowish brown (10YR 6/4), Silty fine SAND (SM), moist, contains trace fine subangular gravel | 0 | 0 | 0833 | |
| | | | | | | Becomes dark yellowish brown (10YR 4/4) | | | | |
| 480 | | | | | | | | | | |
| | 5 | | 2 | 0/30 | | | -- | -- | 0840 | |
| | | | | | | Light yellowish brown (10YR 4/4), GRAVEL (GP), moist, gravel is subangular up to 3 inch diameter | | | | |
| 475 | | | 3 | 17/30 | | | 0 | 0 | 0850 | Rig chatter |
| | | | | | | Light yellowish brown (10YR 4/4), CLAY with fine Gravel (CL), moist, contains trace fine sand, gravel is subangular | | | | |
| | 10 | | 4 | 20/30 | | | 0 | 0 | 0856 | Less chatter |
| | | | | | | Dark yellowish brown (10YR 4/2), fine GRAVEL with Clay (GP), moist, contains trace fine sand, gravel is subangular | | | | |
| 470 | | | 5 | 22/30 | | | 0 | 0 | 0900 | Increase chatter |
| | | | | | | Pale yellowish brown (10YR 6/2), fine SAND with fine Gravel (SP), moist, gravel is subangular | | | | |
| | 15 | | 6 | 23/30 | | Dark yellowish brown (10YR 4/4), Silty fine to coarse SAND with fine Gravel (SM), moist, gravel is subangular | 0 | 0 | 0902 | |
| 465 | | | 7 | 19/30 | | | 0 | 0 | 0906 | No chatter |
| | | | | | | 2-inch Gravel fragment | | | | |
| | 20 | | | | | | | | | |

URS

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring SSA-02



| Elevation, feet MSL | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | | 8 | 22/30 | | | 0 | 0 | 0910 | |
| 460 | | | 9 | 23/30 | | 2-inch Clay (CL) layer | 0 | 0 | 0914 | |
| | 25 | | 10 | 23/30 | | 2-inch Clay (CL) layer | 0 | 0 | 0919 | |
| 455 | | | 11 | 25/30 | | 2-inch diameter Gravel fragment<br>Becomes fine sand with fine gravel (SP), gravel is subangular (6-inches) | 0 | 0 | 0924 | |
| | 30 | | 12 | 20/30 | | 1-inch layer of Clay (CL) | 1 | 0 | 0929 | |
| 450 | | | 13 | 22/30 | | | 1 | 0 | 0937 | |
| | 35 | | 14 | 24/30 | | 3-inch diameter gravel fragment<br>Becomes fine to medium Sand (SP) (6-inches) | 30 | 0 | 0951 | |
| 445 | | | | 24/30 | | Light yellowish brown (10YR 4/4), CLAY (CL), moist, contains trace fine sand | 2100 | 0 | 1000 | |
| | | | 15 | | | dark greenish gray (GLEY 1 4/1), fine to medium SAND with fine Gravel (SP), moist, contains trace silt, gravel is subangular<br>4-inch Clay (CL) layer | | | | |
| | 40 | | 16 | 28/30 | | Dark greenish gray (GLEY 1 4/1), Silty fine to medium SAND with fine Gravel (SM), moist, gravel is subangular | 3000 | 0 | 1005 | |
| 440 | | | | 26/30 | | Silt (ML) layer (6-inches) | 2300 | 0 | 1016 | |

URS

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring SSA-02



| Elevation, feet MSL | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 17 | | | Becomes fine to medium sand (SP) (6-inches) | | | | |
| | 45 | | | 24/30 | | | 1800 | 0 | 1022 | |
| | | | 18 | | | Becomes dark yellowish brown (10YR 4/2) | | | | |
| 435 | | | | 30/30 | | Dark greenish gray (GLEY 1 4/1), SILT (ML), moist, contains trace fine subangular gravel<br>At 48 feet Becomes light yellowish brown (10YR 4/4) | 27 | 0 | 1031 | |
| | | | 19 | | | | | | | |
| | 50 | | | 26/30 | | | 2 | 0 | 1042 | |
| | | | 20 | | | Becomes moderate brown (5Y 3/4) | | | | |
| 430 | | | | 30/30 | | Becomes dark yellowish brown (10YR 4/2) ∇ | 3000 | 0 | 1054 | |
| | | | 21 | | | Becomes dark greenish gray (GLEY 1 4/1), increase gravel content<br>1-inch fine Sand (SP) layer | | | | |
| | 55 | | | 24/30 | | Dark greenish gray (GLEY 1 4/1), Silty fine to medium SAND (SM), wet, contains trace fine subangular gravel | 2000 | 0 | 1101 | |
| | | | 22 | | | Very dark gray (GLEY 1 4/1), fine to coarse SAND with fine Gravel (SP), wet, contains trace silt, gravel is subangular | | | | |
| 425 | | | | 23/30 | | | 2600 | 0 | 1111 | |
| | | | 23 | | | | | | | |
| | 60 | | | | | Completed boring to 60 feet bgs. | | | | |
| 420 | | | | | | | | | | |
| | 65 | | | | | | | | | |

URS

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| **Project: Chevron PCPL**<br>**Project Location: Fillmore, California**<br>**Project Number: 29869787.80000** | **Log of Boring SSA-07**<br>Sheet 1 of 2 |

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | 01/15/07 and 01/16/07 | Logged By | J. Sanks | Checked By | B. Partington (PG# 7612) |
| Drilling Method | Sonic | Drilling Contractor | Water Development Corporation (M. Wilerson) | Total Depth of Borehole ft.bgs | 62 |
| Drill Rig Type | GUS PECH 400RS | Sampler Type | Core Barrel (Continuous) | Approx.Surface Elevation ft msl | 489.03 |
| Approx. Depth Groundwater Encountered | 57 ft bgs | Drill Bit Size/Type | 6-inch | Top of Casing Elevation feet | 488.29 |
| Borehole Diameter (inches) | 6-inch : Diameter of Well (inches) 1.7" | Type of Well Casing | 7-Port 1.7-inch CMT | Screen Perforation | 6-inch Wire Mesh |
| Type of Sand Pack | See Below | Type and Depth of Seal(s) | See Below | | |
| Comments | Air knife to 7 feet bgs. | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 1 | 36/60 | | Light yellowish brown (10YR 6/4), Silty fine SAND (SM), moist, contains trace fine subangular gravel<br>Becomes brown (10YR 4/3) | | 0 | 0 | 1308 | |
| 485 | 5 | | 2 | 60/60 | | Brown (10YR 4/3), fine subangular Gravel with fine to medium Sand (GP), moist, gravel fragments<br>Yellowish brown (10YR 5/4), Silty fine to medium SAND with fine subangular Gravel (SM), moist | | 0 | 0 | 1330 | |
| 480 | 10 | | 3 | 60/60 | | Becomes very pale brown (10YR 7/4)<br>Decrease gravel content<br>Increase Gravel content | | 1 | 0 | 1355 | Centralizer at 10 ft bgs |
| 475 | 15 | | 4 | 60/60 | | Very pale brown (10YR 7/4), CLAY with fine to medium Sand (CL), moist, contains trace fine subangular gravel<br>Brown (10YR 4/3), fine subangular GRAVEL with fine to medium Sand (GP), moist, contains trace silt<br>4 inch gravel fragments | | 0 | 0 | 1433 | Centralizer at 17 ft bgs |
| 470 | 20 | | 5 | 54/60 | | Same as above | | | | 1450 | |
| 465 | 25 | | 6 | 60/60 | | Becomes gravel with clay | | | | 1500 | Centralizer at 24 ft bgs |
| 460 | 30 | | 7 | 78/120 | | Brown (10YR 4/3), Silty fine to medium SAND with fine subangular gravel (SM), moist | | 0 | 0 | 1540 | Centralizer at 31 ft bgs |
| 455 | 35 | | | | | Dark greenish gray (GLEY 1 4/1), SILT with fine subangular Gravel (ML), moist, contains trace fine to medium sand | | 1600 | 0 | 1542 | |
| 450 | 40 | | 8 | 60/60 | | Brown (10YR 4/3), Silty fine to medium SAND (SM), moist, contains trace fine subangular gravel<br>1 foot silt with fine to medium sand (ML) layer, becomes very dark gray (10YR 3/1)<br>6 inch silt (ML) layer | | 2000 | 0 | 1620 | Centralizer at 38 ft bgs |
| 445 | 45 | | 9 | 60/60 | | Same as above<br>6 inch silt (ML) layer | | 3000 | 0 | 1635 | |
| 440 | 50 | | | | | | | | | | |

URS

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Log of Boring SSA-07



| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50 | | | 120/120 | | Same as above | | 3800 | 0 | 1655 | Centralizer at 51 ft bgs |
| -435 | 55 | | 10 | | | Dark greenish Gray (GLEY 1 4/1), SILT with fine Sand (ML), moist | | | | | |
| -430 | 60 | | 11 | 24/24 | | Becomes dark greenish brown (10YR 4/6), 1 foot clay with fine sand (CL) layer | | | | | |
| -425 | 65 | | | | | Completed boring to 62 feet bgs. | | | | | |
| -420 | 70 | | | | | Continuous Multichannel Tubing (CMT) | | | | | |
| -415 | 75 | | | | | Well Screen Intervals (ft bgs)<br>Port 1 6.75 - 7.25<br>Port 2 12.75 - 13.25<br>Port 3 20.75 - 21.25<br>Port 4 27.75 - 28.25<br>Port 5 32.75 - 33.25<br>Port 6 42.75 - 43.25<br>Port 7 59.75 - 60.25 | | | | | |
| -410 | 80 | | | | | Type of Sand Pack: RMC#2/12 (ft bgs)<br>1. 6.5 - 7.5<br>3. 12.5 - 13.5<br>3. 20.5 - 21.5<br>4. 27.5 - 28.5<br>5. 32.5 - 33.5<br>6. 42.5 - 43.5<br>7. 59.5 - 62.0 | | | | | |
| -405 | 85 | | | | | Hydrated Bentonite Chips - (3/8-inch): (ft bgs)<br>1. 2.0 - 5.5<br>2. 7.5 - 11.5<br>3. 13.5 - 19.5<br>4. 21.5 - 26.5<br>5. 28.5 - 31.5<br>6. 33.5 - 41.5<br>7. 43.5 - 59.5 | | | | | |
| -400 | 90 | | | | | Dry Bentonite Crumbles: (ft bgs)<br>1. 5.5 - 6.5<br>2. 11.5 - 12.5<br>3. 19.5 - 20.5<br>4. 26.5 - 27.5<br>5. 31.5 - 32.5<br>6. 41.5 - 42.5<br>7. Not Applicable | | | | | |
| -395 | 95 | | | | | | | | | | |
| -390 | 100 | | | | | | | | | | |
| -385 | 105 | | | | | | | | | | |
| -380 | 110 | | | | | | | | | | |
| -375 | 115 | | | | | | | | | | |

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|---|---|
| **Project: Chevron PCPL**<br>**Project Location: Fillmore, California**<br>**Project Number: 29869787.80000** | **Log of Boring SSA-09**<br>Sheet 1 of 2 |

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **01/17/07** | Logged By | **J. Sanks** | Checked By | **B. Partington (PG# 7612)** |
| Drilling Method | **Sonic** | Drilling Contractor | **Water Development Corporation (M. Wilerson)** | Total Depth of Borehole ft.bgs | **61** |
| Drill Rig Type | **GUS PECH 400RS** | Sampler Type | **Core Barrel (Continuous)** | Approx.Surface Elevation ft msl | **486.29** |
| Approx. Depth Groundwater Encountered | **57 ft bgs** | Drill Bit Size/Type | **6-inch** | Top of Casing Elevation feet | **485.90** |
| Borehole Diameter (inches) | **6-inch** Diameter of Well (inches) **1.7"** | Type of Well Casing | **7-Port 1.7-inch CMT** | Screen Perforation | **6-inch Wire Mesh** |
| Type of Sand Pack | **See Below** | Type and Depth of Seal(s) | **See Below** | | |
| Comments | **Air knife to 7 feet bgs.** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 485 | 0 | | 1 | 30/60 | | Light yellowish brown (10YR 6/4), Silty fine SAND (SM), moist, contains trace subangular gravel<br>Becomes brown (10YR 4/3) | | 0 | 0 | 1015 | |
| 480 | 5 | | 2 | 48/60 | | Very pale brown (10YR 8/2), fine GRAVEL with fine Sand (GP), moist<br>Becomes brown (10YR 4/3) | | 0 | 0 | 1021 | |
| 475 | 10 | | 3 | 42/60 | | Brown (10YR 4/3), Silty fine to medium SAND with fine Gravel (SM), moist<br>Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | 0 | 0 | 1025 | Centralizer at 10 ft bgs |
| 470 | 15 | | 4 | 48/60 | | Brown (10YR 4/3), Silty fine to medium SAND with Gravel (SM), moist<br>3 inch clay layer<br>Brown (10YR 4/3), fine subangular GRAVEL with fine to medium Sand (GP), moist, contains trace silt | | 0 | 0 | 1111 | Centralizer at 17 ft bgs |
| 465 | 20 | | 5 | 60/60 | | Becomes yellowish brown (10YR 5/6) | | 0 | 0 | 1120 | |
| 460 | 25 | | 6 | 60/60 | | Contains trace clay<br>1 inch silt layer | | 0 | 0 | 1130 | Centralizer at 24 ft bgs |
| 455 | 30 | | 7 | 60/60 | | 6 inch silt layer | | 1 | 0 | 1140 | Centralizer at 31 ft bgs |
| 450 | 35 | | 8 | 54/60 | | Brown (10YR 4/3), Silty fine SAND with fine Gravel (SM), moist<br>Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel<br>Becomes very dark greenish gray (GLEY 1 4/1) | | 3 | 0 | 1305 | Centralizer at 38 ft bgs |
| 445 | 40 | | 9 | 60/60 | | Dark greenish gray (GLEY 1 4/1), Silty fine SAND with fine Gravel (SM), moist,<br>3 inch silt layer<br>1 foot silt layer, clay last 3 inches | | 870 | 0 | 1320 | |
| 440 | 45 | | 10 | 60/60 | | Same as above | | 1700 | 0 | 1400 | |
| | 50 | | | | | | | | | | |

URS

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Log of Boring SSA-09



| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 435 | 50 | | 11 | 60/60 | | 1 foot silt layer | | 3500 | 0 | 1415 | Centralizer at 51 ft bgs |
| | | | | | | Dark greenish gray (GLEY 1 4/1), SILT with fine Sand (ML), moist, contains trace fine subangular gravel, trace brown mottling | | | | | |
| 430 | 55 | | 12 | 60/60 | | | | 2000 | 0 | 1435 | |
| 425 | 60 | | 13 | 12/12 | | Same as above | | | | | |
| | | | | | | Completed boring to 61 feet bgs. | | | | | |
| | | | | | | Continuous Multichannel Tubing (CMT) | | | | | |
| 420 | 65 | | | | | Well Screen Intervals (ft bgs)<br>Port 1 6.75 - 7.25<br>Port 2 14.75 - 15.25<br>Port 3 20.75 - 21.25<br>Port 4 27.75 - 28.25<br>Port 5 34.75 - 35.25<br>Port 6 43.75 - 44.25<br>Port 7 59.75 - 60.25 | | | | | |
| 415 | 70 | | | | | Type of Sand Pack RMC#2/12 (ft bgs)<br>1. 6.5 - 7.5<br>2. 14.3 - 15.5<br>3. 20.5 - 21.5<br>4. 27.5 - 28.5<br>5. 34.5 - 35.5<br>6. 43.5 - 44.5<br>7. 57.0 - 61.0 | | | | | |
| 410 | 75 | | | | | | | | | | |
| 405 | 80 | | | | | Hydrated Bentonite Chips - (3/8-inch): (ft bgs)<br>1. 2.0 - 5.5<br>2. 7.5 - 13.5<br>3. 15.5 - 19.5<br>4. 21.5 - 26.5<br>5. 28.5 - 33.5<br>6. 35.5 - 42.5<br>7. 44.5 - 57.0 | | | | | |
| 400 | 85 | | | | | Dry Bentonite Crumbles: (ft bgs)<br>1. 5.5 - 6.5<br>2. 13.5 - 14.3<br>3. 19.5 - 20.5<br>4. 26.5 - 27.5<br>5. 33.5 - 34.5<br>6. 42.5 - 43.5<br>7. Not Applicable | | | | | |
| 395 | 90 | | | | | | | | | | |
| 390 | 95 | | | | | | | | | | |
| 385 | 100 | | | | | | | | | | |
| 380 | 105 | | | | | | | | | | |
| 375 | 110 | | | | | | | | | | |
| 370 | 115 | | | | | | | | | | |

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Log of Boring SSA-10



| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | 01/18/07 | Logged By | J. Sanks | Checked By | B. Partington (PG# 7612) |
| Drilling Method | Sonic | Drilling Contractor | Water Development Corporation (M. Wilerson) | Total Depth of Borehole ft.bgs | 61 |
| Drill Rig Type | GUS PECH 400RS | Sampler Type | Core Barrel (Continuous) | Approx.Surface Elevation ft msl | 484.70 |
| Approx. Depth Groundwater Encountered | 57 ft bgs | Drill Bit Size/Type | 6-inch | Top of Casing Elevation feet | 484.36 |
| Borehole Diameter (inches) | 6-inch / Diameter of Well (inches) 1.7" | Type of Well Casing | 7-Port 1.7-inch CMT | Screen Perforation | 6-inch Wire Mesh |
| Type of Sand Pack | See Below | Type and Depth of Seal(s) | See Below | | |
| Comments | Air knife to 7 feet bgs. | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 1 | 42/60 | | Light yellowish brown (10YR 6/4), Silty fine SAND with Gravel (SM), moist<br>Becomes brown (10YR 4/3) | | 1 | 0 | 1300 | |
| 480 | 5 | | 2 | 60/60 | | Brown (10YR 4/3), fine subangular GRAVEL with fine Sand (GP), moist, contains trace silt | | 1 | 0 | 1305 | |
| 475 | 10 | | 3 | 54/60 | | | | 1 | 0 | 1320 | Centralizer at 10 ft bgs |
| 470 | 15 | | 4 | 48/60 | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | 1 | 0 | 1405 | Centralizer at 17 ft bgs |
| 465 | 20 | | 5 | 60/60 | | Brown (10YR 4/3), Silty fine SAND with fine subangular Gravel (SM), moist | | 1 | 0 | 1410 | |
| 460 | 25 | | 6 | 60/60 | | 3 inch silt (ML) layer | | 1 | 0 | 1415 | Centralizer at 24 ft bgs |
| 455 | 30 | | 7 | 60/60 | | 2 inch silt (ML) layer | | 1 | 0 | 1420 | Centralizer at 31 ft bgs |
| 450 | 35 | | 8 | 120/120 | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | 1 | 0 | 1430 | |
| | | | | | | Brown (10YR 4/3), Silty fine SAND with fine subangular Gravel (SM), moist | | | | | Centralizer at 38 ft bgs |
| 445 | 40 | | | | | Brown (10YR 4/3), CLAY with fine Sand (CL), moist<br>Becomes dark greenish gray (GLEY 1 4/1) | | 700 | 0 | 1440 | |
| | | | | | | Dark greenish gray (GLEY 1 4/1), Silty fine SAND with fine Gravel (SM), moist | | | | | |
| 440 | 45 | | | 108/120 | | 3 inch silt (ML) layer, becomes brown (10YR 4/3)<br>Increase silt content | | 1000 | 0 | 1540 | |
| 435 | 50 | | | | | | | | | | |

URS

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Log of Boring SSA-10



| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50 | | 9 | | | | | | | | Centralizer at 51 ft bgs |
| | | | | | | Dark greenish gray (GLEY 1 4/1), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | | | | |
| -430 | 55 | | | 72/72 | | | | 1500 | 0 | 1600 | |
| | | | 10 | | | Dark greenish gray (GLEY 1 4/1), medium to coarse SAND (SP), moist, contains trace fine subangular gravel, trace silt | | | | | |
| -425 | 60 | | | | | | | | | | |
| | | | | | | Completed boring to 61 feet bgs. | | | | | |
| | | | | | | Continuous Multichannel Tubing (CMT) | | | | | |
| -420 | 65 | | | | | Well Screen Intervals (ft bgs)<br>Port 1 6.75 - 7.25<br>Port 2 12.75 - 13.25<br>Port 3 20.75 - 21.25<br>Port 4 27.75 - 28.25<br>Port 5 32.75 - 33.25<br>Port 6 41.75 - 42.25<br>Port 7 59.75 - 60.25 | | | | | |
| -415 | 70 | | | | | | | | | | |
| | | | | | | Type of Sand Pack RMC#2/12 (ft bgs)<br>1. 6.5 - 7.5<br>2. 12.5 - 13.5<br>3. 20.4 - 21.6<br>4. 27.3 - 28.5<br>5. 32.4 - 33.5<br>6. 41.5 - 42.7<br>7. 58.0 - 61.0 | | | | | |
| -410 | 75 | | | | | | | | | | |
| -405 | 80 | | | | | | | | | | |
| | | | | | | Hydrated Bentonite Chips (3/8-inch): (ft bgs)<br>1. 2.0 - 5.5<br>2. 7.5 - 11.5<br>3. 13.5 - 19.5<br>4. 21.6 - 26.5<br>5. 28.5 - 31.5<br>6. 33.5 - 40.6<br>7. 42.7 - 58.0 | | | | | |
| -400 | 85 | | | | | | | | | | |
| | | | | | | Dry Bentonite Crumbles: (ft bgs)<br>1. 5.5 - 6.5<br>2. 11.5 - 12.5<br>3. 19.5 - 20.4<br>4. 26.5 - 27.3<br>5. 31.5 - 32.4<br>6. 40.6 - 41.5<br>7. Not Applicable | | | | | |
| -395 | 90 | | | | | | | | | | |
| -390 | 95 | | | | | | | | | | |
| -385 | 100 | | | | | | | | | | |
| -380 | 105 | | | | | | | | | | |
| -375 | 110 | | | | | | | | | | |
| -370 | 115 | | | | | | | | | | |

URS

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| **Project: Chevron PCPL**<br>**Project Location: Fillmore, California**<br>**Project Number: 29869787.80000** | **Log of Boring SSA-11**<br>Sheet 1 of 2 |

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | 01/19/07, 01/20/07 | Logged By | J. Sanks | Checked By | B. Partington (PG# 7612) |
| Drilling Method | Sonic | Drilling Contractor | Water Development Corporation (M. Wilerson) | Total Depth of Borehole ft.bgs | 61 |
| Drill Rig Type | GUS PECH 400RS | Sampler Type | Core Barrel (Continuous) | Approx.Surface Elevation ft msl | 483.79 |
| Approx. Depth Groundwater Encountered | 57 ft bgs | Drill Bit Size/Type | 6-inch | Top of Casing Elevation feet | 483.21 |
| Borehole Diameter (inches) | 6-inch; Diameter of Well (inches) 1.7" | Type of Well Casing | 7-Port 1.7-inch CMT | Screen Perforation | 6-inch Wire Mesh |
| Type of Sand Pack | See Below | Type and Depth of Seal(s) | See Below | | |
| Comments | Air knife to 7 feet bgs. | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 1 | 60/60 | | Light yellowish brown (10YR 6/4), Silty fine SAND with fine Gravel (SM), moist<br>Becomes brown (10YR 4/3) | | 0 | 0 | 1530 | |
| 480 | 5 | | 2 | 60/60 | | Brown (10YR 4/3), GRAVEL with fine Sand (GP), moist, gravel is fine subangular, contains trace silt | | 0 | 0 | 1535 | |
| 475 | 10 | | 3 | 60/60 | | Brown (10YR 4/3), Silty fine SAND with fine subangular Gravel (SM), moist<br>6 inch silt (ML) layer | | 0 | 0 | 1538 | Centralizer at 10 ft bgs |
| 470 | 15 | | 4 | 96/120 | | 3 inch silt (ML) layer | | 0 | 0 | 1600 | Centralizer at 17 ft bgs |
| 465 | 20 | | | | | 3 inch silt (ML) layer | | | | | |
| 460 | 25 | | 5 | 120/120 | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | 0 | 0 | 1625 | Centralizer at 24 ft bgs |
| 455 | 30 | | | | | Brown (10YR 4/3), Silty fine SAND with fine subangular Gravel (SM), moist | | | | | Centralizer at 31 ft bgs |
| 450 | 35 | | 6 | 120/120 | | 6 inch silt (ML) layer | | 0 | 0 | 1655 | Centralizer at 38 ft bgs |
| 445 | 40 | | | | | Brown (10YR 4/3), CLAY with fine Sand (CL), moist, contains trace fine subangular gravel<br>Becomes dark greenish (GLEY 1 4/1) | | | | | |
| 440 | 45 | | | 120/120 | | Dark greenish gray (GLEY 1 4/1), Silty fine SAND with fine Gravel (SM), moist<br>4 inch silt (ML) layer | | 600 | 0 | 1715 | |
| 435 | 50 | | | | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | | | | |

URS

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Log of Boring SSA-11



| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50 | | 7 | | | Dark greenish gray (GLEY 1 4/1), Silty fine SAND with fine Gravel (SM), moist<br>Becomes brown (10YR 4/3), gray mottling | | | | | Centralizer at 51 ft bgs |
| 430 | | | | | | | | | | | |
| | 55 | | | 72/72 | | 1 foot Silt (ML) layer | | | | | |
| | | | 8 | | | | | | | | |
| 425 | | | | | | Brown (10YR 4/3), SILT with fine Sand (ML), wet, contains trace fine subangular gravel | | | | | |
| | 60 | | | | | | | | | | |
| | | | | | | Completed boring to 61 feet bgs. | | | | | |
| | | | | | | Continuous Multichannel Tubing (CMT) | | | | | |
| 420 | 65 | | | | | Well Screen Intervals (ft bgs)<br>Port 1 6.75 - 7.25<br>Port 2 12.75 - 13.25<br>Port 3 20.75 - 21.25 | | | | | |
| 415 | | | | | | Port 4 26.75 - 27.25 | | | | | |
| | 70 | | | | | Port 5 35.75 - 36.25<br>Port 6 42.75 - 43.25<br>Port 7 59.75 - 60.25 | | | | | |
| 410 | | | | | | Type of Sand Pack RMC#2/12 (ft bgs)<br>1. 6.5-7.6 | | | | | |
| | 75 | | | | | 2. 12.3 - 13.5<br>3. 20.3 - 21.6<br>4. 26.3 - 27.6<br>5. 35.4 - 36.6 | | | | | |
| 405 | | | | | | 6. 42.2 - 43.7 | | | | | |
| | 80 | | | | | 7. 56.9 - 61.0 | | | | | |
| | | | | | | Hydrated Bentonite Chips (3/8-inch): (ft bgs)<br>1. 2.0 - 5.5 | | | | | |
| 400 | | | | | | 2. 7.6 - 11.5<br>3. 13.5 - 19.5 | | | | | |
| | 85 | | | | | 4. 21.6 - 25.5<br>5. 27.6 - 34.5<br>6. 36.6 - 41.5 | | | | | |
| | | | | | | 7. 43.7 - 56.9 | | | | | |
| 395 | | | | | | Dry Bentonite Crumbles: (ft bgs)<br>1. 5.5 - 6.5 | | | | | |
| | 90 | | | | | 2. 11.5 - 12.3<br>3. 19.5 - 20.3<br>4. 25.5 - 26.3 | | | | | |
| 390 | | | | | | 5. 34.6 - 35.4<br>6. 41.5 - 42.2 | | | | | |
| | 95 | | | | | 7. Not Applicable | | | | | |
| 385 | | | | | | | | | | | |
| | 100 | | | | | | | | | | |
| 380 | | | | | | | | | | | |
| | 105 | | | | | | | | | | |
| 375 | | | | | | | | | | | |
| | 110 | | | | | | | | | | |
| 370 | | | | | | | | | | | |
| | 115 | | | | | | | | | | |

URS

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|---|---|
| **Project:** Chevron PCPL<br>**Project Location:** Fillmore, California<br>**Project Number:** 29869533.80000 | **Log of Boring NSA-01**<br>Sheet 1 of 5 |

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | 10/18/06 | Logged By | J. Sanks | Checked By | B. Partington |
| Drilling Method | Hollow-Stem Auger | Drilling Contractor | Water Development Corporation (Jorge) | Total Depth of Borehole (feet) | 91.0 |
| Drill Rig Type | CME 75 | Borehole Diameter (inches) | 8-inch | Approx. Surface Elevation (feet msl) | 513.3 |
| Approx. Depth Groundwater Encountered | 89 feet bgs | Sampler Type | Core Barrel (Continuous) | Borehole Backfill | Cement Grout (6%-by wt) |
| Comments | Air knife to 6 feet bgs. | | | | |

| Elevation, feet MSL | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | 72/72 | | Light yellowish brown (10YR 6/4), Silty fine to medium SAND with fine Gravel (SM), moist, gravel is subangular to subrounded | 0 | 0 | 0950 | |
| | | | | | | Becomes brown (10YR 4/3) | | | | |
| 510 | | | 1 | | | | | | | |
| | 5 | | | | | | 1 | 0 | 1004 | |
| | | | | 36/48 | | | | | | |
| | | | | | | 2-inch gravel fragments, 6-inch clay (CL) layer | | | | |
| 505 | | | 2 | | | 3-inch shale fragments, becomes brownish yellow (10YR 6/8) | | | | |
| | 10 | | | 22/30 | | Yellowish brown (10YR 5/4), fine to medium SAND with fine Gravel (SP), moist, contains trace silt, gravel is subangular to subrounded<br>At 10 feet 3-inch Gravel fragment | 1 | 0 | 1008 | |
| | | | 3 | | | | | | | |
| | | | | 19/30 | | | 1 | 0 | 1011 | |
| 500 | | | 4 | | | 4-inch Gravel (GP) layer, gravel is subangular to angular, up to 2.5-inch diameter fragments<br>1.5-inch Sandstone fragment | | | | |
| | 15 | | | 23/30 | | | 2 | 0 | 1015 | |
| | | | 5 | | | | | | | |
| | | | | 20/30 | | | 2 | 0 | 1020 | |
| 495 | | | 6 | | | Increase Gravel content, gravel is subrounded to subangular, up to 1-inch diameter | | | | |
| | 20 | | | | | | | | | |

URS

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring NSA-01



| Elevation, feet MSL | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | | 7 | 24/30 | | | 2 | 0 | 1024 | |
| | | | | | | Brown (10YR 4/3), SILT with fine to medium Sand (ML), moist, contains trace fine subangular to subrounded gravel<br>Increase in Sand content | | | | |
| | | | 8 | 24/30 | | Brown (10YR 4/3), Silty fine to medium SAND with fine Gravel (SM), moist, gravel is subangular to subrounded<br>Increase in fines content (3-inches)<br>3.5-inch diameter Gravel fragment | 2 | 0 | 1030 | |
| 490 | | | | | | | | | | |
| | 25 | | 9 | 36/60 | | | 2 | 0 | 1039 | |
| | | | | | | Brown (10YR 4/3), SILT with fine to medium Sand (ML), moist, contains trace fine subangular to subrounded gravel | | | | |
| | | | | | | Brown (10YR 4/3), CLAY with fine to medium Sand (CL), moist, contains some fine subangular to subrounded gravel | | | | |
| 485 | | | | | | | | | | |
| | | | | | | Brown (10YR 4/3), Silty fine to medium SAND with fine Gravel (SM), moist, gravel is subrounded to subangular | | | | |
| | 30 | | 10 | 24/30 | | 2-inch Silt (ML) layer<br>Increase Gravel content, gravel is fine, subangular to angular (5-inches) | 2 | 0 | 1045 | |
| | | | 11 | 26/30 | | Brown (10YR 4/3), SILT (ML), moist, contains trace fine to medium Sand, trace fine subangular gravel<br>Contains Clay with fine to medium Sand (CL), moist, trace fine gravel (3-inches)<br>Increase Gravel content | 1 | 0 | 1051 | |
| 480 | | | | | | | | | | |
| | 35 | | 12 | 29/30 | | Brown (10YR 4/3), fine Gravel with fine to coarse Sand (GP), moist, gravel is subangular to angular | 2 | 0 | 1056 | |
| | | | | | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | | | |
| | | | 13 | 24/30 | | Brown (10R 4/3), Silty fine to medium SAND (SM), moist, contains trace fine subangular gravel<br>Becomes very dark gray (10YR 3/1) | 2 | 0 | 1103 | |
| 475 | | | | | | | | | | |
| | | | | | | Very dark gray (10YR 3/1), SILT with fine to medium Sand (ML), moist, contains trace fine subangular gravel | | | | |
| | 40 | | 14 | 36/60 | | Very dark gray (10YR 3/1), fine to coarse SAND with Gravel (SP), wet, contains trace silt, gravel is fine subangular | 1 | 0 | 1110 | |
| | | | | | | Brown (10YR 4/3), SILT (ML), moist, contains trace fine sand | | | | |
| | | | | | | Very dark brown (10YR 2/2), CLAY with fine to coarse Sand (CL), moist, trace fine subangular to angular gravel | | | | |
| 470 | | | | | | | | | | |

URS

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring NSA-01



| Elevation, feet MSL | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 45 | | 15 | 26/30 | | Increase Gravel content | 3 | 0 | 1116 | |
| | | | | | | Very dark gray (10YR 3/1), Silty fine to coarse SAND (SM), moist, gravel is fine subrounded to subangular | 3 | 0 | 1123 | |
| 465 | | | 16 | 26/30 | | | | | | |
| | 50 | | 17 | 26/30 | | | 2 | 0 | 1130 | |
| | | | | | | Light brown (10YR 8/3), fine SAND (SP), moist, contains trace silt, trace fine subangular to subrounded gravel | | | | |
| | | | | | | Black mottled | 2 | 0 | 1136 | |
| 460 | | | 18 | 24/30 | | Gravel not present | | | | |
| | | | | | | Becomes very dark gray (10YR 3/1), contains gravel (4-inches) | | | | |
| | 55 | | 19 | 24/30 | | Contains fine Gravel | 2 | 0 | 1142 | |
| | | | | | | Light brown (10YR 8/3), SILT (ML), moist, contains trace fine subangular gravel, trace fine sand, black mottled | | | | |
| | | | | | | Becomes reddish brown (5YR 4/3) | 3 | 0 | 1149 | |
| 455 | | | 20 | 30/30 | | 1.5-inch diameter gravel fragments | | | | |
| | 60 | | 21 | 30/30 | | Becomes dark yellowish brown (10YR 4/6), 3-inch diameter gravel fragment | 1 | 0 | 1155 | |
| | | | | | | Increase sand content | | | | |
| | | | | | | Brown (2.5YR 5/4), Silty fine to medium SAND (SM), moist | 1 | 0 | 1205 | |
| 450 | | | 22 | 26/30 | | 6-inch Gravel (GP) layer, gravel is fine subrounded to subangular | | | | |
| | | | | | | 2-inch Gravel fragment, decrease coarse sand | | | | |
| | | | | | | 1-inch Silt (ML) layer | | | | |
| | 65 | | | 38/60 | | Brown (2.5YR 5/4), SILT with Sand (ML), moist, contains trace fine subangular gravel | 1 | 0 | 1348 | |
| | | | | | | Brown (2.5YR 5/4), fine to coarse SAND with Gravel (SP), moist, contains trace silt, gravel is fine subrounded to subangular | | | | |

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring NSA-01



| Elevation, feet MSL | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 23 | | | | | | | |
| 445 | | | | | | | | | | |
| | 70 | | | 46/60 | | 2-inch diameter gravel fragment | 2 | 0 | 1402 | Rig chatter<br>Slow drilling |
| | | | 24 | | | 4-inch cobble fragment<br>3-inch gravel fragment | | | | |
| 440 | | | | | | | | | | |
| | 75 | | | 24/24 | | | 2 | 0 | 1428 | |
| | | | 25 | | | 4-inch cobble fragment<br>2-inch Silt (ML) layer | 2 | 0 | 1457 | Drill rig stalling in gravel.<br>Add water to open auger. |
| | | | | 36/36 | | | | | | |
| 435 | | | 26 | | | 4-inch cobble fragments | | | | |
| | 80 | | | 36/60 | | | 1 | 0 | 1520 | |
| | | | 27 | | | 3-inch layer of medium sand (SP) | | | | |
| 430 | | | | | | | | | | |
| | 85 | | | 30/36 | | 3-inch layer of Silty medium Sand (SM) | 2 | 0 | 1542 | Rig chatter<br>Slow drilling |
| | | | 28 | | | Becomes dark gray (10YR 4/1), medium sand, trace silt<br>Becomes fine to coarse Sand with Gravel, trace cobbles up to 3 inch diameter | | | | |
| 425 | | | | 24/24 | | | 4 | 0 | 1559 | Obstruction, pulling core |
| | | | 29 | | | Becomes wet | | | | |
| | 90 | | | | | | | | | |

URS

**Project:** Chevron PCPL
**Project Location:** Fillmore, California
**Project Number:** 29869533.80000

# Log of Boring NSA-01



| Elevation, feet MSL | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | 90 | | 30 | 0/12 | | | -- | -- | 1630 | Slow drilling |
| | | | | | | Refusal at 91 feet bgs. | | | | |
| 420 | | | | | | | | | | |
| | 95 | | | | | | | | | |
| 415 | | | | | | | | | | |
| | 100 | | | | | | | | | |
| 410 | | | | | | | | | | |
| | 105 | | | | | | | | | |
| 405 | | | | | | | | | | |
| | 110 | | | | | | | | | |
| 400 | | | | | | | | | | |

URS

| | |
|---|---|
| **Project: Chevron PCPL**<br>**Project Location: Fillmore, California**<br>**Project Number: 29869787.80000** | **Log of Boring NSA-03**<br>Sheet 1 of 3 |

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | 01/22/07 and 01/23/07 | Logged By | J. Sanks | Checked By | B. Partington (PG# 7612) |
| Drilling Method | Sonic | Drilling Contractor | Water Development Corporation (M. Wilerson) | Total Depth of Borehole ft.bgs | 97 |
| Drill Rig Type | GUS PECH 400RS | Sampler Type | Core Barrel (Continuous) | Approx.Surface Elevation ft msl | 513.31 |
| Approx. Depth Groundwater Encountered | 88.5 ft bgs | Drill Bit Size/Type | 6-inch | Top of Casing Elevation feet | 512.79 |
| Borehole Diameter (inches) | 6-inch / Diameter of Well (inches) 1.7" | Type of Well Casing | 7-Port 1.7-inch CMT | Screen Perforation | 6-inch Wire Mesh |
| Type of Sand Pack | See Below | Type and Depth of Seal(s) | See Below | | |
| Comments | Air knife to 7 feet bgs. | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | 1 | 60/60 | | Light yellowish brown (10YR 6/4), Silty fine to medium SAND with fine subangular Gravel (SM), moist | | 0 | 0 | 0930 | |
| 510 | | | | | | | | | | | |
| | 5 | | 2 | 60/60 | | Very pale brown (10R 8/2), fine SAND with fine subangular Gravel (SP), moist, contains trace silt<br>Becomes yellowish brown (10YR 5/4) | | 1 | 0 | 0938 | |
| 505 | | | | | | | | | | | Centralizer at 8 ft bgs |
| | 10 | | 3 | 60/60 | | Same as above | | 1 | 0 | 0945 | |
| 500 | | | | | | | | | | | |
| | 15 | | 4 | 108/120 | | 3 inch Silt (ML) layer | | 4 | 0 | 1003 | |
| 495 | | | | | | | | | | | |
| | 20 | | | | | | | | | | Centralizer at 19 ft bgs |
| 490 | | | | | | Brown (10YR 4/3), Silty fine SAND (SM), moist, contains trace fine subangular gravel | | | | | |
| | 25 | | 5 | 120/120 | | Same as above | | 1 | 0 | 1040 | |
| 485 | | | | | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | | | | |
| | 30 | | | | | Brown (10YR 4/3), CLAY with fine Sand (CL), moist, contains trace fine subangular gravel | | 0 | 0 | 1044 | |
| 480 | | | | | | Brown (10YR 4/3), Silty fine to medium SAND with fine Gravel (SM), moist | | | | | Centralizer at 32 ft bgs |
| | 35 | | | 120/120 | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | 0 | 0 | 1118 | |
| 475 | | | | | | Brown (10YR 4/3), Silty fine SAND (SM) with fine subangular Gravel (SM), moist | | | | | |
| | 40 | | 6 | | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace fine subangular gravel | | 1 | 0 | 1120 | |
| 470 | | | | | | Very dark gray (10YR 3/1), Silty fine to medium SAND with fine subangular Gravel (SM), moist | | | | | |
| | 45 | | | 120/120 | | Brown (10YR 4/3), SILT with fine Sand (ML), moist, contains trace<br>1 foot Silty fine Sand with Gravel (SM) layer<br>Becomes dark gray (GLEY 1 4/1) | | 1 | 0 | 1315 | Centralizer at 46 ft bgs |
| 465 | | | | | | | | | | | |
| | 50 | | | | | | | | | | |

URS

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Log of Boring NSA-03



| Elevation, feet | Depth, feet | SAMPLES Type | Number | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50 | | 7 | | | Dark gray (GLEY 1 4/1), Silty fine to medium SAND with fine subangular to subrounded Gravel (SM), moist | | 3 | 0 | 1320 | |
| -460 | | | | | | | | | | | |
| | 55 | | | 120/120 | | Dark gray (GLEY 1 4/1), Silty with fine Sand (ML), moist, contains trace fine subangular gravel | | 2 | 0 | 1430 | |
| -455 | | | | | | | | | | | |
| | 60 | | 8 | | | | | 2 | 0 | 1435 | Centralizer at 60 ft bgs |
| -450 | | | | | | Yellowish brown (10YR 5/4), fine to coarse SAND with fine subangular Gravel (SP), moist | | | | | |
| | 65 | | | 120/120 | | 1 foot Silt (ML), layer | | 2 | 0 | 1500 | |
| -445 | | | | | | | | | | | |
| | 70 | | 9 | | | 3 inch Silt (ML) layer | | | | | |
| -440 | | | | | | 3 inch Silt (ML) layer | | | | | Centralizer at 74 ft bgs |
| | 75 | | | 120/120 | | Increase Gravel content<br>3 inch Silt (ML) layer | | 2 | 0 | 1650 | |
| -435 | | | | | | | | | | | |
| | 80 | | 10 | | | Decrease fines content | | | | | |
| -430 | | | | | | | | | | | |
| | 85 | | | 120/120 | | | | 7 | 0 | 1700 | Centralizer at 86 ft bgs |
| -425 | | | | | | 6 inch silt (ML) layer<br>3 inch Gravel fragment | | | | | |
| | 90 | | 11 | | | | | 8 | 0 | 1105 | |
| -420 | | | | | | Becomes dark gray (10YR 3/1) | | | | | |
| | 95 | | 12 | 24/24 | | | | | | | |
| -415 | | | | | | Completed boring to 97 feet bgs. | | | | | |
| | 100 | | | | | Continuous Multichannel Tubing (CMT) | | | | | |
| -410 | | | | | | Well Screen Intervals (ft bgs)<br>Port 1 12.75 - 13.25<br>Port 2 25.75 - 26.25<br>Port 3 37.75 - 38.25 | | | | | |
| | 105 | | | | | Port 4 52.75 - 53.25<br>Port 5 68.75 - 69.25<br>Port 6 77.75 - 78.25<br>Port 7 94.75 - 95.25 | | | | | |
| -405 | | | | | | | | | | | |
| | 110 | | | | | Type of Sand Pack RMC#2/12 (ft bgs)<br>1. 12.5 - 13.5<br>2. 25.5 - 26.5<br>3. 37.5 - 38.6 | | | | | |
| -400 | | | | | | 4. 52.5 - 53.5<br>5. 68.5 - 69.6 | | | | | |
| | 115 | | | | | 6. 77.3 - 78.5<br>7. 93.7 - 97.0 | | | | | |

URS

**Project: Chevron PCPL**
**Project Location: Fillmore, California**
**Project Number: 29869787.80000**

# Log of Boring NSA-03



| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | SAMPLES Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 395 | | | | | | Hydrated Bentonite Chips (3/8-inch): (ft bgs) | | | | | |
| | | | | | | 1. 2.0 - 11.5 | | | | | |
| | | | | | | 2. 13.5 - 24.5 | | | | | |
| | 120 | | | | | 3. 26.5 - 36.5 | | | | | |
| | | | | | | 4. 38.6 - 51.5 | | | | | |
| | | | | | | 5. 53.5 - 67.5 | | | | | |
| | | | | | | 6. 69.6 - 76.5 | | | | | |
| 390 | | | | | | 7. 78.5 - 93.7 | | | | | |
| | | | | | | Dry Bentonite Crumbles: (ft bgs) | | | | | |
| | 125 | | | | | 1. 11.5 - 12.5 | | | | | |
| | | | | | | 2. 24.5 - 25.5 | | | | | |
| | | | | | | 3. 36.5 - 37.5 | | | | | |
| 385 | | | | | | 4. 51.5 - 52.5 | | | | | |
| | | | | | | 5. 67.5 - 68.5 | | | | | |
| | 130 | | | | | 6. 76.5 - 77.3 | | | | | |
| | | | | | | 7. Not Applicable | | | | | |
| 380 | | | | | | | | | | | |
| | 135 | | | | | | | | | | |
| 375 | | | | | | | | | | | |
| | 140 | | | | | | | | | | |
| 370 | | | | | | | | | | | |
| | 145 | | | | | | | | | | |
| 365 | | | | | | | | | | | |
| | 150 | | | | | | | | | | |
| 360 | | | | | | | | | | | |
| | 155 | | | | | | | | | | |
| 355 | | | | | | | | | | | |
| | 160 | | | | | | | | | | |
| 350 | | | | | | | | | | | |
| | 165 | | | | | | | | | | |
| 345 | | | | | | | | | | | |
| | 170 | | | | | | | | | | |
| 340 | | | | | | | | | | | |
| | 175 | | | | | | | | | | |
| 335 | | | | | | | | | | | |
| | 180 | | | | | | | | | | |
| 330 | | | | | | | | | | | |

URS

# Appendix D

# Field Data Sheets

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-03 (12') |
| Project Number: 29869533 | Date: 10/23/06 |
| Client: Chevron | Sampler: JS |
| Project Location: Fillmore, CA | Weather: Cool, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00782 | Flow Controller (serial number): GV-.5-071 |

| PURGE DATA | |
|---|---|
| Start Time: 10:10:30 | Stop Time: 10:13:50 |
| Initial Summa Canister Pressure (mmHg): -35 | Final Summa Canister Pressure (mmHg): 0 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 654 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15,3C |
| Sample Time: 10:18 | Sample ID: F06-10-001 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
|---|
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPC | Well ID (name and depth): SSA-03 (21') |
| Project Number: 29869537 | Date: 10/23/06 |
| Client: Chevron | Sampler: JS |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 010666 5013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00780 | Flow Controller (serial number): 6V-5-121 |

| PURGE DATA | |
|---|---|
| Start Time: [redacted]:52:30 | Stop Time: 12:56:50 |
| Initial Summa Canister Pressure (mmHg): -35 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 858 |
| (04:20 Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 1259 | Sample ID: F06-10-003 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

~~1226~~ 1230 Set Bentonite, Installed Tubing

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-03 30' |
| Project Number: 29869533 | Date: 10/23/06 |
| Client: Chevron | Sampler: JS |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00130 | Flow Controller (serial number): 6V-0.5-118 |

| PURGE DATA | |
|---|---|
| Start Time: 14:27:30 | Stop Time: 14:32:23 |
| Initial Summa Canister Pressure (mmHg): -35 | Final Summa Canister Pressure (mmHg): ~4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): ~~200~~ 980 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 1434 | Sample ID: FOG-10-005 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |
| (04:53 min Purge) | |

COMMENTS

1405 Set Bentonite @ Surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-03 (40') |
| Project Number: 29869533 | Date: 10/23/06 |
| Client: Chevron | Sampler: JB/TT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00405 | Flow Controller (serial number): 6V-0.5-029 |

| PURGE DATA | |
|---|---|
| Start Time: 16:00:00 | Stop Time: 16:05:38 |
| Initial Summa Canister Pressure (mmHg): -~~30~~ 5 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 1128 |
| (05:38 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 16:07 | Sample ID: FOG-10-007 |
| Duplicate Collected? Yes No | Duplicate ID: N/A |

COMMENTS

1540 Set Bentonite seal @ Surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-04 (10) |
| Project Number: 29869533 | Date: 10/23/06 |
| Client: Chevron | Sampler: JS |
| Project Location: Fillmore, CA | Weather: Breezy, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 010666501R | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00544 | Flow Controller (serial number): 6V-05-082 |

| PURGE DATA | |
|---|---|
| Start Time: 10:30:00 | Stop Time: 10:33:30 |
| Initial Summa Canister Pressure (mmHg): -35 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 654 |
| (03:30) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 3C |
| Sample Time: 10:35:00 | Sample ID: F06-10-002 |
| Duplicate Collected? Yes (No) | Duplicate ID: |

| COMMENTS |
|---|
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-04(20') |
| Project Number: 29869533 | Date: 10/23 |
| Client: Chevron | Sampler: JS |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 1136 | Flow Controller (serial number): GV-5-086 |

| PURGE DATA | |
|---|---|
| Start Time: 13:04:00 | Stop Time: 13:08:20 |
| Initial Summa Canister Pressure (mmHg): -35 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): ~~200~~ 858 |
| (04:20 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 13:09 | Sample ID: F06-10-004 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1245 Set Bentonite @ Surface.

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-04 30' |
| Project Number: 29869533 | Date: 10/23/06 |
| Client: Chevron | Sampler: JS/JT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00810 | Flow Controller (serial number): 6V-0.5-114 |

| PURGE DATA | |
|---|---|
| Start Time: 14:55:00 | Stop Time: 14:59:53 |
| Initial Summa Canister Pressure (mmHg): -35 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 980 |
| (04:53 Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 1500 | Sample ID: FOG-10-006 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1435 Set Bentonite Seal @ ground surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

## PROJECT INFORMATION

| | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-04 40' |
| Project Number: 29869533 | Date: 10/23/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

## EQUIPMENT

| | |
|---|---|
| Sampling Pump (serial number): 010 666 5013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SC00579~~ SC00088 JS | Flow Controller (serial number): 6V-S-~~054~~ 100 |

## PURGE DATA

| | |
|---|---|
| Start Time: 09:20:00 | Stop Time: 09:25:38 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 1128 |

(05.38 min Purge)

## SAMPLING DATA

| | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 0927 | Sample ID: FOG-10-008 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

## COMMENTS

0900 Set Bentonite @ Surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: G' PC PL | Well ID (name and depth): SSA-05 (10') |
| Project Number: 29869533 | Date: 10/24/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Cool, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0 10666 3013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00573 | Flow Controller (serial number): 6V-.5-054 |

| PURGE DATA | |
|---|---|
| Start Time: 09:36:00 | Stop Time: 09:39:37 |
| Initial Summa Canister Pressure (mmHg): -28 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 723 |
| (03:37 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 09:41 | Sample ID: F06-10-009 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

0915 Set Bentonite @ Surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-05 (~~20'~~ 25') |
| Project Number: 29869533 | Date: 10/24/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 010 666 5013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00758 | Flow Controller (serial number): GV-0.5-111 |

| PURGE DATA | |
|---|---|
| Start Time: 12:05:00 | Stop Time: 12:09:30 |
| Initial Summa Canister Pressure (mmHg): | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 899 |
| (04:30 min) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO15, 3C |
| Sample Time: 12:11 | Sample ID: F06-10-010 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1145 Set bentonite seal @ surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-05 (30') |
| Project Number: 29869533 | Date: 10/24/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SC00750~~ | Flow Controller (serial number): ~~6V-5-084~~ |

| PURGE DATA | |
|---|---|
| Start Time: | Stop Time: |
| Initial Summa Canister Pressure (mmHg): 29 | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): ~~200~~ | Purge Volume (mL): |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): ~~200~~ | Analysis Requested: ~~TO-15, 3C~~ |
| Sample Time: | Sample ID: ~~F06-10-013~~ |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

Could not sample - tip falling off rods.
Drove to 35', could not attach tube. Will skip
& collect 40' sample

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-05 (40') |
| Project Number: 29869533 | Date: 10/25/06 |
| Client: Chevron | Sampler: JS / TT |
| Project Location: Fillmore, CA | Weather: ~~Warm~~ Cool, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SE00750~~ (JS) | Flow Controller (serial number): ~~6V-5-084~~ (JS) |
| ~~5600 886 (Top)~~ (JS) | ~~6V-5-087 (Top)~~ (JS) |

| PURGE DATA | |
|---|---|
| Start Time: N/A | Stop Time: N/A |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 1123 |
| (05:37 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: |
| Sample Time: ~~11:00~~ JS | Sample ID: F06-10-013 |
| Duplicate Collected? ~~Yes~~ (No) | Duplicate ID: ~~F06-10-014~~ |

COMMENTS

09:30 Set Bentonite Seal @ Surface

10:40 Pulled up rod, reset Bentonite. Vac Pulling -6 inHg.

1300 Summa did not fill - Pulled rods, tip still attached.

Sample not collected

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-06 (10') |
| Project Number: 29869533 | Date: 10/24/06 |
| Client: Chevron | Sampler: JS |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00300 | Flow Controller (serial number): 6V-.5-125 |

| PURGE DATA | |
|---|---|
| Start Time: 11:12:30 | Stop Time: 11:16:07 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 723 |
| (03.37 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 11:18 | Sample ID: F06-10-010 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1047 Set Bentonite Seal @ Surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-06 (20') |
| Project Number: 27869533 | Date: 10/24/06 |
| Client: Chevron | Sampler: TT |
| Project Location: Fillmore, CA | Weather: Warm, sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SC00300~~ SC00552 | Flow Controller (serial number): 6V-5057 |

| PURGE DATA | |
|---|---|
| Start Time: 12:54:30 | Stop Time: 12:59:00 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 ml/min (4:30 min) | Purge Volume (mL): 899 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 1300 | Sample ID: F06-10-012 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1340 Closed Summa

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA - 06 (30') |
| Project Number: 29869533 | Date: 10/24/06 |
| Client: Chevron | Sampler: JS/RT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106605013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 5C00692 | Flow Controller (serial number): GV-.5-097 |

| PURGE DATA | |
|---|---|
| Start Time: 14:45:00 | Stop Time: 14:49:58 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 993 |
| (04:58) min Purge | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 1453 | Sample ID: F06-10-015 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1425 Set bentonite seal

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): SSA-06 (40') |
| Project Number: 29869533 | Date: 10/25/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Cool, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene (1/4" ID) |
| Summa Canister (serial number): SC06230 | Flow Controller (serial number): GV-.5-096 |

| PURGE DATA | |
|---|---|
| Start Time: 1202:00 | Stop Time: 1211:07 |
| Initial Summa Canister Pressure (mmHg): 30mm Hg | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 1823 |
| (09:07 min Purge | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, VOC |
| Sample Time: 1213:00 | Sample ID: F06-10-016 |
| Duplicate Collected? (Yes) No | Duplicate ID: SC00886 / GV-.5-087 |
| Dup start time 1313 | F06-10-017 |

COMMENTS

11:40 Set Bentonite Seal @ Surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): NSA-02 10' |
| Project Number: 29869533 | Date: 10/25/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00198 | Flow Controller (serial number): GV-0.5-090 |

| PURGE DATA | |
|---|---|
| Start Time: 12:55:00 | Stop Time: 12:58:30 |
| Initial Summa Canister Pressure (mmHg): | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 654 |
| (03:30 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 1300 | Sample ID: F06-10-018 |
| Duplicate Collected? (Yes) No | Duplicate ID: F06-10-019 |
| Start time for drop 1345 | |

COMMENTS

1235 Set Bentonite Seal

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): NSA-02 30' |
| Project Number: 29869533 | Date: 10/25/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00054 | Flow Controller (serial number): 6V-0.5-092 |

| PURGE DATA | |
|---|---|
| Start Time: 15:10 | Stop Time: 15:15 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 989 |
| (04:57 min) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 3C |
| Sample Time: 15:15 | Sample ID: F06-10.20 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

@ 1450 Set bentonite seal @ surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: PCPL | Well ID (name and depth): NSA-02 50' |
| Project Number: 29869533 | Date: 10/26/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Cool, Windy, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene 1/4" ID |
| Summa Canister (serial number): SC00319 | Flow Controller (serial number): 6V-0.5-115 |

| PURGE DATA | |
|---|---|
| Start Time: 08:35:00 | Stop Time: 08:45:33 |
| Initial Summa Canister Pressure (mmHg): -31 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 2113 |
| (10:33 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 08:47 | Sample ID: F06-10-021 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

0815 Set Bentonite seal @ surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: ~~CPC~~ PCPL | Well ID (name and depth): MSA-02 (64ft) |
| Project Number: 29869533 | Date: 10/26/06 |
| Client: Chevron | Sampler: JS/TT |
| Project Location: Fillmore, CA | Weather: Windy, Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 0106665013 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00599 | Flow Controller (serial number): 6V-0.5-062 |

| PURGE DATA | |
|---|---|
| Start Time: ~~12:20:00~~ 13:33:00 | Stop Time: ~~12:32:36~~ 13:45:36 |
| Initial Summa Canister Pressure (mmHg): -28 | Final Summa Canister Pressure (mmHg): -1 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 2518 |
| (12:36 min Purge) | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15, 3C |
| Sample Time: 13:50 | Sample ID: FOG-10-022 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1200 Set bentonite seal @ surface

1313 Reset bentonite seal @ surface

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-11 (7 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cool, Cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00186 | Flow Controller (serial number): 6V-5-105 |

| PURGE DATA | |
|---|---|
| Start Time: 08:55 | Stop Time: 26 min 09:23 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 09:25 | Sample ID: F07-03-001 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-11 (13 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00708 | Flow Controller (serial number): GV-5-135 |

| PURGE DATA | 28.8 min |
|---|---|
| Start Time: 09:36 | Stop Time: 10:04 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 10:08 | Sample ID: F07-03-002 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-11 (21 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00610 | Flow Controller (serial number): 6V-, 5-134 |

| PURGE DATA | 32 min Purge |
|---|---|
| Start Time: 10 11 | Stop Time: 10.43 |
| Initial Summa Canister Pressure (inHg): -28 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 10:45 | Sample ID: F07-03-003 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-11 (27 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SC00342~~ JS | Flow Controller (serial number): ~~FV-0.5-049~~ JS |
| SC00093 | FV-0.5-033 |

| PURGE DATA | |
|---|---|
| | 35 min JS |
| Start Time: 10:28 | Stop Time: ~~1102~~ 1103 |
| Initial Summa Canister Pressure (inHg): ~~-24~~ -30 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6996 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: ~~1102~~ ~~1103~~ 1115 | Sample ID: F07-03-004 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
|---|
| Exchanged Summa Due to first reading -24 instead of -30 initially |

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-11 (36 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cool, cloudy |
| | |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 5C00628 | Flow Controller (serial number): 6V-0.5-062 |
| | |

| PURGE DATA | 39 min purge |
|---|---|
| Start Time: 10:51 | Stop Time: 11:30 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7794 |
| | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 11:30 | Sample ID: F07-03-005 |
| Duplicate Collected? Yes (No) | Duplicate ID: None |
| | |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-11 (43 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, clear |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00413 | Flow Controller (serial number): 6V-5-063 |

| PURGE DATA | 42 min |
|---|---|
| Start Time: 1105 | Stop Time: 11:47 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8415 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1150 | Sample ID: F07-03-006 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-10 (7ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JSM |
| Project Location: Fillmore, California | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00553 | Flow Controller (serial number): GV-5-136 |

| PURGE DATA | 26.1 min |
|---|---|
| Start Time: 11:54 | Stop Time: 12:20 |
| Initial Summa Canister Pressure (inHg): -30 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1221 | Sample ID: F07-03-007 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-1D (13 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cool, cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00842 | Flow Controller (serial number): GV-5-146 |

| PURGE DATA 29 min | |
|---|---|
| Start Time: 12:27 | Stop Time: 12:56 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 12:58 | Sample ID: F07-03-008 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1246 Generator out of fuel, switched to backup

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-10 (21 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, Cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00788 | Flow Controller (serial number): 6V-5-145 |

| PURGE DATA 32.3 Purge | |
|---|---|
| Start Time: 12:36 | Stop Time: 13:09 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1310 | Sample ID: F07-03-009 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1246 Generator out of fuel, switch to battery

# URS CORPORATION

## VAPOR SAMPLING SHEET

**PROJECT INFORMATION**

Project: Chevron PCPL

Project Number: 29869787.70[redacted]

Client: Chevron PCPL

Project Location: Fillmore, Ca[redacted]nia

Well ID (name and depth): SSA-10 (28 ft)

Date: 3/14/07

Sampler: JS

Weather: cool, cloudy

**EQUIPMENT**

Sampling Pump (serial numbe[redacted]

Summa Canister (serial numb[redacted] SC00444 SC00349

Sample Tubing: Dedicated - Polyethylene

Flow Controller (serial number): GV-5-139 GV-5-086

**PURGE DATA**

35.4 min

Start Time: 1303

Stop Time: 1339

Initial Summa Canister Pressu[redacted](inHg): -29

Final Summa Canister Pressure (inHg): -4

Purge Rate (mL/min): 200

Purge Volume (mL): 7085

**SAMPLING DATA**

Sampling Rate (mL/min): 200

Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C)

Sample Time: 1340 / 1420

Sample ID: F-07-03-010

Duplicate Collected? (Yes) No

Duplicate ID: F07-03-011

**COMMENTS**

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-10 (33ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cool, cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 5C00898 | Flow Controller (serial number): 6V-5-143 |

| PURGE DATA 37.6 min Purge | |
|---|---|
| Start Time: 13:14 | Stop Time: 13:52 |
| Initial Summa Canister Pressure (inHg): -30 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7528 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 13:53 | Sample ID: F07-03-012 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-09 (7 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: warm, pt. cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E460UC | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 5C00561 | Flow Controller (serial number): BV-0.5-113 |

| PURGE DATA 26.1 min | |
|---|---|
| Start Time: 14:18 | Stop Time: 14:45 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -9 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1446 | Sample ID: F07-03-013 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

## VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-10 (42 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, warm |

| EQUIPMENT 4.6 min | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00173 | Flow Controller (serial number): 6V-15-19 |

| PURGE DATA | |
|---|---|
| Start Time: 13:45 | Stop Time: 14:~~27~~ 26 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8326 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 14:35 | Sample ID: ~~F06-07~~ F07-03-014 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

First Summa Can ~~Sa~~ was leaking through flow regulator. Replaced with new summa.

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-07 (15ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Clear, warm, breezy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00300 | Flow Controller (serial number): GV-05710 |

| PURGE DATA 29.7 min | |
|---|---|
| Start Time: 14:51 | Stop Time: 15:21 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5932 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1522 | Sample ID: F07-03-015 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSR-09 (21 ft) |
| Project Number: 29869787.70000 | Date: 3/19/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Clear, warm |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00542 | Flow Controller (serial number): GV-5-102 |

| PURGE DATA | 32 min Purge |
|---|---|
| Start Time: 1501 | Stop Time: 15:33 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1535 | Sample ID: F07-03-~~013~~ 016 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-~~10~~ 09 (28 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00892 | Flow Controller (serial number): 6V-0.5-114 |

| PURGE DATA 35.4 min | |
|---|---|
| Start Time: 0720 | Stop Time: 0756 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7085 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 0757 | Sample ID: F07-03-017 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| | |
|---|---|
| PROJECT INFORMATION | 35 |
| Project: Chevron PCPL | Well ID (name and depth): SSA-09 (~~33~~ ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, cool |
| | |
| EQUIPMENT | |
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00130 | Flow Controller (serial number): 6V-5-149 |
| | |
| PURGE DATA Purge 38.5 min | |
| Start Time: 0735 | Stop Time: 0814 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7706 |
| | |
| SAMPLING DATA | |
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 0815 | Sample ID: F 07-03-018 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |
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| COMMENTS | |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-09 (44 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cool, cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC 00115 | Flow Controller (serial number): 6V-5-138 |

| PURGE DATA 42.5 min Purge | |
|---|---|
| Start Time: 0805 | Stop Time: 0848 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8504 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: ~~0850~~ 0849 | Sample ID: F07-03-019 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-07 (7 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, Cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00880 | Flow Controller (serial number): 6V-.5-147 |

| PURGE DATA | 26.1 min Purge |
|---|---|
| Start Time: 0839 | Stop Time: 0906 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 0906 | Sample ID: F07-03-020 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-07 (13ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, Cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00605 | Flow Controller (serial number): 6V-0.5-119 |

| PURGE DATA 28.9 min Purge | |
|---|---|
| Start Time: 0858 | Stop Time: 0927 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 0930 | Sample ID: F07-03-021 |
| Duplicate Collected? ~~Yes~~ ~~No~~ NO JS | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-07 (21 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 5C00805 | Flow Controller (serial number): 6V-05 009 |
| 5C00812 Dup | |

| PURGE DATA 32.3 min Purge | |
|---|---|
| Start Time: 0907 | Stop Time: 0940 |
| Initial Summa Canister Pressure (inHg): ~29 | Final Summa Canister Pressure (inHg): ~~19~~ -3 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 0941 / 1017 | Sample ID: F07-03-022 |
| Duplicate Collected? Yes ~~No~~ JD | Duplicate ID: ~~N/A~~ F07-03-024 |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-07 (28 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: cool, cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E76 046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): | Flow Controller (serial number): |

| PURGE DATA 35.4 min Purge | |
|---|---|
| Start Time: 0934 | Stop Time: 10:10 |
| Initial Summa Canister Pressure (inHg): | Final Summa Canister Pressure (inHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7085 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1011 | Sample ID: F07-03-023 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-07 (33 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: cloudy, slight drizzle |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SCC 00005 | Flow Controller (serial number): 6V-5-144 |

| PURGE DATA 37.6 min Purge | |
|---|---|
| Start Time: 09:50 | Stop Time: 10:28 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7528 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1029 | Sample ID: F07-03-025 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

Vac Gauge reads 2 inHg while Purging

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): SSA-07 (43 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: cloudy, slight drizzle |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): | Flow Controller (serial number): |

| PURGE DATA | 42.1 min |
|---|---|
| Start Time: 1022 | Stop Time: 1105 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8415 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1106 | Sample ID: F07-03-026 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): NSA-03 (13 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, cool, slight drizzle |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E76046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00954 | Flow Controller (serial number): GV-5-149 |
| SC00915 | GV-5-101 |

| PURGE DATA | 28.8 min Purge |
|---|---|
| Start Time: 1205 | Stop Time: 1239 |
| Initial Summa Canister Pressure (inHg): -29 -29 | Final Summa Canister Pressure (inHg): -4 -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): ~~6~~ 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1240 / 1325 | Sample ID: F07-03-027 |
| Duplicate Collected? Yes ~~No~~ | Duplicate ID: F07-03-029 |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): NSA-03 (26 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cool, cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00958 | Flow Controller (serial number): 6V-.5-058 |

| PURGE DATA 34.5 min Purge | |
|---|---|
| Start Time: 1209 | Stop Time: 1244 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6907 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1245 | Sample ID: F07-03-028 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): NSA-03 (38 FH) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, Cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E76046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00371 | Flow Controller (serial number): 6V-,5-141 |

| PURGE DATA 39.9 min Purge | |
|---|---|
| Start Time: 1247 | Stop Time: 1327 |
| Initial Summa Canister Pressure (inHg): -28 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7972 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1328 | Sample ID: F07-03-~~029~~ 030 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): NSA-03 (53 ft) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cool, cloudy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E76046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): N/A | Flow Controller (serial number): N/A |

| PURGE DATA 46.5 min Purge | |
|---|---|
| Start Time: 1255 | Stop Time: 1342 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): N/A |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: N/A | Sample ID: N/A |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

1315 Exceeded 10 in Hg

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): NSA-03 (69 ft) |
| Project Number: 29869787.70000 | Date: 3/21/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00455 | Flow Controller (serial number): 6V-05-109 |

| PURGE DATA | 53.6 min Purge |
|---|---|
| Start Time: 1315 | Stop Time: 1409 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 10271 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1410 | Sample ID: F07-03-031 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: Chevron PCPL | Well ID (name and depth): NSA-03 (78ft BGS) |
| Project Number: 29869787.70000 | Date: 3/20/07 |
| Client: Chevron PCPL | Sampler: JS |
| Project Location: Fillmore, California | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): E46046 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00900 | Flow Controller (serial number): 6V-0.5-111 |

| PURGE DATA 57.6 min Purge | |
|---|---|
| Start Time: 1334 | Stop Time: 1432 |
| Initial Summa Canister Pressure (inHg): -29 | Final Summa Canister Pressure (inHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 11519 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: VOCs (TO-15), Fixed Gasses CO2/O2 (3C) |
| Sample Time: 1433 | Sample ID: F07-03-032 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-11 (7) |
| Project Number: 29869787.80000 | Date: 08/06/2007 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00549 | Flow Controller (serial number): 6V-0.5-028 |

| PURGE DATA 26.1 min | |
|---|---|
| Start Time: 0713 | Stop Time: 07:39 (15) |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 (08:15) |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$+$O_2$ (3C) |
| Sample Time: 0740 | Sample ID: F07-08-200 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-11 (13) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00678 | Flow Controller (serial number): GV-.5-080 |

| PURGE DATA 28.8 min | |
|---|---|
| Start Time: 07 17 | Stop Time: 07:46 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ $O_2$ (3C) |
| Sample Time: 0747 | Sample ID: F07-08-~~002~~ 201 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A (JS) |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-11 (21) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Cloudy, cool |
| | |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00668 | Flow Controller (serial number): GV-, S- 106 |
| | |

| PURGE DATA 32.3 min | |
|---|---|
| Start Time: 07:48 | Stop Time: 08:20 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |
| | |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ + $O_2$ (SC) |
| Sample Time: 08:21 | Sample ID: F07-08-202 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/a |
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| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-11(27) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00666 | Flow Controller (serial number): 6V-.5-139 |
| SC00473 | 6V-.5-122 |

| PURGE DATA 35.0 min | |
|---|---|
| Start Time: 07:55 | Stop Time: 08:30 |
| Initial Summa Canister Pressure (mmHg): ~29 -29 | Final Summa Canister Pressure (mmHg): ~~29~~ 3 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6996 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15(w/isopropanol), CO2+O2 (3C) |
| Sample Time: 08:31 | Sample ID: F07-08-203 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |
| 08:48 | F07-08-204 |

COMMENTS

First Can filled in ~10 mins, resampling w/ new can/reg

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-11 (36) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Cloudy, cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SC00672~~ SC00467 | Flow Controller (serial number): ~~GV-5-098~~ GV-5-096 |

| PURGE DATA 39.0 min | |
|---|---|
| Start Time: 0823 | Stop Time: 0902 |
| Initial Summa Canister Pressure (mmHg): -28.5 | Final Summa Canister Pressure (mmHg): ~4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7794 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ $O_2$ (3C) |
| Sample Time: ~~0905~~ 0908 | Sample ID: F07-08-~~004~~ 205 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

Can filling @ 0.5 pin/sec. Pulling can & replacing

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-11 (43) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE CALIFORNIA | Weather: Cloudy, Cool |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 5C00834 | Flow Controller (serial number): 6V-573 |

| PURGE DATA 42.1 min | |
|---|---|
| Start Time: 08:35 | Stop Time: 09:17 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8415 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ + $O_2$ (3C) |
| Sample Time: 0918 | Sample ID: F07-08-206 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-10 (7) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: pt. Cloudy, Warm |
| | |
| **EQUIPMENT** | |
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00728 | Flow Controller (serial number): 6V-5-10C |
| | |
| **PURGE DATA** 26.1 min | |
| Start Time: 09:42 | Stop Time: 10:08 |
| Initial Summa Canister Pressure (mmHg): | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |
| | |
| **SAMPLING DATA** | |
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ + $O_2$ (3C) |
| Sample Time: 10:09 | Sample ID: F07-08-207 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |
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| **COMMENTS** | |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-10 (13) |
| Project Number: 27869787.[illegible] | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): S000358 | Flow Controller (serial number): C04-6V-0.5-02 |

| PURGE DATA 28.8 min | |
|---|---|
| Start Time: 0947 | Stop Time: 1016 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO 15 (w/ isopropanol) [CO, FOX (32)] |
| Sample Time: 1017 | Sample ID: F07-08-208 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-10 (21) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00857 | Flow Controller (serial number): 6V-5144 |

| PURGE DATA 32.3 min | |
|---|---|
| Start Time: 10:13 | Stop Time: 10:45 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -3 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ + $O_2$ (3C) |
| Sample Time: 10:46 | Sample ID: F07-08-209 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-10(28) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~6V-~~ SC00339 / SC00693 | Flow Controller (serial number): 6V-5-138 / 6V-5-114 |

| PURGE DATA 35.4 min | |
|---|---|
| Start Time: 10:19 | Stop Time: 10:54 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7085 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15(w/isopropanol) $CO_2$+$O_2$ (3C) |
| Sample Time: 10:55 / 1132 | Sample ID: F07-08-210 |
| Duplicate Collected? (Yes) No | Duplicate ID: F07-08-~~211~~ F07-08-~~212~~ 212 |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-10 (33) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00223 | Flow Controller (serial number): 6V-5-097 |

| PURGE DATA 37.6 min | |
|---|---|
| Start Time: 10:48 | Stop Time: 11:25 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7528 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$+$O_2$ (3C) |
| Sample Time: 11:26 | Sample ID: F07-08-211 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-10 (42) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2739 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00821 | Flow Controller (serial number): GV-5-146 |

| PURGE DATA 41.6 min | |
|---|---|
| Start Time: 1057 | Stop Time: 11:38 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8326 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ $CO_2$ (3C) |
| Sample Time: 11:39 | Sample ID: F07-08-213 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-09 (7 ft) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00173 | Flow Controller (serial number): 6V-5147 |
| | J3 |

| PURGE DATA 26.1 min | |
|---|---|
| Start Time: 11:58 | Stop Time: 12:24 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$+$O_2$ (22) |
| Sample Time: 12:25 | Sample ID: F07-08-214 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-09 (15) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00186 | Flow Controller (serial number): BV-05-046 |

| PURGE DATA 29.7 min | |
|---|---|
| Start Time: 1209 | Stop Time: 1239 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5932 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ $O_2$ (3C) |
| Sample Time: 1240 | Sample ID: F07-08-213 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-9 (21) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00643 | Flow Controller (serial number): 6V-.5-128 |

| PURGE DATA 32.3 min | |
|---|---|
| Start Time: 12:26 | Stop Time: 12:58 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$+$O_2$ (3C) |
| Sample Time: 12:59 | Sample ID: F07-08-216 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SS4-9 (28) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00491 | Flow Controller (serial number): COA-6V-0.5-008 |

| PURGE DATA 35.4 min Purge | |
|---|---|
| Start Time: 1242 | Stop Time: 1317 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7085 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ $O_2$ (3C) |
| Sample Time: 1318 | Sample ID: F07-08-217 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA9 (35) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JB |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00903 | Flow Controller (serial number): 6V-5-145 |

| PURGE DATA 38.5 min | |
|---|---|
| Start Time: 13:01 | Stop Time: 13:39 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): -3 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7706 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$, $CO_2$ (3C) |
| Sample Time: 13:40 | Sample ID: F07-08-218 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-9 (44) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00855 | Flow Controller (serial number): 6V-5-123 |
| SC00798 (Dup) | 6V-5-054 |

| PURGE DATA 42.5 min | |
|---|---|
| Start Time: 1320 | Stop Time: 1403 |
| Initial Summa Canister Pressure (mmHg): -29 / -29 | Final Summa Canister Pressure (mmHg): -4 / -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8504 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ + $O_2$ (3C) |
| Sample Time: 1404 / 1442 (Dup) | Sample ID: F07-08-219 |
| Duplicate Collected? Yes ~~No~~ JS | Duplicate ID: ~~F07-08-220~~ JS F07-08-220 |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-07 (7 ft) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00649 | Flow Controller (serial number): GV-5-086 |

| PURGE DATA 26 min Purge | |
|---|---|
| Start Time: ~~1675~~ 14:20 | Stop Time: 14:46 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5223 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$+$O_2$ (3C) |
| Sample Time: 14:47 | Sample ID: F07-08-~~021~~ 221 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-07 (13) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, sunny, breezy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00368 | Flow Controller (serial number): 6V-5-137 |

| PURGE DATA (28.8 min) | |
|---|---|
| Start Time: 14:29 | Stop Time: 14:59 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ $O_2$ (3C) |
| Sample Time: 15:00 | Sample ID: F07-08-222 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-07(21) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00065 | Flow Controller (serial number): 6V-5-134 |

| PURGE DATA 32.3 min | |
|---|---|
| Start Time: 14:49 | Stop Time: 15:21 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6464 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15(w/isopropanol), $CO_2$, $CO$ ($CO_2$) |
| Sample Time: 1522 | Sample ID: F07-08-223 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SS4-07 (28) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny, Windy |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00800 | Flow Controller (serial number): 6V-0.5-062 |

| PURGE DATA 35.4 min | |
|---|---|
| Start Time: 15:02 | Stop Time: 15:37 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7085 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ + $O_2$ (3C) |
| Sample Time: 1538 | Sample ID: F07-08-224 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

Vac Gauge Reading 1 in $H_2O$, stable.
~~Air~~ Air flowing through rotameter

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-07 (35) |
| Project Number: 29869787.80000 | Date: 8/6/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SC00955~~ SC000823 | Flow Controller (serial number): ~~GV#5 078~~ GV#5 ~~036~~ 051 JS |

| PURGE DATA 38 min Purge | |
|---|---|
| Start Time: 1524 | Stop Time: 1602 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7528 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$+$O_2$ (3C) |
| Sample Time: ~~1605~~ 1610 | Sample ID: F07-08-225 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

Summa SC000955 w/ 078 reg filled very quickly, initial vac -25 in $H_2O$. Replaced w/ SC000823 Reg 036 has broken gauge. Replace reg w/ 051

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-07 (43) |
| Project Number: 29869787.80000 | Date: 8/7/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Cool, sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC 00619 | Flow Controller (serial number): GV-0.5-092 |

| PURGE DATA 42.1 min | |
|---|---|
| Start Time: 06:38 | Stop Time: 07:20 |
| Initial Summa Canister Pressure (mmHg): ~~-30~~ 28.5 | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 8415 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$+$O_2$ (3C) |
| Sample Time: 07:21 | Sample ID: F07-08-226 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): NSA-03 (13) |
| Project Number: 29869787.80000 | Date: 8/7/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00837 | Flow Controller (serial number): 6V-5-126 |
| SC00918/Dup | 6V-5-125/Dup |

| PURGE DATA 28.8 min | |
|---|---|
| Start Time: 0831 | Stop Time: 0900 |
| Initial Summa Canister Pressure (mmHg): -30/-30 | Final Summa Canister Pressure (mmHg): -3.5/-3.5 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 5755 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ $O_2$ (3C) |
| Sample Time: 0901 / 0940 Dup | Sample ID: F07-08-227 |
| Duplicate Collected? Yes No | Duplicate ID: F07-08-230 |

| COMMENTS |
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# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): NSA-03 (26) |
| Project Number: 29869787.80000 | Date: 8/7/07 |
| Client: CHEVRON | Sampler: SS |
| Project Location: FILLMORE CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00673 | Flow Controller (serial number): 6V-5-133 |

| PURGE DATA 34.5 min | |
|---|---|
| Start Time: 0835 | Stop Time: 0909 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): -3.5 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 6907 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ + $O_2$ (3C) |
| Sample Time: 0910 | Sample ID: F07-08-228 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): NSA-03 (38) |
| Project Number: 29869787.80000 | Date: 8/7/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00938 | Flow Controller (serial number): GV-5-058 |

| PURGE DATA 39.9 min | |
|---|---|
| Start Time: 0903 | Stop Time: 0943 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -3 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 7972 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) CO2 + O2 (3C) |
| Sample Time: 0944 | Sample ID: F07-08-229 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): NSA-03 (53) |
| Project Number: 29869787.80000 | Date: 8/7/07 |
| Client: CHEVRON | Sampler: JJ |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): N/A | Flow Controller (serial number): N/A |

| PURGE DATA 46.5 min | |
|---|---|
| Start Time: 0913 | Stop Time: 0925 |
| Initial Summa Canister Pressure (mmHg): N/A | Final Summa Canister Pressure (mmHg): N/A |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 9302 (Expected) |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ + $O_2$ (3C) |
| Sample Time: N/A | Sample ID: N/A |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

COMMENTS

Exceeded 10 in ~~Hg~~ Hg while purging. Checked fitting, all looked clear. Did not collect sample.

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): NSA-03 (78) |
| Project Number: 29869787.80000 | Date: 8/7/07 |
| Client: CHEVRON | Sampler: JS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, Sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00182 | Flow Controller (serial number): 6V-0.5-107 |
| SC00425 | 6V-0.5-110 |

| PURGE DATA 57.6 min | |
|---|---|
| Start Time: 0945 | Stop Time: 1043 |
| Initial Summa Canister Pressure (mmHg): -30 | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 11519 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol) $CO_2$ + $O_2$ (3C) |
| Sample Time: 1044 | Sample ID: F07-08-232 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A ~~F07-08-233~~ |

COMMENTS

# URS CORPORATION

# VAPOR SAMPLING SHEET

| PROJECT INFORMATION | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): NSA-03 (69) |
| Project Number: 29869787.80000 | Date: 8/7/07 |
| Client: CHEVRON | Sampler: SS |
| Project Location: FILLMORE, CALIFORNIA | Weather: Warm, sunny |

| EQUIPMENT | |
|---|---|
| Sampling Pump (serial number): 2729 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): ~~SC00428~~ | Flow Controller (serial number): ~~GV-5-063~~ |
| SC00425 | GV-0.5-110 |

| PURGE DATA 53.6 min | |
|---|---|
| Start Time: 09:26:00 | Stop Time: 10:20 |
| Initial Summa Canister Pressure (mmHg): | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 10721 |

| SAMPLING DATA | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 (w/ isopropanol), $CO_2$ + $O_2$ (3C) |
| Sample Time: ~~10:21~~ 1045 | Sample ID: ~~F07-08-23T~~ 233 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

| COMMENTS |
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# URS CORPORATION

## VAPOR SAMPLING SHEET

**PROJECT INFORMATION**

| | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): SSA-10 (21') POET 3 |
| Project Number: 29869787 80000 | Date: 09/13/07 |
| Client: CHEVRON | Sampler: B. PARTINGTON |
| Project Location: FILLMORE, CA | Weather: CLEAR, COOL (60-70s) |

**EQUIPMENT**

| | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 00240/00439 | Flow Controller (serial number): 6V-0.75-001 |

**PURGE DATA** 32.3 MIN PURGE

| | |
|---|---|
| Start Time: 11:19 (0" Hg) | Stop Time: 11:53 (0" Hg) |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): ~4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 200 ML/MIN x 34 MIN = 6,800 ML |

**SAMPLING DATA**

| | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 w He |
| Sample Time: 12:05 | Sample ID: F07-09-102 |
| Duplicate Collected? Yes (No) | Duplicate ID: N/A |

**COMMENTS**

HELIUM (He) USED AS TRACER GAS. MAINTAIN ≥ 10%
START SAMPLING (He @ 12:05 = 40%) He @ 12:18 = 38%
He @ 12:33 = 26% He @ 12:41 = 20%

# URS CORPORATION

## VAPOR SAMPLING SHEET

**PROJECT INFORMATION**

| | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): PORT 6 SSA-11 (43') |
| Project Number: 29869787.80000 | Date: 09/13/07 |
| Client: CHEVRON | Sampler: B. PARTINGTON |
| Project Location: FILLMORE, CA | Weather: CLEAR, COOL (60-70s) |

**EQUIPMENT**

| | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 00132 | Flow Controller (serial number): 6V-.75-009 |

**PURGE DATA** 42.1 MIN PURGE

| | |
|---|---|
| Start Time: 12:53:00 | Stop Time: 13:36:00 |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 200 mL/min × 42.1 min = 8420 |

**SAMPLING DATA**

| | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 w/ He |
| Sample Time: 13:37 | Sample ID: F07-09-103 |
| Duplicate Collected? Yes No | Duplicate ID: N/A |

**COMMENTS**

HELIUM (He) USED AS TRACER GAS.
He @ 13:40 = 25%
He @ 13:55 = 15%
He @ 14:05 = 12%

# URS CORPORATION

## VAPOR SAMPLING SHEET

**PROJECT INFORMATION**

| | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): PORT 6 SSA-07 (43') |
| Project Number: 29869787 80000 | Date: 09/13/07 |
| Client: CHEVRON | Sampler: B. PARTINGTON |
| Project Location: FILLMORE, CA | Weather: CLEAR, COOL (60-70s) |

**EQUIPMENT**

| | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): SC00554/01113 | Flow Controller (serial number): 6V-0.5-118 |

**PURGE DATA** 42.1 MIN PURGE

| | |
|---|---|
| Start Time: 09:31 (0.5" Hg) | Stop Time: 10:16 (0.5" Hg) |
| Initial Summa Canister Pressure (mmHg): -30+ | Final Summa Canister Pressure (mmHg): -4 |
| Purge Rate (mL/min): 200 | Purge Volume (mL): 200 ml/m x 45 min = 9,000 mL |

**SAMPLING DATA**

| | |
|---|---|
| Sampling Rate (mL/min): ~~10:21~~ 200 | Analysis Requested: TO-15 w/ He |
| Sample Time: 10:21 | Sample ID: F07-09-101 |
| Duplicate Collected? Yes (No) | Duplicate ID: NA |

**COMMENTS**

HELIUM (He) USED AS TRACER GAS.
GAUGE SERIAL # AVG00347
START SAMPLING @ 10:21 (He = 16%) MAINTAIN He @ ≥ 10%
He @ 10:27 = 14% He @ 10:36 = 13% He @ 10:55 = 14%
He @ 11:03 = 13%
STOP SAMPLING @ 11:03

# URS CORPORATION

## VAPOR SAMPLING SHEET

**PROJECT INFORMATION**

| | |
|---|---|
| Project: CHEVRON PCPL | Well ID (name and depth): PORT 5 SSA-07 (33') |
| Project Number: 29869787.80000 | Date: 09/13/07 |
| Client: CHEVRON | Sampler: B. PARTINGTON |
| Project Location: FILLMORE, CA | Weather: CLEAR, COOL (60-70s) |

**EQUIPMENT**

| | |
|---|---|
| Sampling Pump (serial number): 1675 | Sample Tubing: Dedicated - Polyethylene |
| Summa Canister (serial number): 00559/01166 | Flow Controller (serial number): 6V-0.75-005 |

**PURGE DATA** 38 MINUTE PURGE

| | |
|---|---|
| Start Time: 08:08 (0" Hg) | Stop Time: 08:48 (0" Hg) |
| Initial Summa Canister Pressure (mmHg): -29 | Final Summa Canister Pressure (mmHg): -1.5 (NOTE) |
| Purge Rate (mL/min): 200 ML/MIN | Purge Volume (mL): 200ML/MIN x 40MIN = 8,000 ML |

**SAMPLING DATA**

| | |
|---|---|
| Sampling Rate (mL/min): 200 | Analysis Requested: TO-15 w He |
| Sample Time: 09:04 | Sample ID: F07-09-100 |
| Duplicate Collected? Yes (No) | Duplicate ID: NA |

**COMMENTS**

HELIUM (He) USED AS TRACER GAS.

GAUGE SERIAL # AV600719

START SAMPLING @ 09:04 (He = 15%) MAINTAIN He @ ≥ 10%

He @ 09:12 = 11% He @ 09:19 = 10%

STOP SAMPLING @ 09:29 - NOTE: SAMPLING DRAW FASTER AT END.

# Appendix E

## Photographic Documentation
(Electronic Copy)

# Appendix F

## Physical/Geochemical Analytical Reports

PTS Laboratories
ENVIRONMENTAL SERVICES

November 14, 2006

Brian Partington, PG
URS Corporation
2020 E. First St., Ste. 400
Santa Ana, CA 92705

Re: Chevron PCPL Fillmore
PTS File No: 36836

Dear Mr. Partington:

Enclosed are final petrophysical data and PhotoLog™ images for Boring SSA-01, Chevron PCPL Fillmore Project 29869533.80000.

Electronic versions of the data files have been previously sent to your attention. Analyses were performed by applicable ASTM, EPA or API methodologies and all core material was discarded per your request. Also as requested, both mechanical (screen) sieve and Laser particle size (<#10 sieve fraction) was performed on each requested sample. Data is reported as two separate sets for each sample.

We appreciate the opportunity to be of service and trust these data will prove beneficial in the development of this project. Please call me at (562) 907-3607 with any questions or if you require additional information.

Sincerely,
PTS Laboratories, Inc.

Larry Kunkel
District Manager

LAK:vk

Encl.

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PTS File No: 36836
Client: URS Corporation

# PHYSICAL PROPERTIES DATA - PERMEABILITY TO AIR

(METHODOLOGY: API RP40

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| SAMPLE ID. | DEPTH, ft. | SAMPLE ORIENTATION (1) | 25 PSI CONFINING STRESS EFFECTIVE (2) PERMEABILITY TO AIR millidarcy |
|---|---|---|---|
| SSA-01-06 | 6.0 | H | 4220 |
| SSA-01-06 | 6.0 | V | 4019 |
| SSA-01-11 | 11.0 | H | 3701 |
| SSA-01-11 | 11.0 | V | 2046 |
| SSA-01-21 | 21.0 | H | 9874 |
| SSA-01-21 | 21.0 | V | 7378 |
| SSA-01-28 | 28.0 | H | 4799 |
| SSA-01-28 | 28.0 | V | 2890 |
| SSA-01-35.5 | 35.5 | H | 4963 |
| SSA-01-35.5 | 35.5 | V | 98.5 |
| SSA-01-43 | 43.0 | H | 3610 |
| SSA-01-43 | 43.0 | V | 5782 |
| SSA-01-61 | 61.0 | H | 3969 |
| SSA-01-61 | 61.0 | V | 1099 |

(1) Sample Orientation: H = horizontal; V = vertical (2) Native State or Effective = With as-received pore fluids in place

**PTS** Laboratories, Inc.

URS Corporation
PTS File No: 36836

## PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

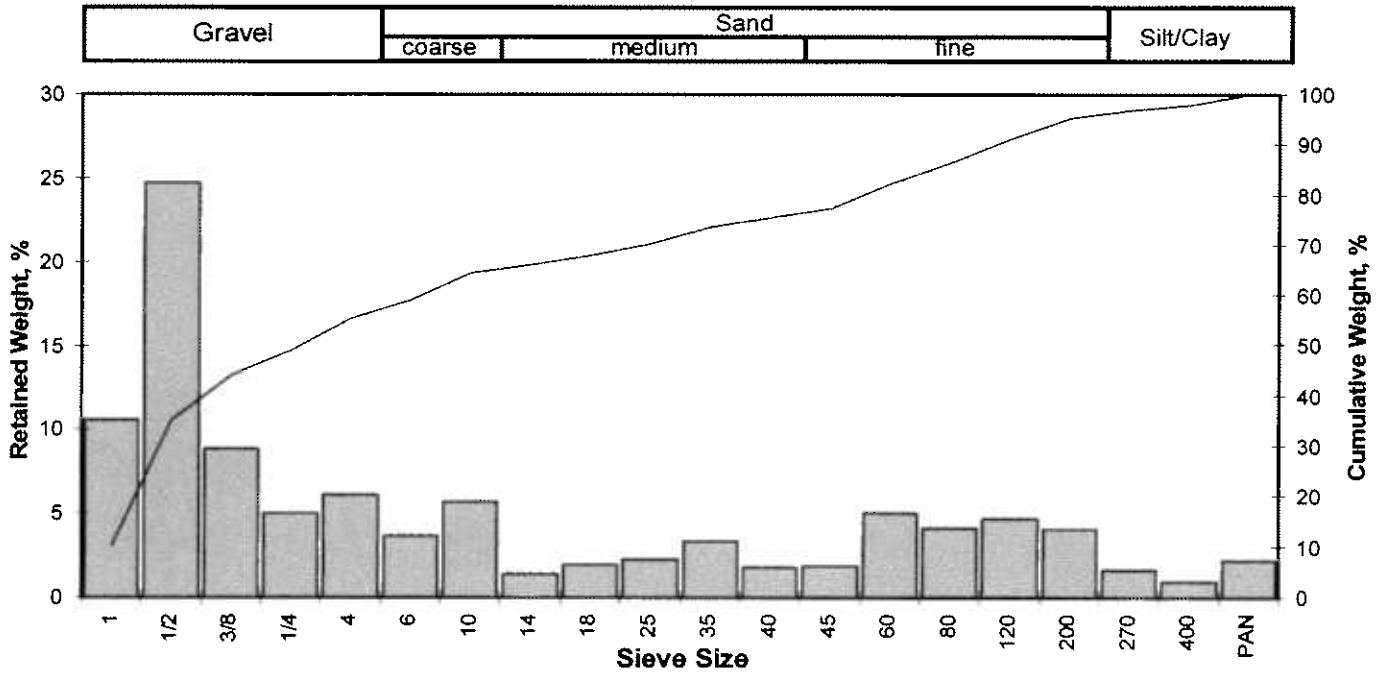
| Sample ID | Depth, ft. | Description USCS/ASTM (1) | Median Grain Size, mm | Particle Size Distribution, wt. percent | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Gravel | Sand Size | | | Silt/Clay |
| | | | | | Coarse | Medium | Fine | |
| SSA-01-06 | 6.0 | Gravel | 6.097 | 55.22 | 9.36 | 10.84 | 19.84 | 4.73 |
| SSA-01-11 | 11.0 | Gravel | 10.809 | 65.33 | 4.39 | 6.09 | 19.43 | 4.75 |
| SSA-01-21 | 21.0 | Gravel | 10.159 | 65.82 | 12.33 | 11.53 | 8.83 | 1.49 |
| SSA-01-28 | 28.0 | N/A | 11.594 | 64.26 | 6.32 | 9.89 | 15.48 | 4.04 |
| SSA-01-35.5 | 35.5 | Gravel | 10.021 | 70.49 | 9.41 | 7.41 | 7.99 | 4.69 |
| SSA-01-43 | 43.0 | Gravel | 10.683 | 72.69 | 10.43 | 7.83 | 6.14 | 2.91 |
| SSA-01-61 | 61.0 | Gravel | 2.766 | 43.43 | 10.41 | 19.02 | 21.68 | 5.46 |

(1) based on Mean fromTrask

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-06 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 6.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 20.23 | 10.55 | 10.55 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 47.40 | 24.73 | 35.28 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 17.00 | 8.87 | 44.15 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 9.57 | 4.99 | 49.14 |
| 0.1873 | 4.757 | -2.25 | 4 | 11.66 | 6.08 | 55.22 |
| 0.1324 | 3.364 | -1.75 | 6 | 7.02 | 3.66 | 58.89 |
| 0.0787 | 2.000 | -1.00 | 10 | 10.92 | 5.70 | 64.58 |
| 0.0557 | 1.414 | -0.50 | 14 | 2.70 | 1.41 | 65.99 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.82 | 1.99 | 67.98 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.30 | 2.24 | 70.23 |
| 0.0197 | 0.500 | 1.00 | 35 | 6.45 | 3.36 | 73.59 |
| 0.0166 | 0.420 | 1.25 | 40 | 3.51 | 1.83 | 75.42 |
| 0.0139 | 0.354 | 1.50 | 45 | 3.60 | 1.88 | 77.30 |
| 0.0098 | 0.250 | 2.00 | 60 | 9.57 | 4.99 | 82.29 |
| 0.0070 | 0.177 | 2.50 | 80 | 8.03 | 4.19 | 86.48 |
| 0.0049 | 0.125 | 3.00 | 120 | 9.04 | 4.72 | 91.20 |
| 0.0029 | 0.074 | 3.75 | 200 | 7.80 | 4.07 | 95.27 |
| 0.0021 | 0.053 | 4.25 | 270 | 3.10 | 1.62 | 96.89 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.84 | 0.96 | 97.85 |
| | | | PAN | 4.13 | 2.15 | 100.00 |
| **TOTALS** | | | | 191.69 | 100.00 | 100.00 |

**Cumulative Weight Percent greater than**

| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
|---|---|---|---|
| 5 | | | |
| 10 | | | |
| 16 | -4.42 | 0.8450 | 21.462 |
| 25 | -4.06 | 0.6566 | 16.677 |
| 40 | -3.43 | 0.4253 | 10.802 |
| 50 | -2.61 | 0.2401 | 6.097 |
| 60 | -1.60 | 0.1196 | 3.039 |
| 75 | 1.19 | 0.0172 | 0.438 |
| 84 | 2.20 | 0.0085 | 0.217 |
| 90 | 2.87 | 0.0054 | 0.137 |
| 95 | 3.70 | 0.0030 | 0.077 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -2.61 | -2.61 | -2.61 |
| Median, in. | 0.2401 | 0.2401 | 0.2401 |
| Median, mm | 6.097 | 6.097 | 6.097 |
| Mean, phi | -3.10 | -1.11 | -1.61 |
| Mean, in. | 0.3369 | 0.0850 | 0.1201 |
| Mean, mm | 8.557 | 2.159 | 3.051 |
| Sorting | 6.173 | 3.314 | |
| Skewness | 0.443 | 0.452 | |
| Kurtosis | | | |

| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

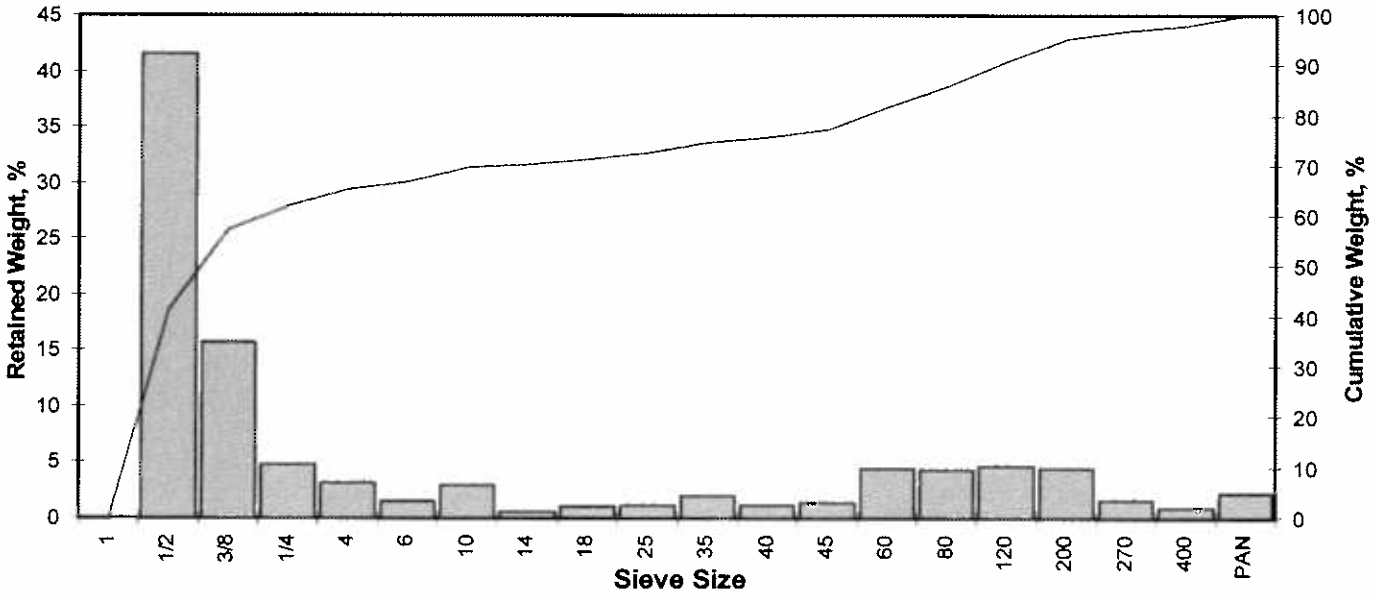
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 55.22 |
| Coarse Sand | 10 | 9.36 |
| Medium Sand | 40 | 10.84 |
| Fine Sand | 200 | 19.84 |
| Silt/Clay | <200 | 4.73 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-11 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 11.0 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 84.70 | 41.64 | 41.64 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 32.10 | 15.78 | 57.42 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 9.75 | 4.79 | 62.21 |
| 0.1873 | 4.757 | -2.25 | 4 | 6.35 | 3.12 | 65.33 |
| 0.1324 | 3.364 | -1.75 | 6 | 3.00 | 1.47 | 66.81 |
| 0.0787 | 2.000 | -1.00 | 10 | 5.94 | 2.92 | 69.73 |
| 0.0557 | 1.414 | -0.50 | 14 | 1.20 | 0.59 | 70.32 |
| 0.0394 | 1.000 | 0.00 | 18 | 2.07 | 1.02 | 71.34 |
| 0.0278 | 0.707 | 0.50 | 25 | 2.50 | 1.23 | 72.56 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.13 | 2.03 | 74.59 |
| 0.0166 | 0.420 | 1.25 | 40 | 2.49 | 1.22 | 75.82 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.79 | 1.37 | 77.19 |
| 0.0098 | 0.250 | 2.00 | 60 | 9.15 | 4.50 | 81.69 |
| 0.0070 | 0.177 | 2.50 | 80 | 8.83 | 4.34 | 86.03 |
| 0.0049 | 0.125 | 3.00 | 120 | 9.61 | 4.72 | 90.75 |
| 0.0029 | 0.074 | 3.75 | 200 | 9.14 | 4.49 | 95.25 |
| 0.0021 | 0.053 | 4.25 | 270 | 3.38 | 1.66 | 96.91 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.86 | 0.91 | 97.82 |
| | | | PAN | 4.43 | 2.18 | 100.00 |
| **TOTALS** | | | | 203.42 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -4.52 | 0.9057 | 23.006 |
| 10 | -4.40 | 0.8334 | 21.168 |
| 16 | -4.26 | 0.7542 | 19.156 |
| 25 | -4.04 | 0.6492 | 16.491 |
| 40 | -3.68 | 0.5058 | 12.847 |
| 50 | -3.43 | 0.4255 | 10.809 |
| 60 | -2.94 | 0.3011 | 7.648 |
| 75 | 1.08 | 0.0186 | 0.472 |
| 84 | 2.27 | 0.0082 | 0.208 |
| 90 | 2.92 | 0.0052 | 0.132 |
| 95 | 3.71 | 0.0030 | 0.076 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.43 | -3.43 | -3.43 |
| Median, in. | 0.4255 | 0.4255 | 0.4255 |
| Median, mm | 10.809 | 10.809 | 10.809 |
| Mean, phi | -3.08 | -1.00 | -1.81 |
| Mean, in. | 0.3339 | 0.0786 | 0.1380 |
| Mean, mm | 8.481 | 1.995 | 3.504 |
| Sorting | 5.910 | 3.263 | 2.879 |
| Skewness | 0.258 | 0.747 | 0.741 |
| Kurtosis | 0.381 | 0.262 | 0.658 |

| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

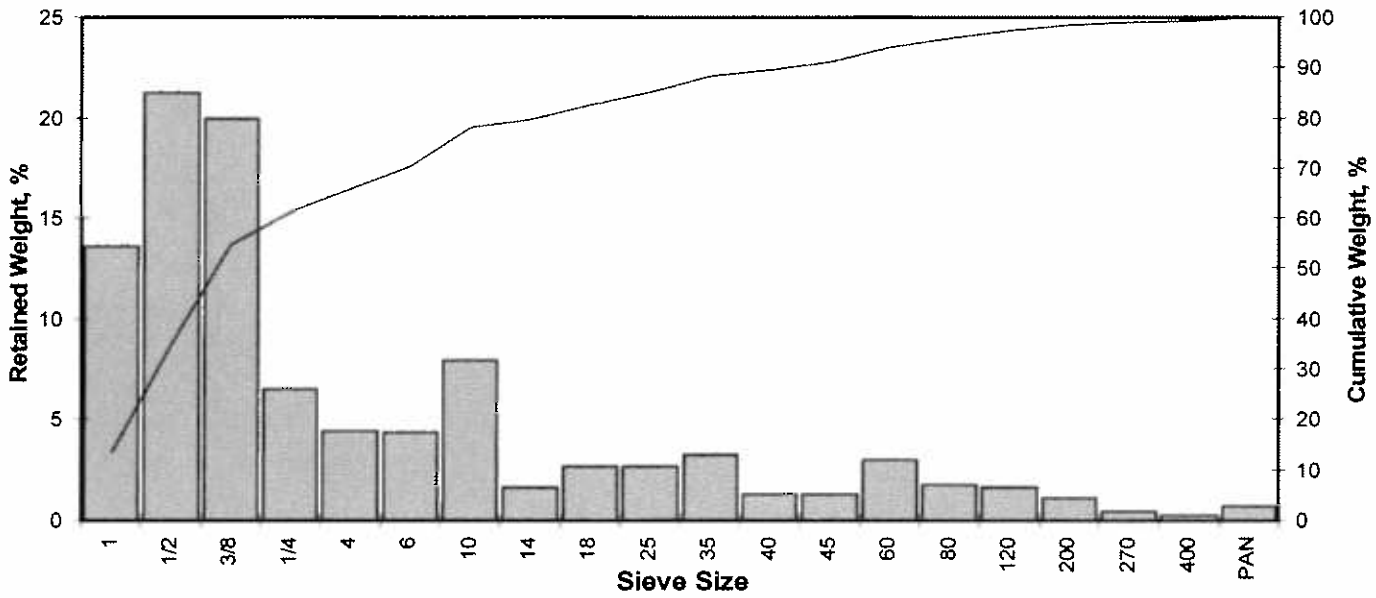
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 65.33 |
| Coarse Sand | 10 | 4.39 |
| Medium Sand | 40 | 6.09 |
| Fine Sand | 200 | 19.43 |
| Silt/Clay | <200 | 4.75 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-21 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 21.0 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 28.79 | 13.66 | 13.66 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 44.80 | 21.25 | 34.91 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 42.10 | 19.97 | 54.88 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 13.71 | 6.50 | 61.38 |
| 0.1873 | 4.757 | -2.25 | 4 | 9.36 | 4.44 | 65.82 |
| 0.1324 | 3.364 | -1.75 | 6 | 9.22 | 4.37 | 70.20 |
| 0.0787 | 2.000 | -1.00 | 10 | 16.77 | 7.96 | 78.15 |
| 0.0557 | 1.414 | -0.50 | 14 | 3.40 | 1.61 | 79.76 |
| 0.0394 | 1.000 | 0.00 | 18 | 5.59 | 2.65 | 82.42 |
| 0.0278 | 0.707 | 0.50 | 25 | 5.70 | 2.70 | 85.12 |
| 0.0197 | 0.500 | 1.00 | 35 | 6.84 | 3.24 | 88.36 |
| 0.0166 | 0.420 | 1.25 | 40 | 2.77 | 1.31 | 89.68 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.81 | 1.33 | 91.01 |
| 0.0098 | 0.250 | 2.00 | 60 | 6.36 | 3.02 | 94.03 |
| 0.0070 | 0.177 | 2.50 | 80 | 3.66 | 1.74 | 95.76 |
| 0.0049 | 0.125 | 3.00 | 120 | 3.46 | 1.64 | 97.41 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.32 | 1.10 | 98.51 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.01 | 0.48 | 98.98 |
| 0.0015 | 0.037 | 4.75 | 400 | 0.56 | 0.27 | 99.25 |
| | | | PAN | 1.58 | 0.75 | 100.00 |
| **TOTALS** | | | | 210.81 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | -4.53 | 0.9119 | 23.163 |
| 25 | -4.11 | 0.6799 | 17.271 |
| 40 | -3.54 | 0.4589 | 11.656 |
| 50 | -3.34 | 0.4000 | 10.159 |
| 60 | -2.79 | 0.2724 | 6.919 |
| 75 | -1.30 | 0.0967 | 2.457 |
| 84 | 0.29 | 0.0321 | 0.816 |
| 90 | 1.31 | 0.0159 | 0.403 |
| 95 | 2.28 | 0.0081 | 0.206 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.34 | -3.34 | -3.34 |
| Median, in. | 0.4000 | 0.4000 | 0.4000 |
| Median, mm | 10.159 | 10.159 | 10.159 |
| Mean, phi | -3.30 | -2.12 | -2.53 |
| Mean, in. | 0.3883 | 0.1712 | 0.2272 |
| Mean, mm | 9.864 | 4.348 | 5.770 |
| Sorting | 2.651 | 2.413 | |
| Skewness | 0.641 | 0.507 | |
| Kurtosis | | | |

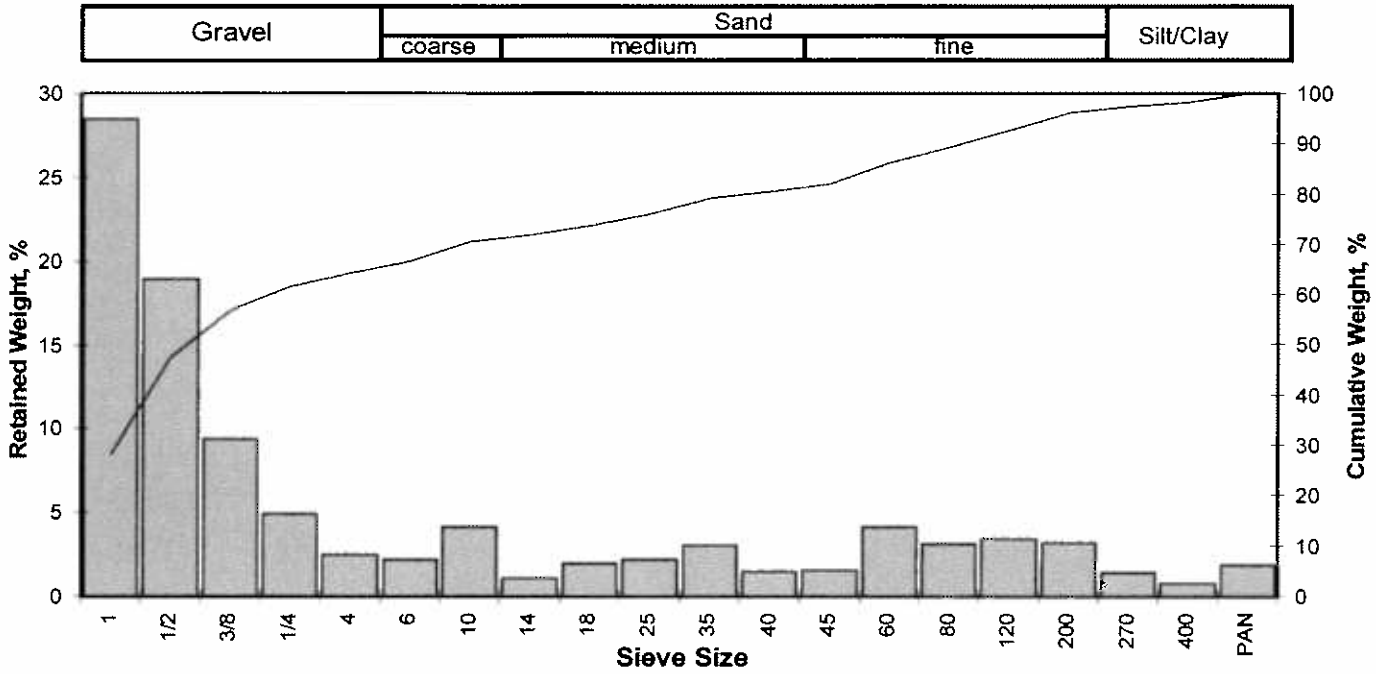
| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 65.82 |
| Coarse Sand | 10 | 12.33 |
| Medium Sand | 40 | 11.53 |
| Fine Sand | 200 | 8.83 |
| Silt/Clay | <200 | 1.49 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-28 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 28.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 47.98 | 28.49 | 28.49 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 31.90 | 18.94 | 47.43 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 15.80 | 9.38 | 56.81 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 8.32 | 4.94 | 61.75 |
| 0.1873 | 4.757 | -2.25 | 4 | 4.24 | 2.52 | 64.26 |
| 0.1324 | 3.364 | -1.75 | 6 | 3.69 | 2.19 | 66.45 |
| 0.0787 | 2.000 | -1.00 | 10 | 6.95 | 4.13 | 70.58 |
| 0.0557 | 1.414 | -0.50 | 14 | 1.90 | 1.13 | 71.71 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.35 | 1.99 | 73.70 |
| 0.0278 | 0.707 | 0.50 | 25 | 3.70 | 2.20 | 75.90 |
| 0.0197 | 0.500 | 1.00 | 35 | 5.20 | 3.09 | 78.98 |
| 0.0166 | 0.420 | 1.25 | 40 | 2.51 | 1.49 | 80.47 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.59 | 1.54 | 82.01 |
| 0.0098 | 0.250 | 2.00 | 60 | 7.01 | 4.16 | 86.17 |
| 0.0070 | 0.177 | 2.50 | 80 | 5.32 | 3.16 | 89.33 |
| 0.0049 | 0.125 | 3.00 | 120 | 5.81 | 3.45 | 92.78 |
| 0.0029 | 0.074 | 3.75 | 200 | 5.35 | 3.18 | 95.96 |
| 0.0021 | 0.053 | 4.25 | 270 | 2.37 | 1.41 | 97.36 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.33 | 0.79 | 98.15 |
| | | | PAN | 3.11 | 1.85 | 100.00 |
| **TOTALS** | | | | 168.43 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | | | |
| 25 | | | |
| 40 | -4.04 | 0.6459 | 16.405 |
| 50 | -3.54 | 0.4565 | 11.594 |
| 60 | -2.87 | 0.2883 | 7.323 |
| 75 | 0.30 | 0.0321 | 0.814 |
| 84 | 1.74 | 0.0118 | 0.300 |
| 90 | 2.60 | 0.0065 | 0.165 |
| 95 | 3.52 | 0.0034 | 0.087 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.54 | -3.54 | -3.54 |
| Median, in. | 0.4565 | 0.4565 | 0.4565 |
| Median, mm | 11.594 | 11.594 | 11.594 |
| Mean, phi | | | |
| Mean, in. | | | |
| Mean, mm | | | |
| Sorting | | | |
| Skewness | | | |
| Kurtosis | | | |

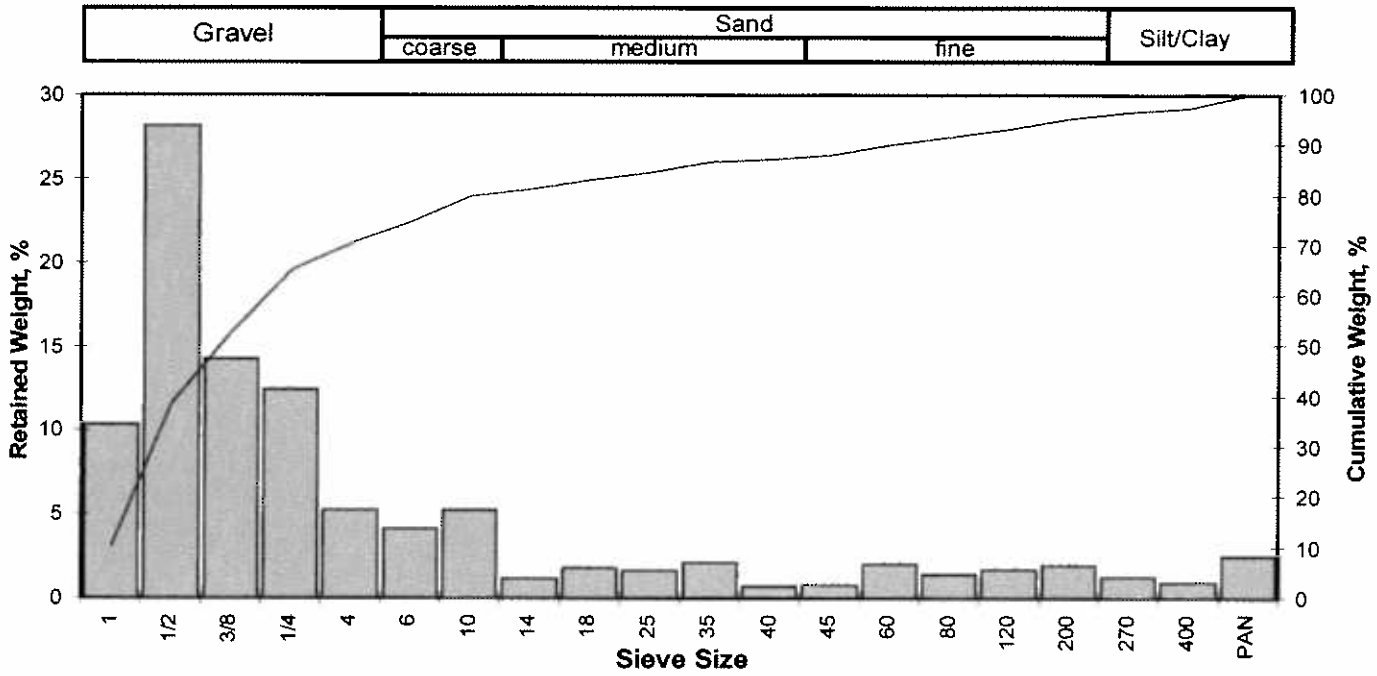
| Grain Size Description (ASTM-USCS Scale) | N/A (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 64.26 |
| Coarse Sand | 10 | 6.32 |
| Medium Sand | 40 | 9.89 |
| Fine Sand | 200 | 15.48 |
| Silt/Clay | <200 | 4.04 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-35.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 35.5 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 23.47 | 10.31 | 10.31 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 64.20 | 28.21 | 38.53 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 32.40 | 14.24 | 52.77 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 28.36 | 12.46 | 65.23 |
| 0.1873 | 4.757 | -2.25 | 4 | 11.97 | 5.26 | 70.49 |
| 0.1324 | 3.364 | -1.75 | 6 | 9.53 | 4.19 | 74.68 |
| 0.0787 | 2.000 | -1.00 | 10 | 11.88 | 5.22 | 79.90 |
| 0.0557 | 1.414 | -0.50 | 14 | 2.70 | 1.19 | 81.09 |
| 0.0394 | 1.000 | 0.00 | 18 | 4.17 | 1.83 | 82.92 |
| 0.0278 | 0.707 | 0.50 | 25 | 3.70 | 1.63 | 84.55 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.73 | 2.08 | 86.63 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.57 | 0.69 | 87.32 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.80 | 0.79 | 88.11 |
| 0.0098 | 0.250 | 2.00 | 60 | 4.64 | 2.04 | 90.15 |
| 0.0070 | 0.177 | 2.50 | 80 | 3.21 | 1.41 | 91.56 |
| 0.0049 | 0.125 | 3.00 | 120 | 3.99 | 1.75 | 93.31 |
| 0.0029 | 0.074 | 3.75 | 200 | 4.54 | 2.00 | 95.31 |
| 0.0021 | 0.053 | 4.25 | 270 | 2.91 | 1.28 | 96.59 |
| 0.0015 | 0.037 | 4.75 | 400 | 2.09 | 0.92 | 97.50 |
| | | | PAN | 5.68 | 2.50 | 100.00 |
| **TOTALS** | | | | 227.54 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | -4.44 | 0.8560 | 21.743 |
| 25 | -4.12 | 0.6862 | 17.430 |
| 40 | -3.60 | 0.4784 | 12.152 |
| 50 | -3.33 | 0.3945 | 10.021 |
| 60 | -2.91 | 0.2961 | 7.521 |
| 75 | -1.70 | 0.1283 | 3.259 |
| 84 | 0.33 | 0.0313 | 0.795 |
| 90 | 1.96 | 0.0101 | 0.256 |
| 95 | 3.63 | 0.0032 | 0.081 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.33 | -3.33 | -3.33 |
| Median, in. | 0.3945 | 0.3945 | 0.3945 |
| Median, mm | 10.021 | 10.021 | 10.021 |
| Mean, phi | -3.37 | -2.06 | -2.48 |
| Mean, in. | 0.4073 | 0.1637 | 0.2194 |
| Mean, mm | 10.344 | 4.157 | 5.574 |
| Sorting | 2.313 | 2.387 | |
| Skewness | 0.752 | 0.532 | |
| Kurtosis | | | |

| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

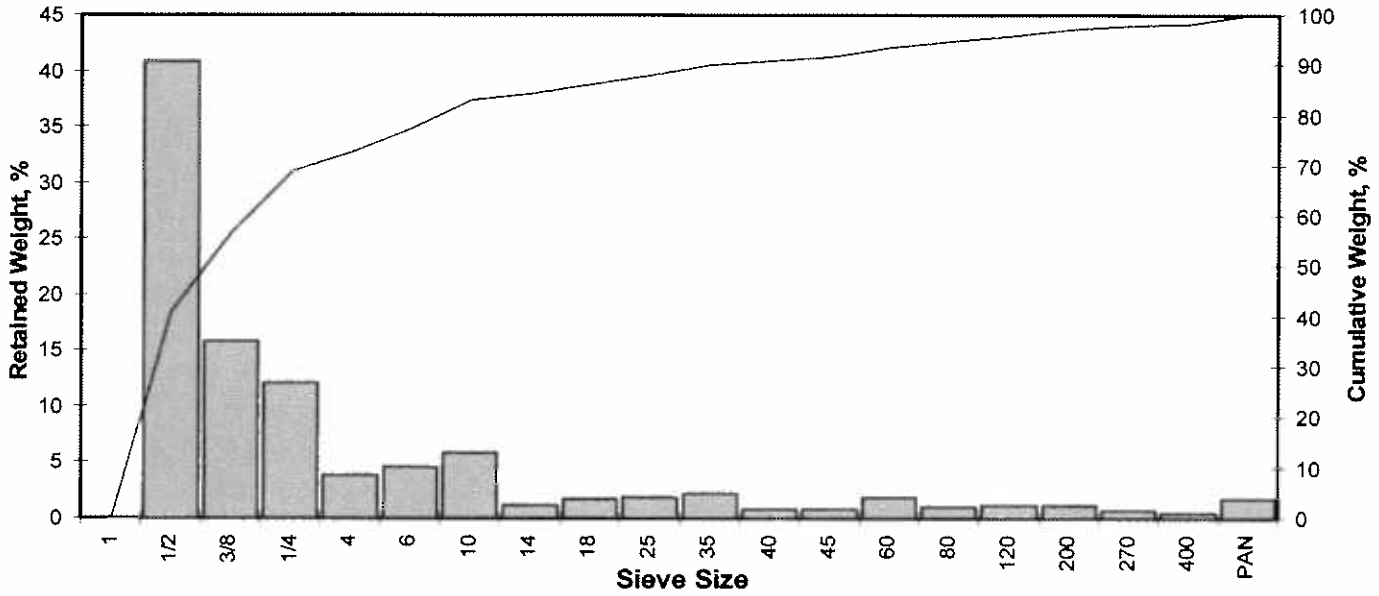
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 70.49 |
| Coarse Sand | 10 | 9.41 |
| Medium Sand | 40 | 7.41 |
| Fine Sand | 200 | 7.99 |
| Silt/Clay | <200 | 4.69 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-43 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 43.0 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 101.50 | 40.92 | 40.92 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 39.30 | 15.85 | 56.77 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 29.89 | 12.05 | 68.82 |
| 0.1873 | 4.757 | -2.25 | 4 | 9.60 | 3.87 | 72.69 |
| 0.1324 | 3.364 | -1.75 | 6 | 11.27 | 4.54 | 77.24 |
| 0.0787 | 2.000 | -1.00 | 10 | 14.60 | 5.89 | 83.12 |
| 0.0557 | 1.414 | -0.50 | 14 | 2.80 | 1.13 | 84.25 |
| 0.0394 | 1.000 | 0.00 | 18 | 4.46 | 1.80 | 86.05 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.60 | 1.85 | 87.90 |
| 0.0197 | 0.500 | 1.00 | 35 | 5.66 | 2.28 | 90.19 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.90 | 0.77 | 90.95 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.96 | 0.79 | 91.74 |
| 0.0098 | 0.250 | 2.00 | 60 | 4.59 | 1.85 | 93.59 |
| 0.0070 | 0.177 | 2.50 | 80 | 2.73 | 1.10 | 94.69 |
| 0.0049 | 0.125 | 3.00 | 120 | 2.99 | 1.21 | 95.90 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.96 | 1.19 | 97.09 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.71 | 0.69 | 97.78 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.15 | 0.46 | 98.25 |
| | | | PAN | 4.35 | 1.75 | 100.00 |
| **TOTALS** | | | | 248.02 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -4.52 | 0.9044 | 22.972 |
| 10 | -4.40 | 0.8310 | 21.107 |
| 16 | -4.25 | 0.7507 | 19.067 |
| 25 | -4.03 | 0.6445 | 16.371 |
| 40 | -3.67 | 0.4999 | 12.698 |
| 50 | -3.42 | 0.4206 | 10.683 |
| 60 | -3.09 | 0.3358 | 8.528 |
| 75 | -2.00 | 0.1570 | 3.989 |
| 84 | -0.61 | 0.0601 | 1.528 |
| 90 | 0.96 | 0.0202 | 0.514 |
| 95 | 2.63 | 0.0064 | 0.162 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.42 | -3.42 | -3.42 |
| Median, in. | 0.4206 | 0.4206 | 0.4206 |
| Median, mm | 10.683 | 10.683 | 10.683 |
| Mean, phi | -3.35 | -2.43 | -2.76 |
| Mean, in. | 0.4008 | 0.2125 | 0.2668 |
| Mean, mm | 10.180 | 5.397 | 6.776 |
| Sorting | 2.026 | 1.821 | 1.994 |
| Skewness | 0.756 | 0.541 | 0.616 |
| Kurtosis | 0.301 | 0.963 | 1.438 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Gravel (based on Mean from Trask) |

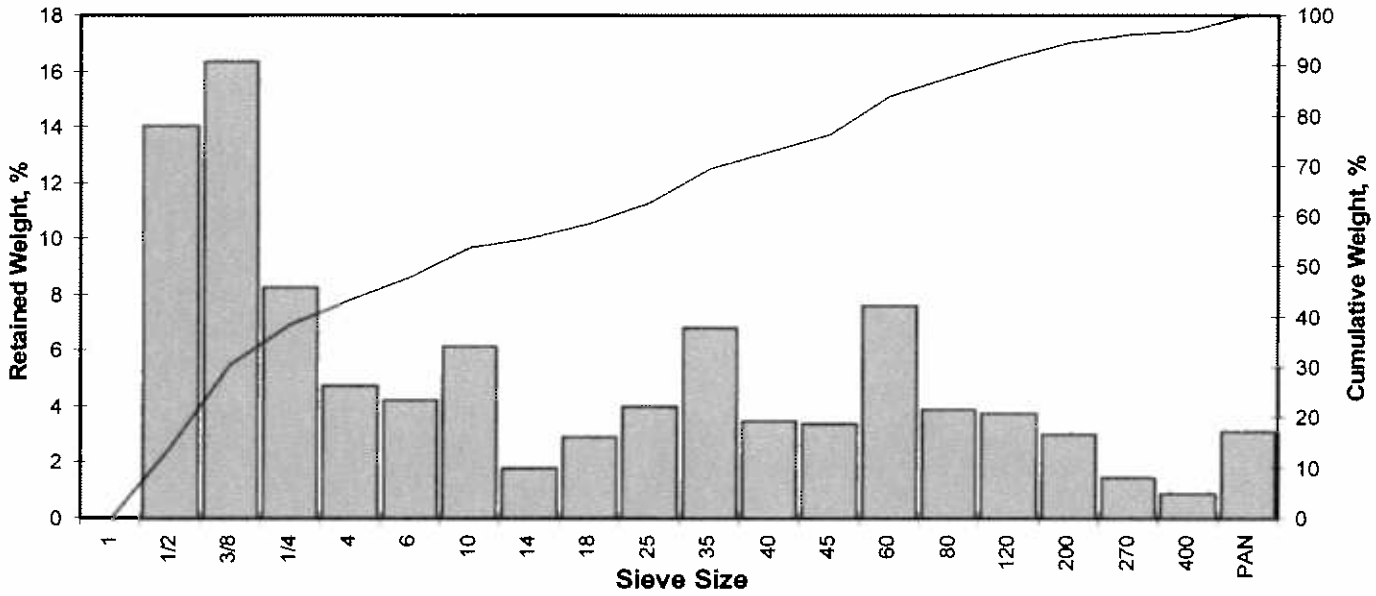
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 72.69 |
| Coarse Sand | 10 | 10.43 |
| Medium Sand | 40 | 7.83 |
| Fine Sand | 200 | 6.14 |
| Silt/Clay | <200 | 2.91 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-61 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 61.0 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 18.20 | 14.06 | 14.06 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 21.20 | 16.37 | 30.43 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 10.70 | 8.26 | 38.69 |
| 0.1873 | 4.757 | -2.25 | 4 | 6.14 | 4.74 | 43.43 |
| 0.1324 | 3.364 | -1.75 | 6 | 5.50 | 4.25 | 47.68 |
| 0.0787 | 2.000 | -1.00 | 10 | 7.98 | 6.16 | 53.84 |
| 0.0557 | 1.414 | -0.50 | 14 | 2.30 | 1.78 | 55.62 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.77 | 2.91 | 58.53 |
| 0.0278 | 0.707 | 0.50 | 25 | 5.20 | 4.02 | 62.55 |
| 0.0197 | 0.500 | 1.00 | 35 | 8.84 | 6.83 | 69.37 |
| 0.0166 | 0.420 | 1.25 | 40 | 4.52 | 3.49 | 72.86 |
| 0.0139 | 0.354 | 1.50 | 45 | 4.37 | 3.37 | 76.24 |
| 0.0098 | 0.250 | 2.00 | 60 | 9.87 | 7.62 | 83.86 |
| 0.0070 | 0.177 | 2.50 | 80 | 5.07 | 3.92 | 87.78 |
| 0.0049 | 0.125 | 3.00 | 120 | 4.84 | 3.74 | 91.51 |
| 0.0029 | 0.074 | 3.75 | 200 | 3.92 | 3.03 | 94.54 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.89 | 1.46 | 96.00 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.16 | 0.90 | 96.90 |
| | | | PAN | 4.02 | 3.10 | 100.00 |
| **TOTALS** | | | | 129.49 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -4.29 | 0.7692 | 19.539 |
| 10 | -3.93 | 0.6011 | 15.269 |
| 16 | -3.60 | 0.4764 | 12.100 |
| 25 | -3.38 | 0.4097 | 10.405 |
| 40 | -2.55 | 0.2309 | 5.864 |
| 50 | -1.47 | 0.1089 | 2.766 |
| 60 | 0.18 | 0.0347 | 0.881 |
| 75 | 1.41 | 0.0148 | 0.377 |
| 84 | 2.02 | 0.0097 | 0.247 |
| 90 | 2.80 | 0.0057 | 0.144 |
| 95 | 3.91 | 0.0026 | 0.067 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -1.47 | -1.47 | -1.47 |
| Median, in. | 0.1089 | 0.1089 | 0.1089 |
| Median, mm | 2.766 | 2.766 | 2.766 |
| Mean, phi | -2.43 | -0.79 | -1.02 |
| Mean, in. | 0.2122 | 0.0681 | 0.0796 |
| Mean, mm | 5.391 | 1.729 | 2.022 |
| Sorting | 5.255 | 2.807 | 2.646 |
| Skewness | 0.716 | 0.242 | 0.277 |
| Kurtosis | 0.332 | 0.460 | 0.702 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Gravel (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 43.43 |
| Coarse Sand | 10 | 10.41 |
| Medium Sand | 40 | 19.02 |
| Fine Sand | 200 | 21.68 |
| Silt/Clay | <200 | 5.46 |
| | Total | 100 |

**PTS** Laboratories, Inc.

URS Corporation
PTS File No: 36836

## PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| Sample ID | Depth, ft. | Mean Grain Size Description (1) | Median Grain Size mm | Particle Size Distribution, wt. percent | | | | | | Silt & Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Gravel | Sand Size | | | Silt | Clay | |
| | | | | | Coarse | Medium | Fine | | | |
| SSA-01-06 | 6.0 | Fine sand | 0.158 | 0.00 | 0.00 | 22.77 | 38.62 | 25.66 | 12.96 | 38.62 |
| SSA-01-11 | 11.0 | Medium sand | 0.684 | 0.00 | 0.00 | 58.04 | 22.89 | 15.10 | 3.97 | 19.08 |
| SSA-01-21 | 21.0 | Fine sand | 0.282 | 0.00 | 0.00 | 38.89 | 32.86 | 20.39 | 7.86 | 28.25 |
| SSA-01-28 | 28.0 | Fine sand | 0.150 | 0.00 | 0.00 | 29.56 | 32.57 | 27.61 | 10.27 | 37.88 |
| SSA-01-35.5 | 35.5 | Silt | 0.005 | 0.00 | 0.00 | 0.00 | 0.00 | 51.35 | 48.65 | 100.00 |
| SSA-01-43 | 43.0 | Silt | 0.005 | 0.00 | 0.00 | 0.00 | 0.00 | 53.53 | 46.47 | 100.00 |
| SSA-01-61 | 61.0 | Fine sand | 0.254 | 0.00 | 0.00 | 32.97 | 37.90 | 19.84 | 9.30 | 29.14 |

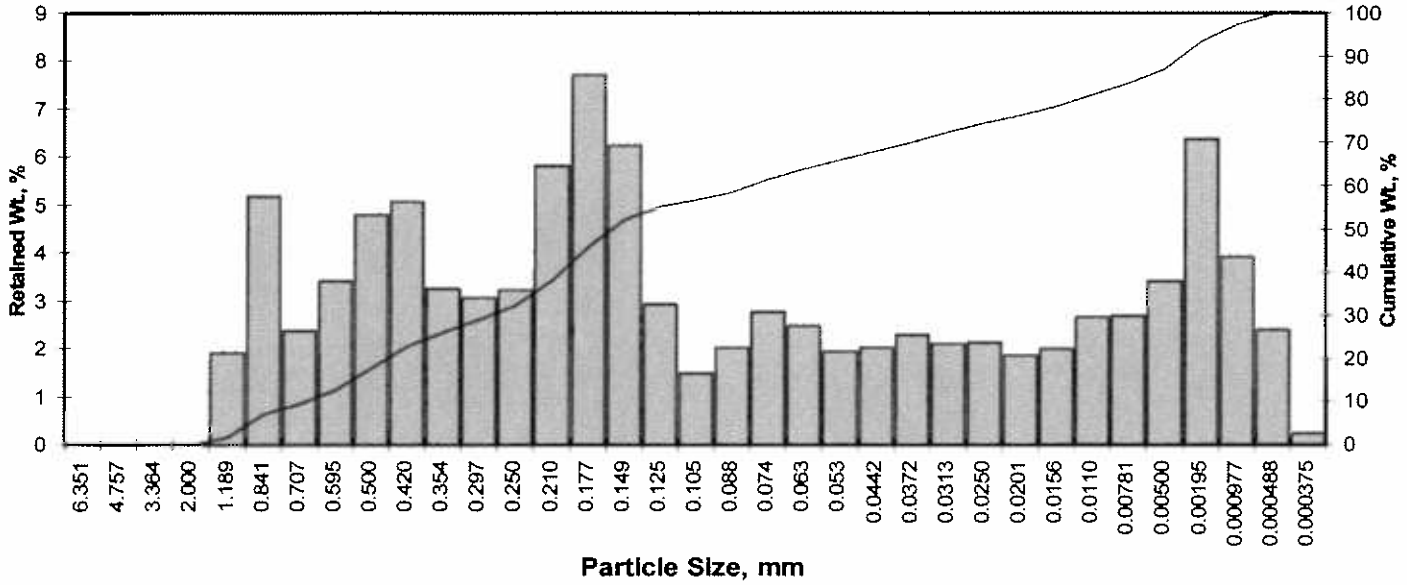
(1) Based on Mean from Trask

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-06 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 6.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 1.92 | 1.92 | 1.92 |
| 0.0331 | 0.841 | 0.25 | 20 | 5.18 | 5.18 | 7.10 |
| 0.0278 | 0.707 | 0.50 | 25 | 2.39 | 2.39 | 9.49 |
| 0.0234 | 0.595 | 0.75 | 30 | 3.41 | 3.41 | 12.90 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.80 | 4.80 | 17.70 |
| 0.0166 | 0.420 | 1.25 | 40 | 5.07 | 5.07 | 22.77 |
| 0.0139 | 0.354 | 1.50 | 45 | 3.27 | 3.27 | 26.04 |
| 0.0117 | 0.297 | 1.75 | 50 | 3.06 | 3.06 | 29.10 |
| 0.0098 | 0.250 | 2.00 | 60 | 3.23 | 3.23 | 32.33 |
| 0.0083 | 0.210 | 2.25 | 70 | 5.81 | 5.81 | 38.14 |
| 0.0070 | 0.177 | 2.50 | 80 | 7.72 | 7.72 | 45.86 |
| 0.0059 | 0.149 | 2.75 | 100 | 6.26 | 6.26 | 52.11 |
| 0.0049 | 0.125 | 3.00 | 120 | 2.95 | 2.95 | 55.06 |
| 0.0041 | 0.105 | 3.25 | 140 | 1.50 | 1.50 | 56.56 |
| 0.0035 | 0.088 | 3.50 | 170 | 2.03 | 2.03 | 58.59 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.79 | 2.79 | 61.38 |
| 0.0025 | 0.063 | 4.00 | 230 | 2.49 | 2.49 | 63.87 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.96 | 1.96 | 65.83 |
| 0.00174 | 0.0442 | 4.50 | 325 | 2.04 | 2.04 | 67.87 |
| 0.00146 | 0.0372 | 4.75 | 400 | 2.29 | 2.29 | 70.16 |
| 0.00123 | 0.0313 | 5.00 | 450 | 2.10 | 2.10 | 72.26 |
| 0.000986 | 0.0250 | 5.32 | 500 | 2.13 | 2.13 | 74.39 |
| 0.000790 | 0.0201 | 5.64 | 635 | 1.87 | 1.87 | 76.26 |
| 0.000615 | 0.0156 | 6.00 | | 1.99 | 1.99 | 78.25 |
| 0.000435 | 0.0110 | 6.50 | | 2.66 | 2.66 | 80.91 |
| 0.000308 | 0.00781 | 7.00 | | 2.71 | 2.71 | 83.62 |
| 0.000197 | 0.00500 | 7.65 | | 3.42 | 3.42 | 87.04 |
| 0.000077 | 0.00195 | 9.00 | | 6.39 | 6.39 | 93.43 |
| 0.000038 | 0.000977 | 10.00 | | 3.92 | 3.92 | 97.35 |
| 0.000019 | 0.000488 | 11.00 | | 2.40 | 2.40 | 99.75 |
| 0.000015 | 0.000375 | 11.38 | | 0.25 | 0.25 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 0.05 | 0.0381 | 0.968 |
| 10 | 0.54 | 0.0271 | 0.689 |
| 16 | 0.91 | 0.0209 | 0.532 |
| 25 | 1.42 | 0.0147 | 0.374 |
| 40 | 2.31 | 0.0079 | 0.202 |
| 50 | 2.67 | 0.0062 | 0.158 |
| 60 | 3.63 | 0.0032 | 0.081 |
| 75 | 5.42 | 0.0009 | 0.023 |
| 84 | 7.07 | 0.0003 | 0.007 |
| 90 | 8.27 | 0.0001 | 0.003 |
| 95 | 9.40 | 0.0001 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 2.67 | 2.67 | 2.67 |
| Median, in. | 0.0062 | 0.0062 | 0.0062 |
| Median, mm | 0.158 | 0.158 | 0.158 |
| Mean, phi | 2.33 | 3.99 | 3.55 |
| Mean, in. | 0.0078 | 0.0025 | 0.0034 |
| Mean, mm | 0.198 | 0.063 | 0.085 |
| Sorting | 4.005 | 3.080 | 2.957 |
| Skewness | 0.592 | 0.431 | 0.435 |
| Kurtosis | 0.255 | 0.518 | 0.958 |
| **Grain Size Description** (ASTM-USCS Scale) | | Fine sand (based on Mean from Trask) | |

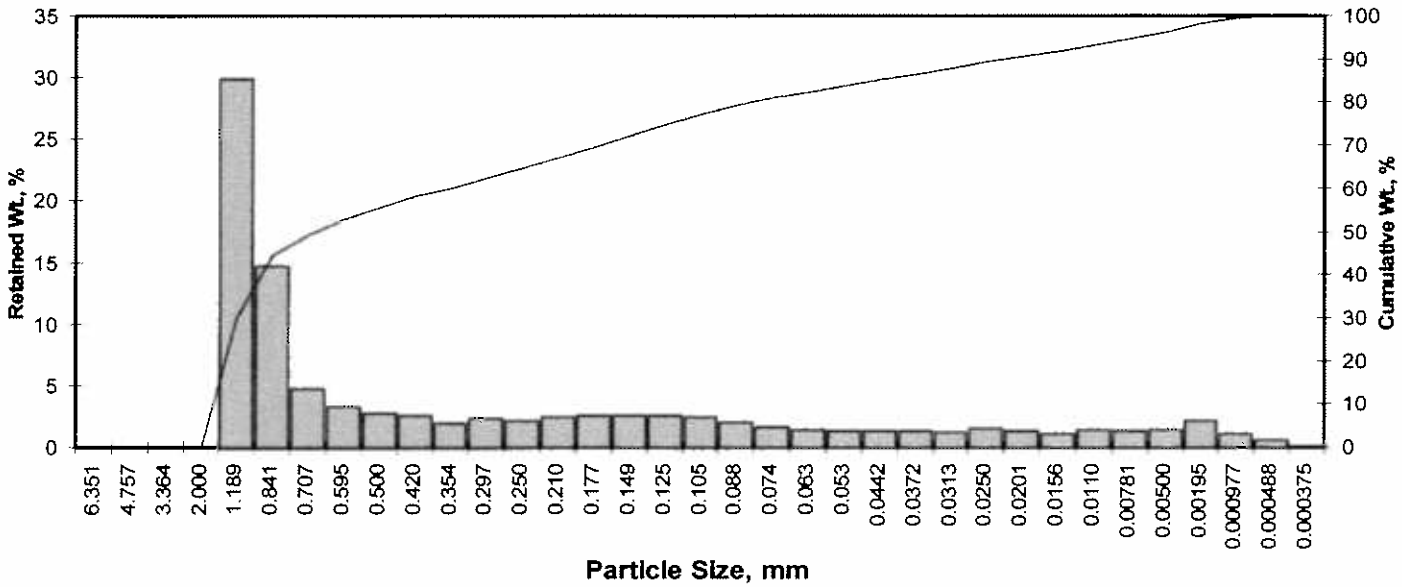
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 22.77 |
| Fine Sand | 200 | 38.62 |
| Silt | >0.005 mm | 25.66 |
| Clay | <0.005 mm | 12.96 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-11 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 11.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 29.90 | 29.91 | 29.91 |
| 0.0331 | 0.841 | 0.25 | 20 | 14.70 | 14.70 | 44.61 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.73 | 4.73 | 49.34 |
| 0.0234 | 0.595 | 0.75 | 30 | 3.36 | 3.36 | 52.70 |
| 0.0197 | 0.500 | 1.00 | 35 | 2.76 | 2.76 | 55.47 |
| 0.0166 | 0.420 | 1.25 | 40 | 2.57 | 2.57 | 58.04 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.93 | 1.93 | 59.97 |
| 0.0117 | 0.297 | 1.75 | 50 | 2.42 | 2.42 | 62.39 |
| 0.0098 | 0.250 | 2.00 | 60 | 2.16 | 2.16 | 64.55 |
| 0.0083 | 0.210 | 2.25 | 70 | 2.46 | 2.46 | 67.01 |
| 0.0070 | 0.177 | 2.50 | 80 | 2.57 | 2.57 | 69.58 |
| 0.0059 | 0.149 | 2.75 | 100 | 2.59 | 2.59 | 72.17 |
| 0.0049 | 0.125 | 3.00 | 120 | 2.59 | 2.59 | 74.76 |
| 0.0041 | 0.105 | 3.25 | 140 | 2.47 | 2.47 | 77.23 |
| 0.0035 | 0.088 | 3.50 | 170 | 2.06 | 2.06 | 79.29 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.63 | 1.63 | 80.92 |
| 0.0025 | 0.063 | 4.00 | 230 | 1.42 | 1.42 | 82.34 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.40 | 1.40 | 83.74 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.36 | 1.36 | 85.10 |
| 0.00146 | 0.0372 | 4.75 | 400 | 1.31 | 1.31 | 86.41 |
| 0.00123 | 0.0313 | 5.00 | 450 | 1.29 | 1.29 | 87.70 |
| 0.000986 | 0.0250 | 5.32 | 500 | 1.58 | 1.58 | 89.28 |
| 0.000790 | 0.0201 | 5.64 | 635 | 1.31 | 1.31 | 90.60 |
| 0.000615 | 0.0156 | 6.00 | | 1.18 | 1.18 | 91.78 |
| 0.000435 | 0.0110 | 6.50 | | 1.46 | 1.46 | 93.24 |
| 0.000308 | 0.00781 | 7.00 | | 1.33 | 1.33 | 94.57 |
| 0.000197 | 0.00500 | 7.65 | | 1.46 | 1.46 | 96.03 |
| 0.000077 | 0.00195 | 9.00 | | 2.19 | 2.19 | 98.22 |
| 0.000038 | 0.000977 | 10.00 | | 1.11 | 1.11 | 99.33 |
| 0.000019 | 0.000488 | 11.00 | | 0.61 | 0.61 | 99.94 |
| 0.000015 | 0.000375 | 11.38 | | 0.06 | 0.06 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -0.87 | 0.0722 | 1.834 |
| 10 | -0.75 | 0.0662 | 1.681 |
| 16 | -0.60 | 0.0596 | 1.514 |
| 25 | -0.37 | 0.0510 | 1.295 |
| 40 | 0.09 | 0.0369 | 0.937 |
| 50 | 0.55 | 0.0269 | 0.684 |
| 60 | 1.50 | 0.0139 | 0.353 |
| 75 | 3.02 | 0.0048 | 0.123 |
| 84 | 4.30 | 0.0020 | 0.051 |
| 90 | 5.49 | 0.0009 | 0.022 |
| 95 | 7.19 | 0.0003 | 0.007 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 0.55 | 0.55 | 0.55 |
| Median, in. | 0.0269 | 0.0269 | 0.0269 |
| Median, mm | 0.684 | 0.684 | 0.684 |
| Mean, phi | 0.50 | 1.85 | 1.42 |
| Mean, in. | 0.0279 | 0.0109 | 0.0148 |
| Mean, mm | 0.709 | 0.278 | 0.375 |
| Sorting | 3.246 | 2.448 | 2.446 |
| Skewness | 0.584 | 0.531 | 0.589 |
| Kurtosis | 0.353 | 0.648 | 0.973 |
| **Grain Size Description** (ASTM-USCS Scale) | | Medium sand (based on Mean from Trask) | |

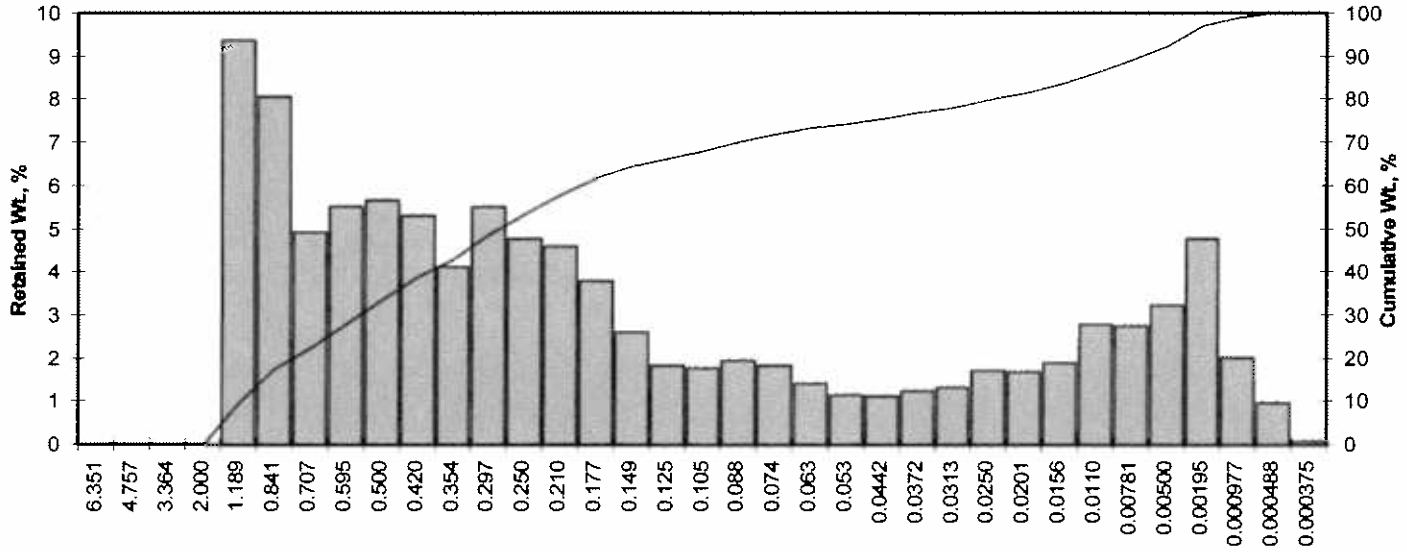
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 58.04 |
| Fine Sand | 200 | 22.89 |
| Silt | >0.005 mm | 15.10 |
| Clay | <0.005 mm | 3.97 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-21 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 21.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 9.39 | 9.39 | 9.39 |
| 0.0331 | 0.841 | 0.25 | 20 | 8.08 | 8.08 | 17.47 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.93 | 4.93 | 22.40 |
| 0.0234 | 0.595 | 0.75 | 30 | 5.51 | 5.51 | 27.91 |
| 0.0197 | 0.500 | 1.00 | 35 | 5.67 | 5.67 | 33.58 |
| 0.0166 | 0.420 | 1.25 | 40 | 5.32 | 5.32 | 38.89 |
| 0.0139 | 0.354 | 1.50 | 45 | 4.12 | 4.12 | 43.01 |
| 0.0117 | 0.297 | 1.75 | 50 | 5.53 | 5.53 | 48.54 |
| 0.0098 | 0.250 | 2.00 | 60 | 4.77 | 4.77 | 53.31 |
| 0.0083 | 0.210 | 2.25 | 70 | 4.61 | 4.61 | 57.92 |
| 0.0070 | 0.177 | 2.50 | 80 | 3.80 | 3.80 | 61.72 |
| 0.0059 | 0.149 | 2.75 | 100 | 2.60 | 2.60 | 64.32 |
| 0.0049 | 0.125 | 3.00 | 120 | 1.83 | 1.83 | 66.15 |
| 0.0041 | 0.105 | 3.25 | 140 | 1.79 | 1.79 | 67.94 |
| 0.0035 | 0.088 | 3.50 | 170 | 1.97 | 1.97 | 69.91 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.84 | 1.84 | 71.75 |
| 0.0025 | 0.063 | 4.00 | 230 | 1.43 | 1.43 | 73.18 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.15 | 1.15 | 74.33 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.13 | 1.13 | 75.46 |
| 0.00146 | 0.0372 | 4.75 | 400 | 1.26 | 1.26 | 76.72 |
| 0.00123 | 0.0313 | 5.00 | 450 | 1.34 | 1.34 | 78.06 |
| 0.000986 | 0.0250 | 5.32 | 500 | 1.71 | 1.71 | 79.77 |
| 0.000790 | 0.0201 | 5.64 | 635 | 1.68 | 1.68 | 81.45 |
| 0.000615 | 0.0156 | 6.00 | | 1.90 | 1.90 | 83.35 |
| 0.000435 | 0.0110 | 6.50 | | 2.79 | 2.79 | 86.14 |
| 0.000308 | 0.00781 | 7.00 | | 2.77 | 2.77 | 88.91 |
| 0.000197 | 0.00500 | 7.65 | | 3.23 | 3.23 | 92.14 |
| 0.000077 | 0.00195 | 9.00 | | 4.79 | 4.79 | 96.93 |
| 0.000038 | 0.000977 | 10.00 | | 2.01 | 2.01 | 98.94 |
| 0.000019 | 0.000488 | 11.00 | | 0.97 | 0.97 | 99.91 |
| 0.000015 | 0.000375 | 11.38 | | 0.09 | 0.09 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -0.60 | 0.0597 | 1.516 |
| 10 | -0.21 | 0.0456 | 1.158 |
| 16 | 0.16 | 0.0353 | 0.896 |
| 25 | 0.62 | 0.0257 | 0.652 |
| 40 | 1.32 | 0.0158 | 0.401 |
| 50 | 1.83 | 0.0111 | 0.282 |
| 60 | 2.39 | 0.0075 | 0.191 |
| 75 | 4.40 | 0.0019 | 0.047 |
| 84 | 6.12 | 0.0006 | 0.014 |
| 90 | 7.22 | 0.0003 | 0.007 |
| 95 | 8.45 | 0.0001 | 0.003 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 1.83 | 1.83 | 1.83 |
| Median, in. | 0.0111 | 0.0111 | 0.0111 |
| Median, mm | 0.282 | 0.282 | 0.282 |
| Mean, phi | 1.52 | 3.14 | 2.70 |
| Mean, in. | 0.0138 | 0.0045 | 0.0061 |
| Mean, mm | 0.349 | 0.114 | 0.154 |
| Sorting | 3.707 | 2.979 | 2.861 |
| Skewness | 0.623 | 0.440 | 0.452 |
| Kurtosis | 0.262 | 0.520 | 0.982 |
| **Grain Size Description** (ASTM-USCS Scale) | | Fine sand (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 38.89 |
| Fine Sand | 200 | 32.86 |
| Silt | >0.005 mm | 20.39 |
| Clay | <0.005 mm | 7.86 |
| | **Total** | **100** |

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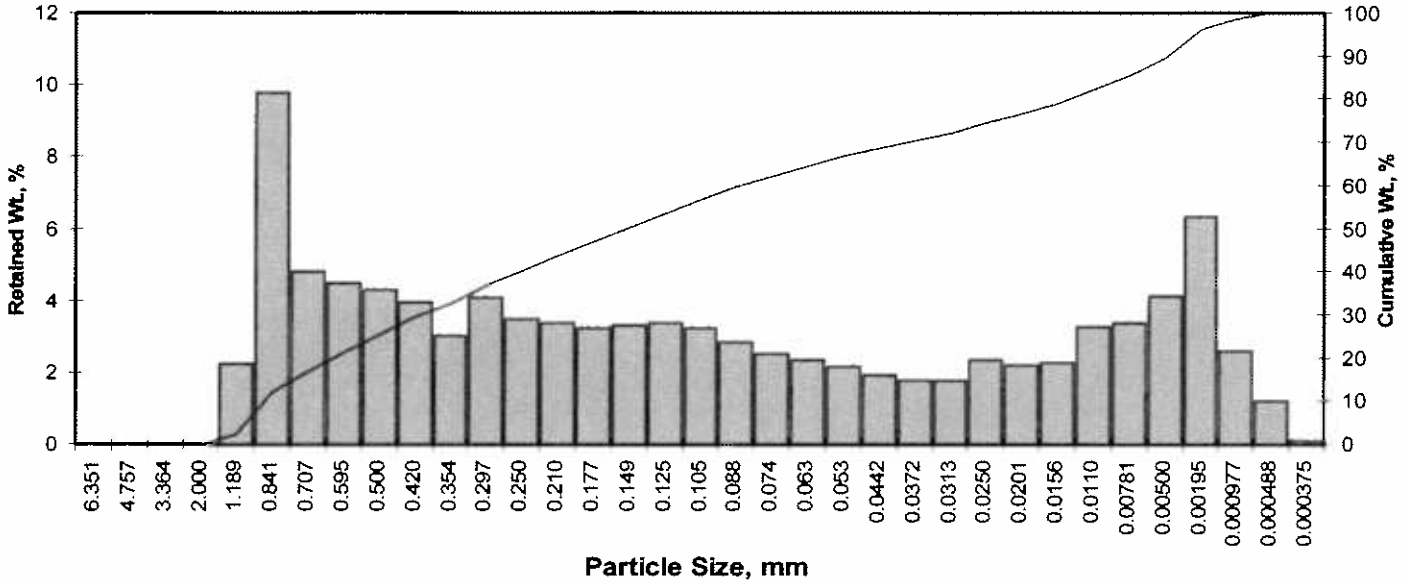
# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-28 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 28.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 2.25 | 2.25 | 2.25 |
| 0.0331 | 0.841 | 0.25 | 20 | 9.78 | 9.78 | 12.03 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.79 | 4.79 | 16.82 |
| 0.0234 | 0.595 | 0.75 | 30 | 4.50 | 4.50 | 21.32 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.30 | 4.30 | 25.62 |
| 0.0166 | 0.420 | 1.25 | 40 | 3.94 | 3.94 | 29.56 |
| 0.0139 | 0.354 | 1.50 | 45 | 3.04 | 3.04 | 32.60 |
| 0.0117 | 0.297 | 1.75 | 50 | 4.08 | 4.08 | 36.68 |
| 0.0098 | 0.250 | 2.00 | 60 | 3.48 | 3.48 | 40.16 |
| 0.0083 | 0.210 | 2.25 | 70 | 3.40 | 3.40 | 43.56 |
| 0.0070 | 0.177 | 2.50 | 80 | 3.25 | 3.25 | 46.81 |
| 0.0059 | 0.149 | 2.75 | 100 | 3.31 | 3.31 | 50.11 |
| 0.0049 | 0.125 | 3.00 | 120 | 3.39 | 3.39 | 53.50 |
| 0.0041 | 0.105 | 3.25 | 140 | 3.25 | 3.25 | 56.75 |
| 0.0035 | 0.088 | 3.50 | 170 | 2.85 | 2.85 | 59.60 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.52 | 2.52 | 62.12 |
| 0.0025 | 0.063 | 4.00 | 230 | 2.35 | 2.35 | 64.47 |
| 0.0021 | 0.053 | 4.25 | 270 | 2.17 | 2.17 | 66.64 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.91 | 1.91 | 68.55 |
| 0.00146 | 0.0372 | 4.75 | 400 | 1.77 | 1.77 | 70.32 |
| 0.00123 | 0.0313 | 5.00 | 450 | 1.79 | 1.79 | 72.11 |
| 0.000986 | 0.0250 | 5.32 | 500 | 2.34 | 2.34 | 74.45 |
| 0.000790 | 0.0201 | 5.64 | 635 | 2.21 | 2.21 | 76.66 |
| 0.000615 | 0.0156 | 6.00 | | 2.28 | 2.28 | 78.94 |
| 0.000435 | 0.0110 | 6.50 | | 3.26 | 3.26 | 82.20 |
| 0.000308 | 0.00781 | 7.00 | | 3.39 | 3.39 | 85.59 |
| 0.000197 | 0.00500 | 7.65 | | 4.14 | 4.14 | 89.73 |
| 0.000077 | 0.00195 | 9.00 | | 6.34 | 6.34 | 96.07 |
| 0.000038 | 0.000977 | 10.00 | | 2.59 | 2.59 | 98.66 |
| 0.000019 | 0.000488 | 11.00 | | 1.22 | 1.22 | 99.88 |
| 0.000015 | 0.000375 | 11.38 | | 0.12 | 0.12 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -0.11 | 0.0425 | 1.079 |
| 10 | 0.15 | 0.0356 | 0.904 |
| 16 | 0.46 | 0.0287 | 0.728 |
| 25 | 0.96 | 0.0202 | 0.513 |
| 40 | 1.99 | 0.0099 | 0.252 |
| 50 | 2.74 | 0.0059 | 0.150 |
| 60 | 3.54 | 0.0034 | 0.086 |
| 75 | 5.40 | 0.0009 | 0.024 |
| 84 | 6.77 | 0.0004 | 0.009 |
| 90 | 7.70 | 0.0002 | 0.005 |
| 95 | 8.77 | 0.0001 | 0.002 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 2.74 | 2.74 | 2.74 |
| Median, in. | 0.0059 | 0.0059 | 0.0059 |
| Median, mm | 0.150 | 0.150 | 0.150 |
| Mean, phi | 1.90 | 3.61 | 3.32 |
| Mean, in. | 0.0106 | 0.0032 | 0.0039 |
| Mean, mm | 0.268 | 0.082 | 0.100 |
| Sorting | 4.651 | 3.154 | 2.923 |
| Skewness | 0.737 | 0.276 | 0.317 |
| Kurtosis | 0.272 | 0.408 | 0.821 |
| **Grain Size Description** (ASTM-USCS Scale) | | Fine sand (based on Mean from Trask) | |

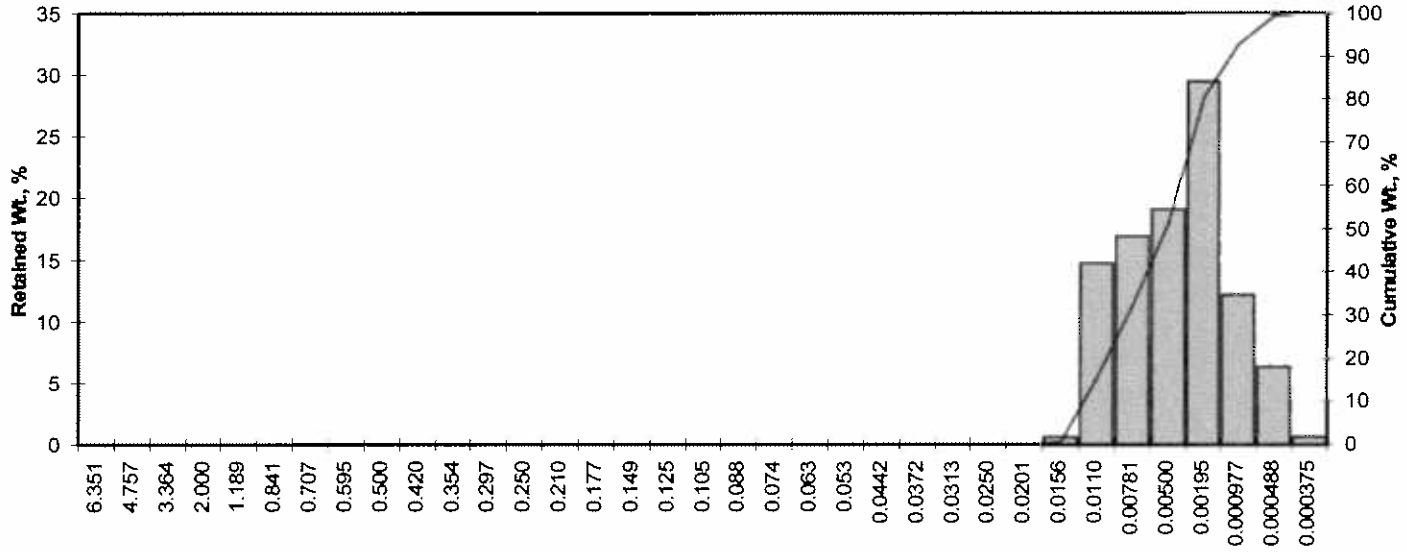
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 29.56 |
| Fine Sand | 200 | 32.57 |
| Silt | >0.005 mm | 27.61 |
| Clay | <0.005 mm | 10.27 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-35.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 35.5 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.59 | 0.59 | 0.59 |
| 0.000435 | 0.0110 | 6.50 | | 14.80 | 14.79 | 15.38 |
| 0.000308 | 0.00781 | 7.00 | | 16.90 | 16.89 | 32.27 |
| 0.000197 | 0.00500 | 7.65 | | 19.10 | 19.09 | 51.35 |
| 0.000077 | 0.00195 | 9.00 | | 29.50 | 29.48 | 80.83 |
| 0.000038 | 0.000977 | 10.00 | | 12.20 | 12.19 | 93.02 |
| 0.000019 | 0.000488 | 11.00 | | 6.32 | 6.32 | 99.34 |
| 0.000015 | 0.000375 | 11.38 | | 0.66 | 0.66 | 100.00 |
| **TOTALS** | | | | **100.10** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.15 | 0.0006 | 0.014 |
| 10 | 6.32 | 0.0005 | 0.013 |
| 16 | 6.52 | 0.0004 | 0.011 |
| 25 | 6.78 | 0.0004 | 0.009 |
| 40 | 7.26 | 0.0003 | 0.007 |
| 50 | 7.60 | 0.0002 | 0.005 |
| 60 | 8.04 | 0.0001 | 0.004 |
| 75 | 8.73 | 0.0001 | 0.002 |
| 84 | 9.26 | 0.0001 | 0.002 |
| 90 | 9.75 | 0.0000 | 0.001 |
| 95 | 10.31 | 0.0000 | 0.001 |

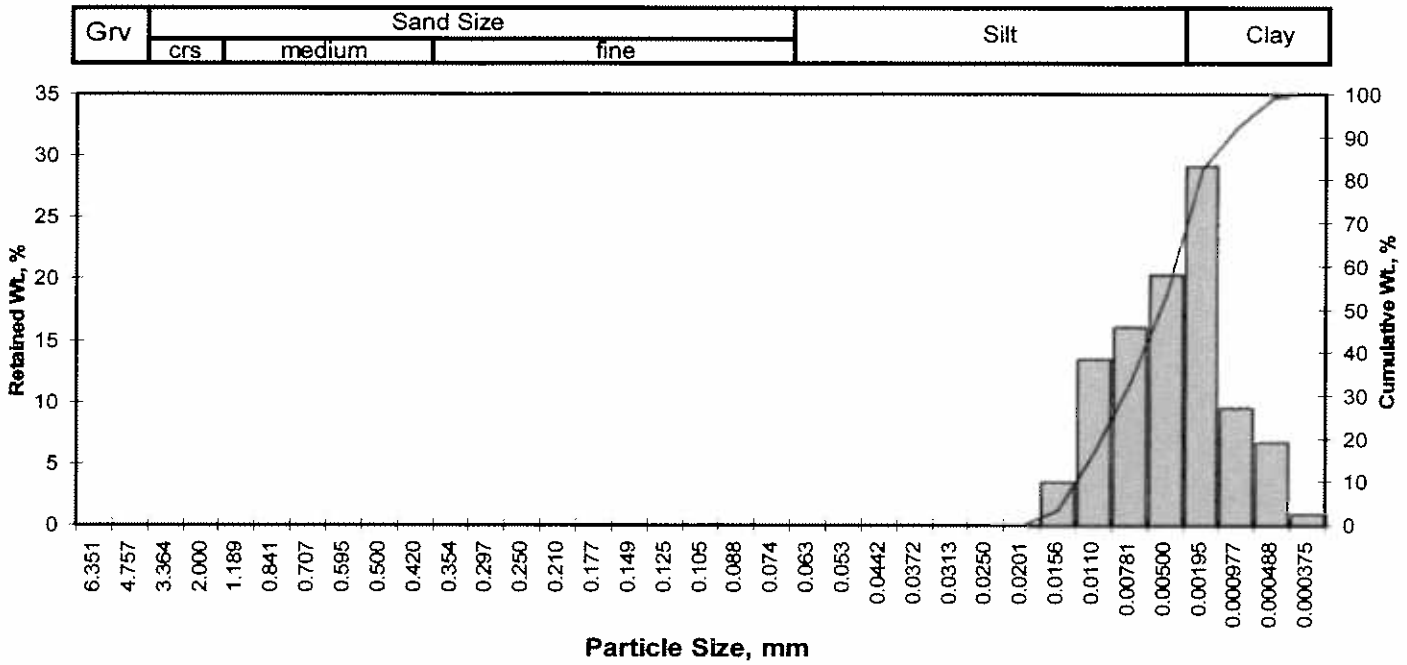
| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.60 | 7.60 | 7.60 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.005 | 0.005 | 0.005 |
| Mean, phi | 7.45 | 7.89 | 7.79 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.006 | 0.004 | 0.005 |
| Sorting | 1.964 | 1.371 | 1.316 |
| Skewness | 0.896 | 0.211 | 0.257 |
| Kurtosis | 0.295 | 0.519 | 0.876 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Silt (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 51.35 |
| Clay | <0.005 mm | 48.65 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-43 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 43.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.03 | 0.03 | 0.03 |
| 0.000615 | 0.0156 | 6.00 | | 3.48 | 3.48 | 3.52 |
| 0.000435 | 0.0110 | 6.50 | | 13.50 | 13.50 | 17.02 |
| 0.000308 | 0.00781 | 7.00 | | 16.10 | 16.11 | 33.13 |
| 0.000197 | 0.00500 | 7.65 | | 20.40 | 20.41 | 53.53 |
| 0.000077 | 0.00195 | 9.00 | | 29.20 | 29.21 | 82.74 |
| 0.000038 | 0.000977 | 10.00 | | 9.53 | 9.53 | 92.28 |
| 0.000019 | 0.000488 | 11.00 | | 6.80 | 6.80 | 99.08 |
| 0.000015 | 0.000375 | 11.38 | | 0.92 | 0.92 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.05 | 0.0006 | 0.015 |
| 10 | 6.24 | 0.0005 | 0.013 |
| 16 | 6.46 | 0.0004 | 0.011 |
| 25 | 6.75 | 0.0004 | 0.009 |
| 40 | 7.22 | 0.0003 | 0.007 |
| 50 | 7.53 | 0.0002 | 0.005 |
| 60 | 7.94 | 0.0002 | 0.004 |
| 75 | 8.64 | 0.0001 | 0.003 |
| 84 | 9.13 | 0.0001 | 0.002 |
| 90 | 9.76 | 0.0000 | 0.001 |
| 95 | 10.40 | 0.0000 | 0.001 |

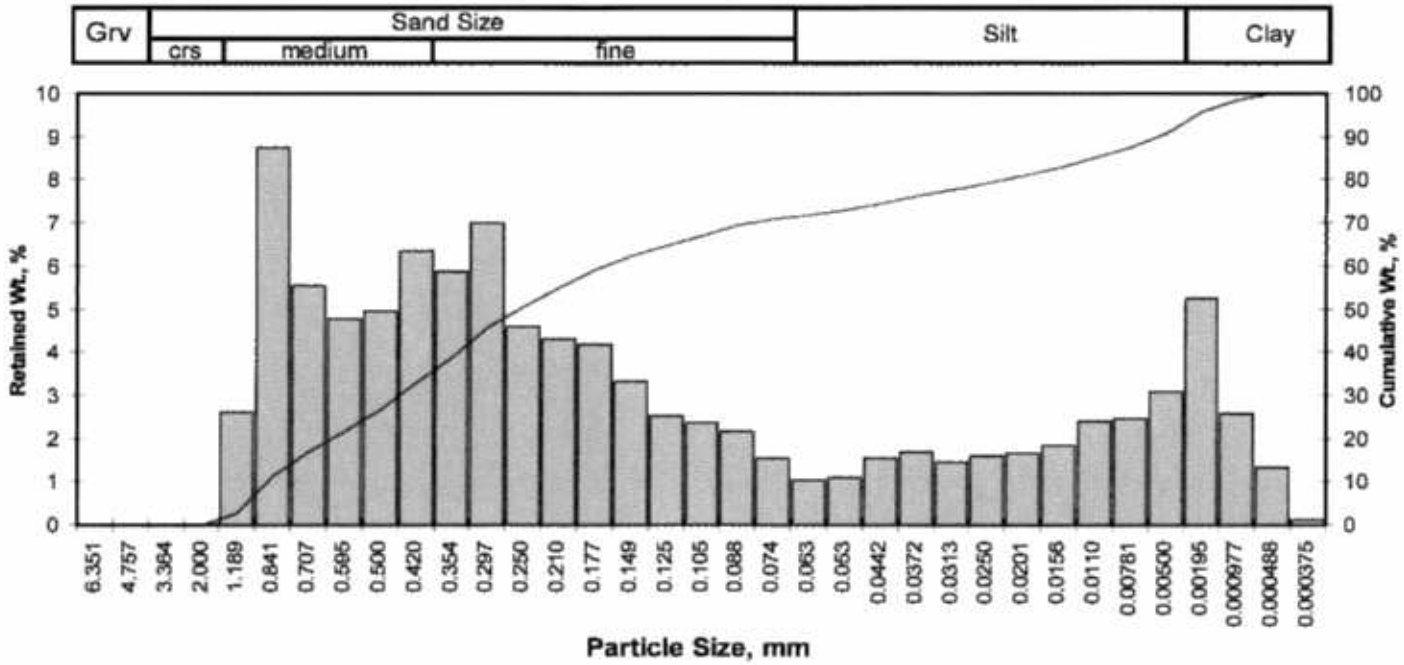
| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.53 | 7.53 | 7.53 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.005 | 0.005 | 0.005 |
| Mean, phi | 7.40 | 7.80 | 7.71 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.006 | 0.004 | 0.005 |
| Sorting | 1.927 | 1.335 | 1.326 |
| Skewness | 0.894 | 0.198 | 0.259 |
| Kurtosis | 0.282 | 0.628 | 0.941 |
| **Grain Size Description** (ASTM-USCS Scale) | | Silt (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 53.53 |
| Clay | <0.005 mm | 46.47 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-01-61 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 61.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 2.60 | 2.60 | 2.60 |
| 0.0331 | 0.841 | 0.25 | 20 | 8.74 | 8.74 | 11.34 |
| 0.0278 | 0.707 | 0.50 | 25 | 5.54 | 5.54 | 16.88 |
| 0.0234 | 0.595 | 0.75 | 30 | 4.79 | 4.79 | 21.67 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.95 | 4.95 | 26.62 |
| 0.0166 | 0.420 | 1.25 | 40 | 6.35 | 6.35 | 32.97 |
| 0.0139 | 0.354 | 1.50 | 45 | 5.87 | 5.87 | 38.84 |
| 0.0117 | 0.297 | 1.75 | 50 | 7.00 | 7.00 | 45.84 |
| 0.0098 | 0.250 | 2.00 | 60 | 4.61 | 4.61 | 50.44 |
| 0.0083 | 0.210 | 2.25 | 70 | 4.31 | 4.31 | 54.75 |
| 0.0070 | 0.177 | 2.50 | 80 | 4.17 | 4.17 | 58.92 |
| 0.0059 | 0.149 | 2.75 | 100 | 3.32 | 3.32 | 62.24 |
| 0.0049 | 0.125 | 3.00 | 120 | 2.53 | 2.53 | 64.77 |
| 0.0041 | 0.105 | 3.25 | 140 | 2.37 | 2.37 | 67.14 |
| 0.0035 | 0.088 | 3.50 | 170 | 2.17 | 2.17 | 69.31 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.55 | 1.55 | 70.86 |
| 0.0025 | 0.063 | 4.00 | 230 | 1.03 | 1.03 | 71.89 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.09 | 1.09 | 72.98 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.53 | 1.53 | 74.51 |
| 0.00146 | 0.0372 | 4.75 | 400 | 1.68 | 1.68 | 76.19 |
| 0.00123 | 0.0313 | 5.00 | 450 | 1.46 | 1.46 | 77.65 |
| 0.000986 | 0.0250 | 5.32 | 500 | 1.60 | 1.60 | 79.25 |
| 0.000790 | 0.0201 | 5.64 | 635 | 1.66 | 1.66 | 80.91 |
| 0.000615 | 0.0156 | 6.00 | | 1.85 | 1.85 | 82.76 |
| 0.000435 | 0.0110 | 6.50 | | 2.40 | 2.40 | 85.16 |
| 0.000308 | 0.00781 | 7.00 | | 2.45 | 2.45 | 87.61 |
| 0.000197 | 0.00500 | 7.65 | | 3.09 | 3.09 | 90.70 |
| 0.000077 | 0.00195 | 9.00 | | 5.25 | 5.25 | 95.95 |
| 0.000038 | 0.000977 | 10.00 | | 2.58 | 2.58 | 98.53 |
| 0.000019 | 0.000488 | 11.00 | | 1.34 | 1.34 | 99.87 |
| 0.000015 | 0.000375 | 11.38 | | 0.13 | 0.13 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -0.11 | 0.0426 | 1.081 |
| 10 | 0.17 | 0.0349 | 0.887 |
| 16 | 0.46 | 0.0286 | 0.727 |
| 25 | 0.92 | 0.0208 | 0.529 |
| 40 | 1.54 | 0.0135 | 0.344 |
| 50 | 1.98 | 0.0100 | 0.254 |
| 60 | 2.58 | 0.0066 | 0.167 |
| 75 | 4.57 | 0.0017 | 0.042 |
| 84 | 6.26 | 0.0005 | 0.013 |
| 90 | 7.50 | 0.0002 | 0.006 |
| 95 | 8.75 | 0.0001 | 0.002 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 1.98 | 1.98 | 1.98 |
| Median, in. | 0.0100 | 0.0100 | 0.0100 |
| Median, mm | 0.254 | 0.254 | 0.254 |
| Mean, phi | 1.81 | 3.36 | 2.90 |
| Mean, in. | 0.0112 | 0.0038 | 0.0053 |
| Mean, mm | 0.286 | 0.097 | 0.134 |
| Sorting | 3.548 | 2.899 | 2.793 |
| Skewness | 0.587 | 0.477 | 0.503 |
| Kurtosis | 0.276 | 0.529 | 0.995 |
| **Grain Size Description** (ASTM-USCS Scale) | | Fine sand (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 32.97 |
| Fine Sand | 200 | 37.90 |
| Silt | >0.005 mm | 19.84 |
| Clay | <0.005 mm | 9.30 |
| | **Total** | **100** |

PTS File No: 36836
Client: URS Corporation

# PHYSICAL PROPERTIES DATA - PORE FLUID SATURATIONS

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| | | METHODS: | API RP 40 / ASTM D2216 | API RP 40 | | API RP 40 | | API RP 40 | |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID. | DEPTH, ft. | SAMPLE ORIENTATION (1) | MOISTURE CONTENT, % weight | DENSITY BULK, g/cc | DENSITY GRAIN, g/cc | POROSITY, %Vb (2) TOTAL | POROSITY, %Vb (2) AIR FILLED | PORE FLUID SATURATIONS, % Pv (3) WATER | PORE FLUID SATURATIONS, % Pv (3) NAPL |
| SSA-01-06 | 6.0 | H | 7.0 | 1.66 | 2.63 | 36.7 | 25.0 | 31.7 | ND<0.1 |
| SSA-01-11 | 11.0 | H | 10.1 | 1.52 | 2.55 | 40.3 | 24.9 | 38.1 | ND<0.1 |
| SSA-01-21 | 21.0 | H | 11.7 | 1.49 | 2.49 | 40.0 | 22.5 | 43.6 | ND<0.1 |
| SSA-01-28 | 28.0 | H | 14.5 | 1.30 | 2.48 | 47.5 | 28.5 | 39.8 | ND<0.1 |
| SSA-01-35.5 | 35.5 | H | 17.6 | 1.41 | 2.46 | 43.0 | 18.2 | 57.4 | ND<0.1 |
| SSA-01-43 | 43.0 | H | 13.9 | 1.59 | 2.43 | 34.5 | 12.3 | 64.1 | ND<0.1 |
| SSA-01-61 | 61.0 | H | 19.2 | 1.45 | 2.49 | 42.1 | 13.7 | 61.6 | 5.8 |

(1) Sample Orientation: H = horizontal; V = vertical (2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids (3) Water = 0.9996 g/cc, Hydrocarbon = 0.780 g/cc; Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS File No: 36836
Client: URS Corporation

# ORGANIC CARBON DATA - TOC

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| | | METHOD: | WALKLEY-BLACK |
|---|---|---|---|
| SAMPLE ID. | DEPTH, ft. | SAMPLE MATRIX | TOTAL ORGANIC CARBON, mg/kg |
| SSA-01 6 | 6.0 | SOIL | 700 |
| SSA-01 11 | 11.0 | SOIL | 2750 |
| SSA-01 21 | 21.0 | SOIL | 3700 |
| SSA-01 28 | 28.0 | SOIL | 2650 |
| SSA-01 35.5 | 35.5 | SOIL | 3050 |
| SSA-01 43 | 43.0 | SOIL | 8750 |
| SSA-01 61 | 61.0 | SOIL | 3100 |

PTS Laboratories
ENVIRONMENTAL SERVICES

November 14, 2006

Brian Partington, PG
URS Corporation
2020 E. First St., Ste. 400
Santa Ana, CA 92705

Re: Chevron PCPL Fillmore
PTS File No: 36836

Dear Mr. Partington:

Enclosed are final petrophysical data and PhotoLog™ images for Boring SSA-02, Chevron PCPL Fillmore Project 29869533.80000.

Electronic versions of the data files have been previously sent to your attention. Analyses were performed by applicable ASTM, EPA or API methodologies and all core material was discarded per your request. Also as requested, both mechanical (screen) sieve and Laser particle size (<#10 sieve fraction) was performed on each requested sample. Data is reported as two separate sets for each sample.

We appreciate the opportunity to be of service and trust these data will prove beneficial in the development of this project. Please call me at (562) 907-3607 with any questions or if you require additional information.

Sincerely,
PTS Laboratories, Inc.

Larry Kunkel
District Manager

LAK:vk

Encl.

8100 Secura Way – Santa Fe Springs, CA 90670
Phone 562 907 3607 Fax 562 907 3610
www.ptsgeolabs.com

PTS File No: 36836
Client: URS Corporation

# PHYSICAL PROPERTIES DATA - PERMEABILITY TO AIR

(METHODOLOGY: API RP40

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| SAMPLE ID. | DEPTH, ft. | SAMPLE ORIENTATION (1) | 25 PSI CONFINING STRESS EFFECTIVE (2) PERMEABILITY TO AIR millidarcy |
|---|---|---|---|
| SSA-02-09 | 8.7 | H | 952 |
| SSA-02-09 | 8.7 | V | 366 |
| SSA-02-14 | 14.0 | H | 3131 |
| SSA-02-14 | 14.0 | V | 2223 |
| SSA-02-21 | 21.0 | H | 5723 |
| SSA-02-21 | 21.0 | V | 2564 |
| SSA-02-28 | 28.0 | H | 8954 |
| SSA-02-28 | 28.0 | V | 6491 |
| SSA-02-35.5 | 35.5 | H | 3723 |
| SSA-02-35.5 | 35.5 | V | 1979 |
| SSA-02-43 | 43.0 | H | 7869 |
| SSA-02-43 | 43.0 | V | 2160 |
| SSA-02-56 | 56.0 | H | 1605 |
| SSA-02-56 | 56.0 | V | 49.1 |

(1) Sample Orientation: H = horizontal; V = vertical (2) Native State or Effective = With as-received pore fluids in place

**PTS** Laboratories, Inc.

URS Corporation
PTS File No: 36836

## PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| Sample ID | Depth, ft. | Description USCS/ASTM (1) | Median Grain Size, mm | Particle Size Distribution, wt. percent | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Gravel | Sand Size | | | Silt/Clay |
| | | | | | Coarse | Medium | Fine | |
| SSA-02-8.7 | 8.7 | Fine sand | 0.243 | 10.19 | 5.17 | 19.42 | 47.38 | 17.84 |
| SSA-02-14 | 14.0 | Gravel | 8.679 | 62.02 | 9.72 | 11.43 | 11.25 | 5.57 |
| SSA-02-21 | 21.0 | Gravel | 8.605 | 63.43 | 14.23 | 10.82 | 9.30 | 2.21 |
| SSA-02-28 | 28.0 | Gravel | 10.337 | 68.21 | 6.95 | 14.81 | 8.55 | 1.48 |
| SSA-02-35.5 | 35.5 | Gravel | 7.623 | 60.22 | 14.16 | 14.02 | 8.72 | 2.88 |
| SSA-02-43 | 43.0 | Gravel | 10.729 | 68.56 | 9.87 | 13.50 | 6.20 | 1.88 |
| SSA-02-56 | 56.0 | N/A | 10.279 | 58.88 | 7.77 | 15.27 | 14.49 | 3.59 |

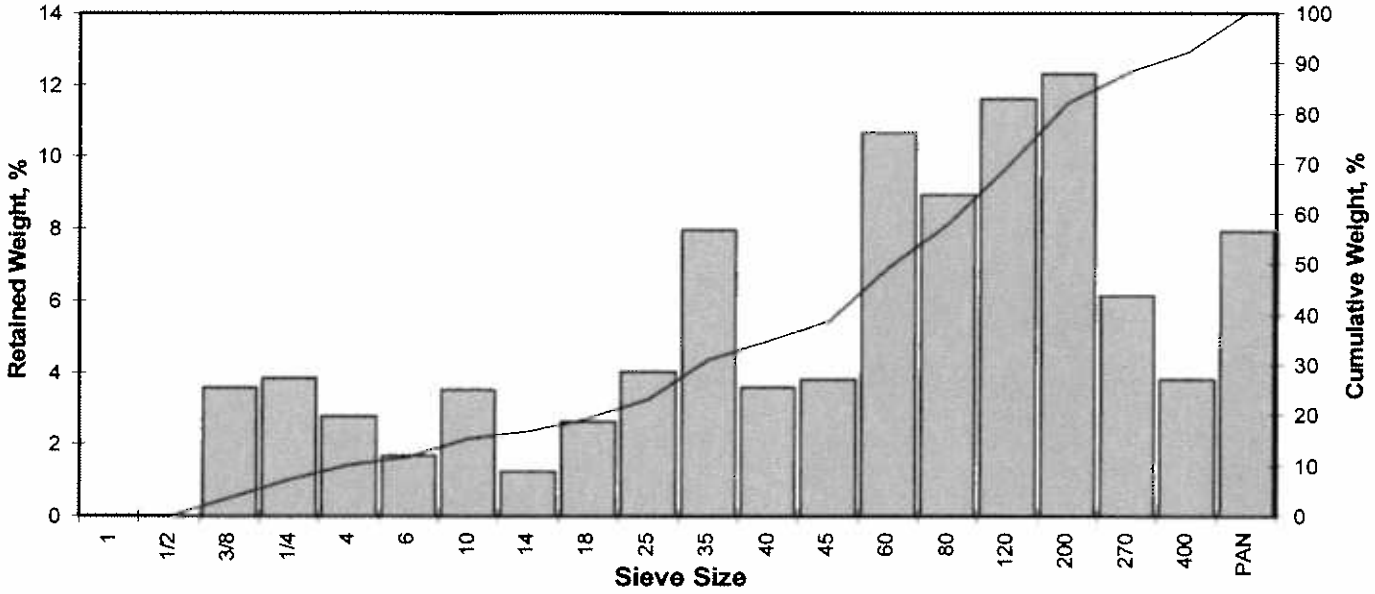
(1) based on Mean fromTrask

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 8.7 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 0.00 | 0.00 | 0.00 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 4.30 | 3.59 | 3.59 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 4.59 | 3.83 | 7.41 |
| 0.1873 | 4.757 | -2.25 | 4 | 3.33 | 2.78 | 10.19 |
| 0.1324 | 3.364 | -1.75 | 6 | 2.00 | 1.67 | 11.86 |
| 0.0787 | 2.000 | -1.00 | 10 | 4.20 | 3.50 | 15.36 |
| 0.0557 | 1.414 | -0.50 | 14 | 1.50 | 1.25 | 16.61 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.14 | 2.62 | 19.23 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.80 | 4.00 | 23.24 |
| 0.0197 | 0.500 | 1.00 | 35 | 9.54 | 7.96 | 31.19 |
| 0.0166 | 0.420 | 1.25 | 40 | 4.30 | 3.59 | 34.78 |
| 0.0139 | 0.354 | 1.50 | 45 | 4.55 | 3.79 | 38.57 |
| 0.0098 | 0.250 | 2.00 | 60 | 12.81 | 10.68 | 49.26 |
| 0.0070 | 0.177 | 2.50 | 80 | 10.74 | 8.96 | 58.22 |
| 0.0049 | 0.125 | 3.00 | 120 | 13.92 | 11.61 | 69.82 |
| 0.0029 | 0.074 | 3.75 | 200 | 14.79 | 12.34 | 82.16 |
| 0.0021 | 0.053 | 4.25 | 270 | 7.36 | 6.14 | 88.30 |
| 0.0015 | 0.037 | 4.75 | 400 | 4.54 | 3.79 | 92.09 |
| | | | PAN | 9.49 | 7.91 | 100.00 |
| **TOTALS** | | | | 119.90 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -3.03 | 0.3223 | 8.188 |
| 10 | -2.28 | 0.1911 | 4.853 |
| 16 | -0.75 | 0.0660 | 1.676 |
| 25 | 0.61 | 0.0258 | 0.655 |
| 40 | 1.57 | 0.0133 | 0.338 |
| 50 | 2.04 | 0.0096 | 0.243 |
| 60 | 2.58 | 0.0066 | 0.168 |
| 75 | 3.31 | 0.0040 | 0.101 |
| 84 | 3.90 | 0.0026 | 0.067 |
| 90 | 4.47 | 0.0018 | 0.045 |
| 95 | 3.00 | 0.0049 | 0.125 |

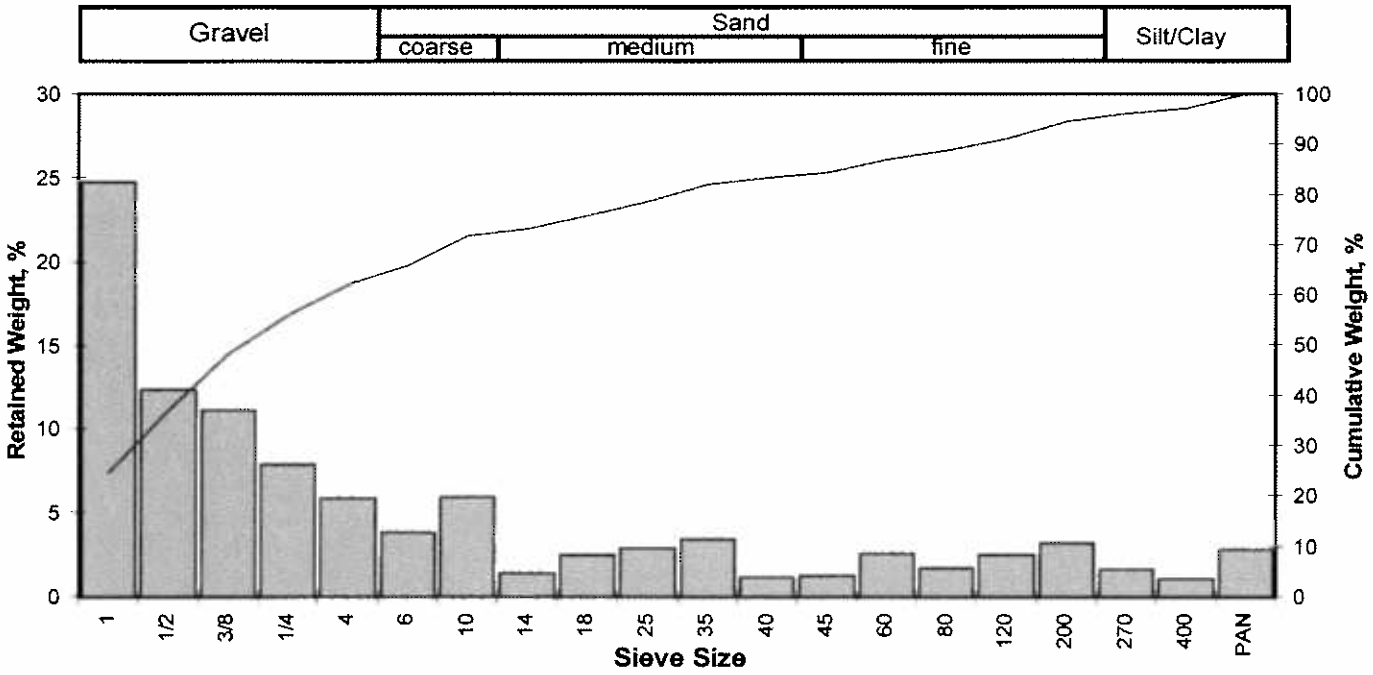
| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 2.04 | 2.04 | 2.04 |
| Median, in. | 0.0096 | 0.0096 | 0.0096 |
| Median, mm | 0.243 | 0.243 | 0.243 |
| Mean, phi | 1.40 | 1.58 | 1.73 |
| Mean, in. | 0.0149 | 0.0132 | 0.0119 |
| Mean, mm | 0.378 | 0.335 | 0.301 |
| Sorting | 2.552 | 2.323 | 2.076 |
| Skewness | 1.056 | -0.200 | -0.441 |
| Kurtosis | 0.058 | 0.299 | 0.915 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Fine sand (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 10.19 |
| Coarse Sand | 10 | 5.17 |
| Medium Sand | 40 | 19.42 |
| Fine Sand | 200 | 47.38 |
| Silt/Clay | <200 | 17.84 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-14 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 14.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 45.50 | 24.76 | 24.76 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 22.70 | 12.35 | 37.12 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 20.40 | 11.10 | 48.22 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 14.58 | 7.93 | 56.15 |
| 0.1873 | 4.757 | -2.25 | 4 | 10.79 | 5.87 | 62.02 |
| 0.1324 | 3.364 | -1.75 | 6 | 6.99 | 3.80 | 65.83 |
| 0.0787 | 2.000 | -1.00 | 10 | 10.87 | 5.92 | 71.74 |
| 0.0557 | 1.414 | -0.50 | 14 | 2.60 | 1.41 | 73.16 |
| 0.0394 | 1.000 | 0.00 | 18 | 4.65 | 2.53 | 75.69 |
| 0.0278 | 0.707 | 0.50 | 25 | 5.30 | 2.88 | 78.57 |
| 0.0197 | 0.500 | 1.00 | 35 | 6.27 | 3.41 | 81.99 |
| 0.0166 | 0.420 | 1.25 | 40 | 2.18 | 1.19 | 83.17 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.25 | 1.22 | 84.40 |
| 0.0098 | 0.250 | 2.00 | 60 | 4.79 | 2.61 | 87.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 3.14 | 1.71 | 88.71 |
| 0.0049 | 0.125 | 3.00 | 120 | 4.59 | 2.50 | 91.21 |
| 0.0029 | 0.074 | 3.75 | 200 | 5.91 | 3.22 | 94.43 |
| 0.0021 | 0.053 | 4.25 | 270 | 3.01 | 1.64 | 96.07 |
| 0.0015 | 0.037 | 4.75 | 400 | 2.00 | 1.09 | 97.15 |
| | | | PAN | 5.23 | 2.85 | 100.00 |
| **TOTALS** | | | | 183.75 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | | | |
| 25 | -4.62 | 0.9713 | 24.671 |
| 40 | -3.54 | 0.4583 | 11.641 |
| 50 | -3.12 | 0.3417 | 8.679 |
| 60 | -2.39 | 0.2069 | 5.255 |
| 75 | -0.14 | 0.0433 | 1.099 |
| 84 | 1.42 | 0.0147 | 0.374 |
| 90 | 2.76 | 0.0058 | 0.148 |
| 95 | 3.92 | 0.0026 | 0.066 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.12 | -3.12 | -3.12 |
| Median, in. | 0.3417 | 0.3417 | 0.3417 |
| Median, mm | 8.679 | 8.679 | 8.679 |
| Mean, phi | -3.69 | | |
| Mean, in. | 0.5073 | | |
| Mean, mm | 12.885 | | |
| Sorting | 4.738 | | |
| Skewness | 0.600 | | |
| Kurtosis | | | |

| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

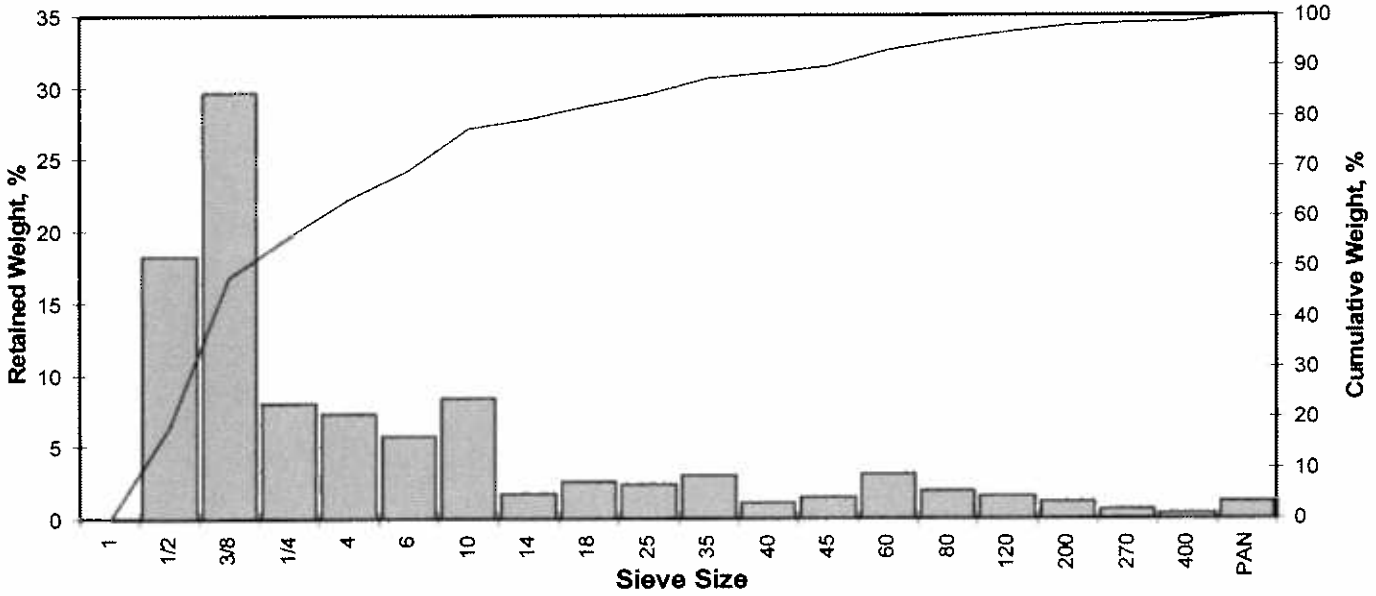
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 62.02 |
| Coarse Sand | 10 | 9.72 |
| Medium Sand | 40 | 11.43 |
| Fine Sand | 200 | 11.25 |
| Silt/Clay | <200 | 5.57 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-21 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 21.0 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 27.50 | 18.31 | 18.31 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 44.60 | 29.70 | 48.01 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 12.14 | 8.08 | 56.10 |
| 0.1873 | 4.757 | -2.25 | 4 | 11.02 | 7.34 | 63.43 |
| 0.1324 | 3.364 | -1.75 | 6 | 8.70 | 5.79 | 69.23 |
| 0.0787 | 2.000 | -1.00 | 10 | 12.67 | 8.44 | 77.67 |
| 0.0557 | 1.414 | -0.50 | 14 | 2.60 | 1.73 | 79.40 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.89 | 2.59 | 81.99 |
| 0.0278 | 0.707 | 0.50 | 25 | 3.60 | 2.40 | 84.38 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.51 | 3.00 | 87.39 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.65 | 1.10 | 88.49 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.16 | 1.44 | 89.92 |
| 0.0098 | 0.250 | 2.00 | 60 | 4.68 | 3.12 | 93.04 |
| 0.0070 | 0.177 | 2.50 | 80 | 2.89 | 1.92 | 94.97 |
| 0.0049 | 0.125 | 3.00 | 120 | 2.39 | 1.59 | 96.56 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.85 | 1.23 | 97.79 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.98 | 0.65 | 98.44 |
| 0.0015 | 0.037 | 4.75 | 400 | 0.56 | 0.37 | 98.81 |
| | | | PAN | 1.78 | 1.19 | 100.00 |
| **TOTALS** | | | | 150.17 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -4.37 | 0.8146 | 20.691 |
| 10 | -4.10 | 0.6742 | 17.124 |
| 16 | -3.77 | 0.5372 | 13.645 |
| 25 | -3.55 | 0.4627 | 11.752 |
| 40 | -3.35 | 0.4028 | 10.231 |
| 50 | -3.11 | 0.3388 | 8.605 |
| 60 | -2.45 | 0.2144 | 5.446 |
| 75 | -1.24 | 0.0928 | 2.357 |
| 84 | 0.42 | 0.0294 | 0.748 |
| 90 | 1.51 | 0.0138 | 0.351 |
| 95 | 2.51 | 0.0069 | 0.175 |

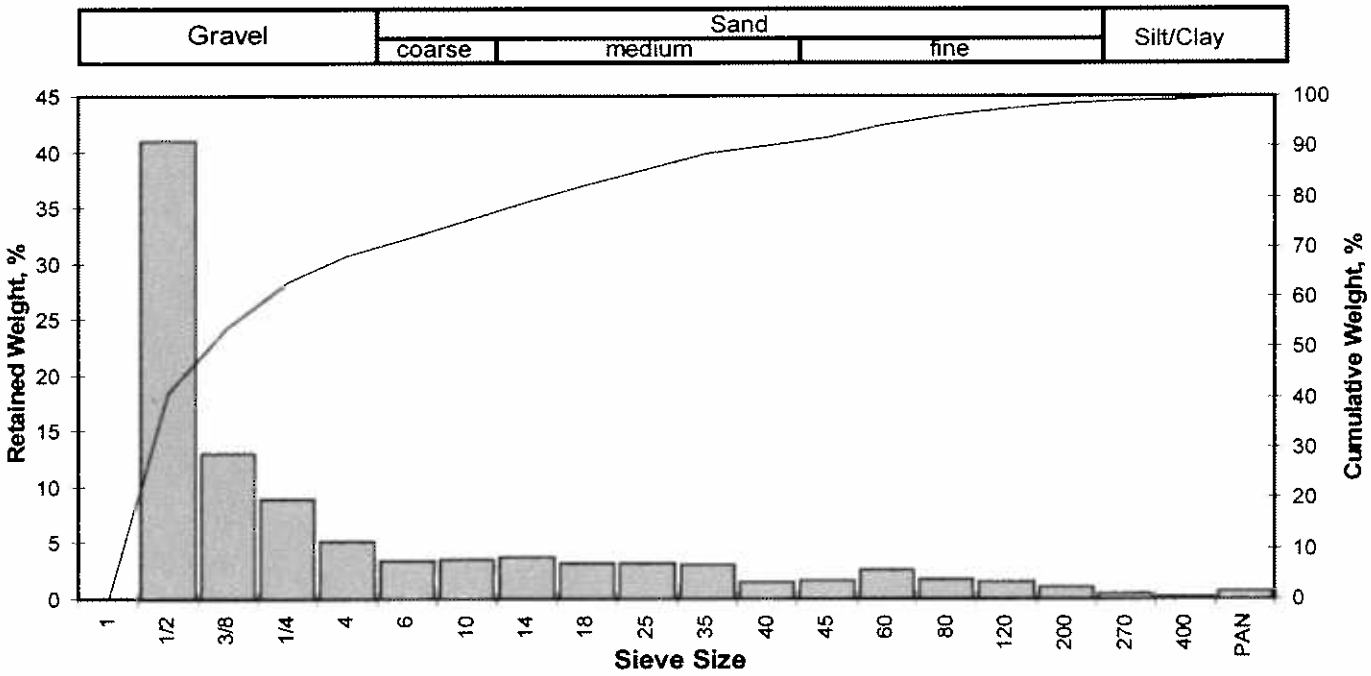
| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.11 | -3.11 | -3.11 |
| Median, in. | 0.3388 | 0.3388 | 0.3388 |
| Median, mm | 8.605 | 8.605 | 8.605 |
| Mean, phi | -2.82 | -1.68 | -2.15 |
| Mean, in. | 0.2777 | 0.1257 | 0.1750 |
| Mean, mm | 7.054 | 3.194 | 4.444 |
| Sorting | 2.233 | 2.095 | 2.090 |
| Skewness | 0.612 | 0.683 | 0.657 |
| Kurtosis | 0.280 | 0.642 | 1.217 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Gravel (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 63.43 |
| Coarse Sand | 10 | 14.23 |
| Medium Sand | 40 | 10.82 |
| Fine Sand | 200 | 9.30 |
| Silt/Clay | <200 | 2.21 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-28 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 28.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 46.20 | 40.97 | 40.97 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 14.70 | 13.04 | 54.01 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 10.12 | 8.97 | 62.98 |
| 0.1873 | 4.757 | -2.25 | 4 | 5.89 | 5.22 | 68.21 |
| 0.1324 | 3.364 | -1.75 | 6 | 3.87 | 3.43 | 71.64 |
| 0.0787 | 2.000 | -1.00 | 10 | 3.97 | 3.52 | 75.16 |
| 0.0557 | 1.414 | -0.50 | 14 | 4.30 | 3.81 | 78.97 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.62 | 3.21 | 82.18 |
| 0.0278 | 0.707 | 0.50 | 25 | 3.59 | 3.18 | 85.37 |
| 0.0197 | 0.500 | 1.00 | 35 | 3.42 | 3.03 | 88.40 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.77 | 1.57 | 89.97 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.81 | 1.61 | 91.58 |
| 0.0098 | 0.250 | 2.00 | 60 | 2.95 | 2.62 | 94.19 |
| 0.0070 | 0.177 | 2.50 | 80 | 2.02 | 1.79 | 95.98 |
| 0.0049 | 0.125 | 3.00 | 120 | 1.68 | 1.49 | 97.47 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.18 | 1.05 | 98.52 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.57 | 0.51 | 99.02 |
| 0.0015 | 0.037 | 4.75 | 400 | 0.33 | 0.29 | 99.32 |
| | | | PAN | 0.77 | 0.68 | 100.00 |
| **TOTALS** | | | | 112.76 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -4.52 | 0.9045 | 22.975 |
| 10 | -4.40 | 0.8311 | 21.111 |
| 16 | -4.25 | 0.7509 | 19.073 |
| 25 | -4.03 | 0.6449 | 16.380 |
| 40 | -3.67 | 0.5003 | 12.709 |
| 50 | -3.37 | 0.4070 | 10.337 |
| 60 | -2.86 | 0.2859 | 7.261 |
| 75 | -1.03 | 0.0806 | 2.048 |
| 84 | 0.29 | 0.0323 | 0.821 |
| 90 | 1.25 | 0.0165 | 0.419 |
| 95 | 2.23 | 0.0084 | 0.214 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.37 | -3.37 | -3.37 |
| Median, in. | 0.4070 | 0.4070 | 0.4070 |
| Median, mm | 10.337 | 10.337 | 10.337 |
| Mean, phi | -3.20 | -1.98 | -2.45 |
| Mean, in. | 0.3627 | 0.1558 | 0.2145 |
| Mean, mm | 9.214 | 3.956 | 5.449 |
| Sorting | 2.828 | 2.269 | 2.157 |
| Skewness | 0.560 | 0.611 | 0.635 |
| Kurtosis | 0.346 | 0.487 | 0.922 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Gravel (based on Mean from Trask) |

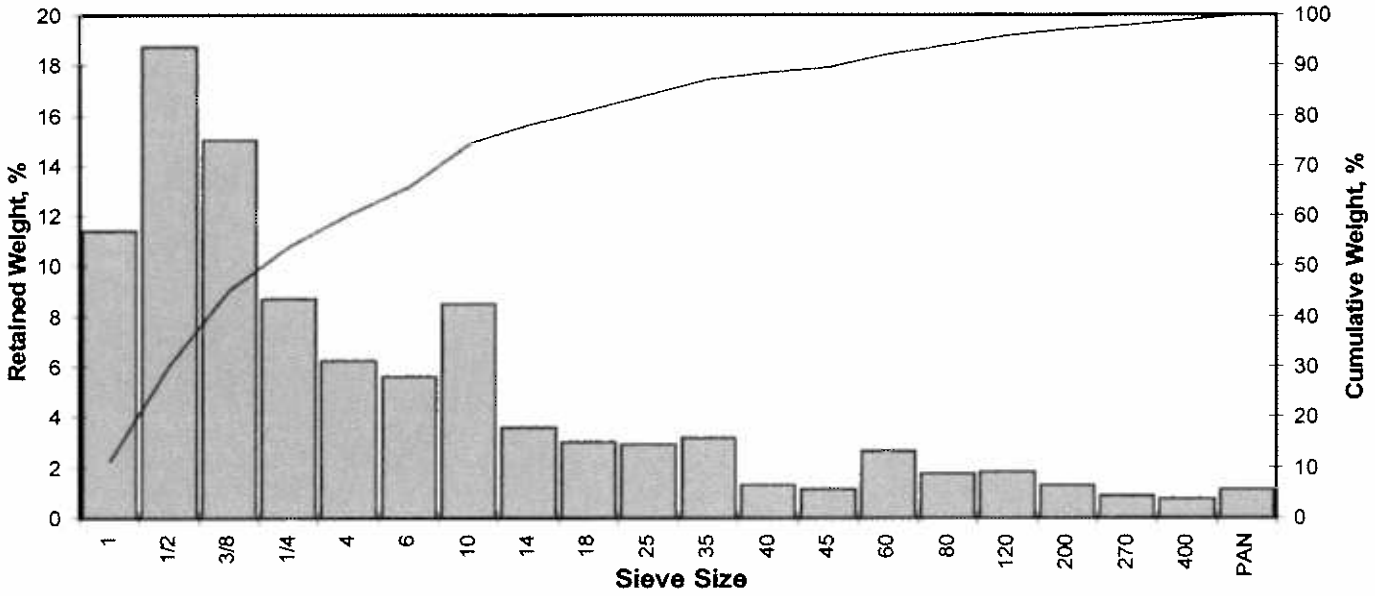
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 68.21 |
| Coarse Sand | 10 | 6.95 |
| Medium Sand | 40 | 14.81 |
| Fine Sand | 200 | 8.55 |
| Silt/Clay | <200 | 1.48 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-35.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 35.5 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 12.33 | 11.44 | 11.44 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 20.20 | 18.75 | 30.19 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 16.20 | 15.03 | 45.22 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 9.42 | 8.74 | 53.96 |
| 0.1873 | 4.757 | -2.25 | 4 | 6.74 | 6.25 | 60.22 |
| 0.1324 | 3.364 | -1.75 | 6 | 6.09 | 5.65 | 65.87 |
| 0.0787 | 2.000 | -1.00 | 10 | 9.17 | 8.51 | 74.38 |
| 0.0557 | 1.414 | -0.50 | 14 | 3.91 | 3.63 | 78.01 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.24 | 3.01 | 81.01 |
| 0.0278 | 0.707 | 0.50 | 25 | 3.16 | 2.93 | 83.95 |
| 0.0197 | 0.500 | 1.00 | 35 | 3.41 | 3.16 | 87.11 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.39 | 1.29 | 88.40 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.26 | 1.17 | 89.57 |
| 0.0098 | 0.250 | 2.00 | 60 | 2.86 | 2.65 | 92.22 |
| 0.0070 | 0.177 | 2.50 | 80 | 1.91 | 1.77 | 94.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 1.99 | 1.85 | 95.84 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.38 | 1.28 | 97.12 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.97 | 0.90 | 98.02 |
| 0.0015 | 0.037 | 4.75 | 400 | 0.87 | 0.81 | 98.83 |
| | | | PAN | 1.26 | 1.17 | 100.00 |
| **TOTALS** | | | | 107.76 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | -4.40 | 0.8317 | 21.125 |
| 25 | -3.92 | 0.5962 | 15.145 |
| 40 | -3.39 | 0.4114 | 10.451 |
| 50 | -2.93 | 0.3001 | 7.623 |
| 60 | -2.26 | 0.1892 | 4.805 |
| 75 | -0.91 | 0.0742 | 1.885 |
| 84 | 0.51 | 0.0277 | 0.703 |
| 90 | 1.58 | 0.0132 | 0.334 |
| 95 | 2.77 | 0.0058 | 0.146 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -2.93 | -2.93 | -2.93 |
| Median, in. | 0.3001 | 0.3001 | 0.3001 |
| Median, mm | 7.623 | 7.623 | 7.623 |
| Mean, phi | -3.09 | -1.95 | -2.27 |
| Mean, in. | 0.3352 | 0.1517 | 0.1904 |
| Mean, mm | 8.515 | 3.853 | 4.837 |
| Sorting | 2.835 | 2.455 | |
| Skewness | 0.701 | 0.401 | |
| Kurtosis | | | |

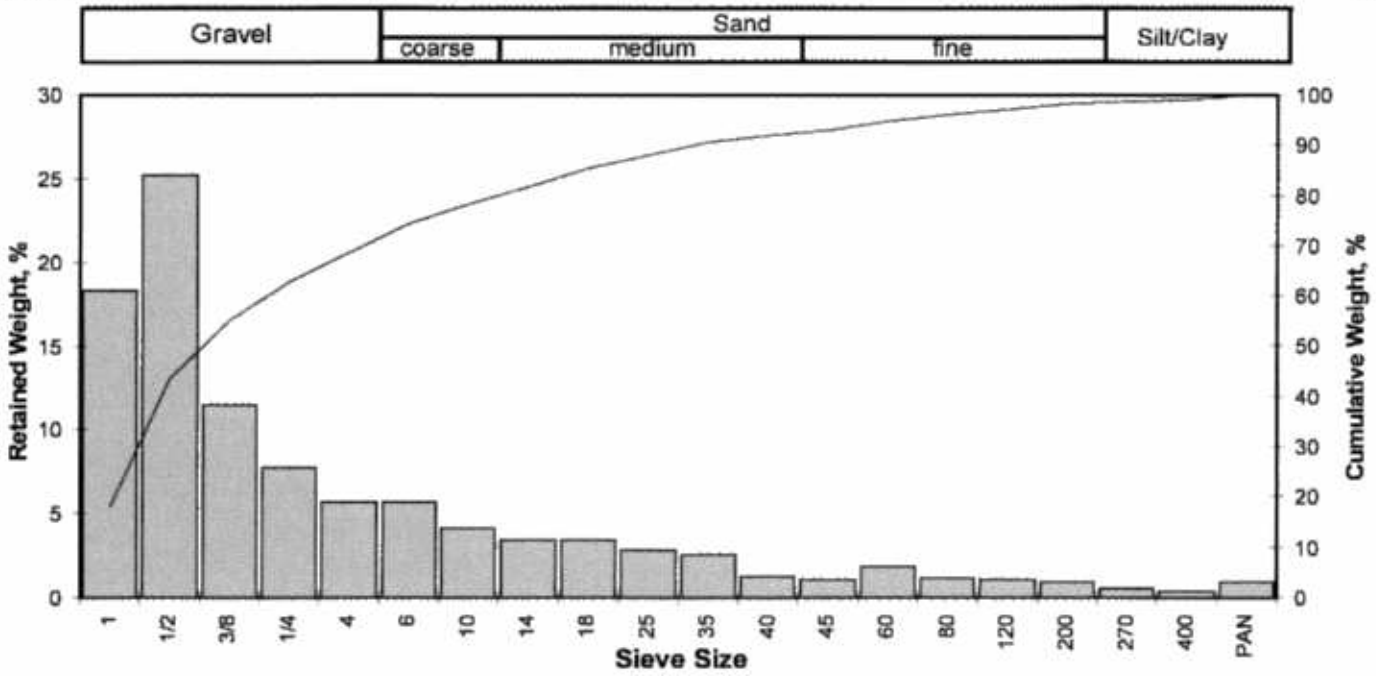
| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 60.22 |
| Coarse Sand | 10 | 14.16 |
| Medium Sand | 40 | 14.02 |
| Fine Sand | 200 | 8.72 |
| Silt/Clay | <200 | 2.88 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-43 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 43.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 25.92 | 18.36 | 18.36 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 35.60 | 25.21 | 43.57 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 16.30 | 11.54 | 55.11 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 10.90 | 7.72 | 62.83 |
| 0.1873 | 4.757 | -2.25 | 4 | 8.08 | 5.72 | 68.56 |
| 0.1324 | 3.364 | -1.75 | 6 | 8.12 | 5.75 | 74.31 |
| 0.0787 | 2.000 | -1.00 | 10 | 5.82 | 4.12 | 78.43 |
| 0.0557 | 1.414 | -0.50 | 14 | 4.83 | 3.42 | 81.85 |
| 0.0394 | 1.000 | 0.00 | 18 | 4.87 | 3.45 | 85.30 |
| 0.0278 | 0.707 | 0.50 | 25 | 3.93 | 2.78 | 88.08 |
| 0.0197 | 0.500 | 1.00 | 35 | 3.66 | 2.59 | 90.67 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.77 | 1.25 | 91.93 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.59 | 1.13 | 93.05 |
| 0.0098 | 0.250 | 2.00 | 60 | 2.61 | 1.85 | 94.90 |
| 0.0070 | 0.177 | 2.50 | 80 | 1.70 | 1.20 | 96.10 |
| 0.0049 | 0.125 | 3.00 | 120 | 1.50 | 1.06 | 97.17 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.35 | 0.96 | 98.12 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.82 | 0.58 | 98.70 |
| 0.0015 | 0.037 | 4.75 | 400 | 0.51 | 0.36 | 99.07 |
| | | | PAN | 1.32 | 0.93 | 100.00 |
| **TOTALS** | | | | 141.20 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | | | |
| 25 | -4.38 | 0.8200 | 20.829 |
| 40 | -3.79 | 0.5429 | 13.790 |
| 50 | -3.42 | 0.4224 | 10.729 |
| 60 | -2.88 | 0.2899 | 7.363 |
| 75 | -1.62 | 0.1213 | 3.082 |
| 84 | -0.19 | 0.0449 | 1.139 |
| 90 | 0.87 | 0.0215 | 0.547 |
| 95 | 2.04 | 0.0096 | 0.243 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.42 | -3.42 | -3.42 |
| Median, in. | 0.4224 | 0.4224 | 0.4224 |
| Median, mm | 10.729 | 10.729 | 10.729 |
| Mean, phi | -3.58 | | |
| Mean, in. | 0.4707 | | |
| Mean, mm | 11.955 | | |
| Sorting | 2.600 | | |
| Skewness | 0.747 | | |
| Kurtosis | | | |

| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

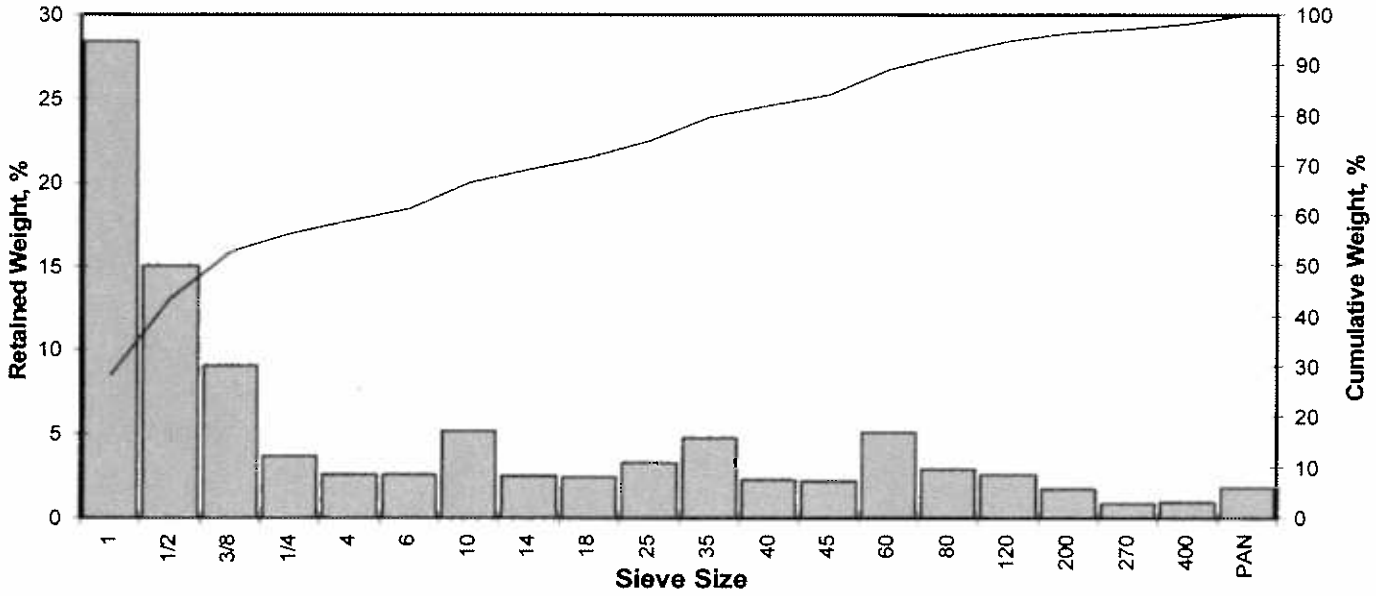
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 68.56 |
| Coarse Sand | 10 | 9.87 |
| Medium Sand | 40 | 13.50 |
| Fine Sand | 200 | 6.20 |
| Silt/Clay | <200 | 1.88 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-56 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 56.0 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 40.03 | 28.45 | 28.45 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 21.20 | 15.07 | 43.52 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 12.80 | 9.10 | 52.61 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 5.19 | 3.69 | 56.30 |
| 0.1873 | 4.757 | -2.25 | 4 | 3.63 | 2.58 | 58.88 |
| 0.1324 | 3.364 | -1.75 | 6 | 3.67 | 2.61 | 61.49 |
| 0.0787 | 2.000 | -1.00 | 10 | 7.27 | 5.17 | 66.65 |
| 0.0557 | 1.414 | -0.50 | 14 | 3.53 | 2.51 | 69.16 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.46 | 2.46 | 71.62 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.60 | 3.27 | 74.89 |
| 0.0197 | 0.500 | 1.00 | 35 | 6.72 | 4.78 | 79.67 |
| 0.0166 | 0.420 | 1.25 | 40 | 3.17 | 2.25 | 81.92 |
| 0.0139 | 0.354 | 1.50 | 45 | 3.04 | 2.16 | 84.08 |
| 0.0098 | 0.250 | 2.00 | 60 | 7.15 | 5.08 | 89.16 |
| 0.0070 | 0.177 | 2.50 | 80 | 4.13 | 2.94 | 92.10 |
| 0.0049 | 0.125 | 3.00 | 120 | 3.66 | 2.60 | 94.70 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.41 | 1.71 | 96.41 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.18 | 0.84 | 97.25 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.36 | 0.97 | 98.22 |
| | | | PAN | 2.51 | 1.78 | 100.00 |
| **TOTALS** | | | | 140.71 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | | | |
| 25 | | | |
| 40 | -3.88 | 0.5786 | 14.695 |
| 50 | -3.36 | 0.4047 | 10.279 |
| 60 | -2.04 | 0.1614 | 4.099 |
| 75 | 0.51 | 0.0276 | 0.702 |
| 84 | 1.49 | 0.0140 | 0.356 |
| 90 | 2.14 | 0.0089 | 0.226 |
| 95 | 3.13 | 0.0045 | 0.114 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.36 | -3.36 | -3.36 |
| Median, in. | 0.4047 | 0.4047 | 0.4047 |
| Median, mm | 10.279 | 10.279 | 10.279 |
| Mean, phi | | | |
| Mean, in. | | | |
| Mean, mm | | | |
| Sorting | | | |
| Skewness | | | |
| Kurtosis | | | |

| Grain Size Description (ASTM-USCS Scale) | N/A (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 58.88 |
| Coarse Sand | 10 | 7.77 |
| Medium Sand | 40 | 15.27 |
| Fine Sand | 200 | 14.49 |
| Silt/Clay | <200 | 3.59 |
| | Total | 100 |

**PTS** Laboratories, Inc.

URS Corporation
PTS File No: 36836

## PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| Sample ID | Depth, ft. | Mean Grain Size Description (1) | Median Grain Size mm | Particle Size Distribution, wt. percent | | | | | | Silt & Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Gravel | Sand Size | | | Silt | Clay | |
| | | | | | Coarse | Medium | Fine | | | |
| SSA-02-8.7 | 8.7 | Silt | 0.005 | 0.00 | 0.00 | 0.00 | 0.00 | 51.41 | 48.59 | 100.00 |
| SSA-02-14 | 14.0 | Silt | 0.005 | 0.00 | 0.00 | 0.00 | 0.00 | 47.72 | 52.28 | 100.00 |
| SSA-02-21 | 21.0 | Silt | 0.005 | 0.00 | 0.00 | 0.00 | 0.00 | 47.95 | 52.05 | 100.00 |
| SSA-02-28 | 28.0 | Medium sand | 0.285 | 0.00 | 0.00 | 42.27 | 27.57 | 20.25 | 9.91 | 30.15 |
| SSA-02-35.5 | 35.5 | Silt | 0.005 | 0.00 | 0.00 | 0.00 | 0.00 | 52.09 | 47.91 | 100.00 |
| SSA-02-43 | 43.0 | Silt | 0.006 | 0.00 | 0.00 | 0.00 | 0.00 | 55.90 | 44.10 | 100.00 |
| SSA-02-56 | 56.0 | Silt | 0.006 | 0.00 | 0.00 | 0.00 | 0.00 | 54.55 | 45.45 | 100.00 |

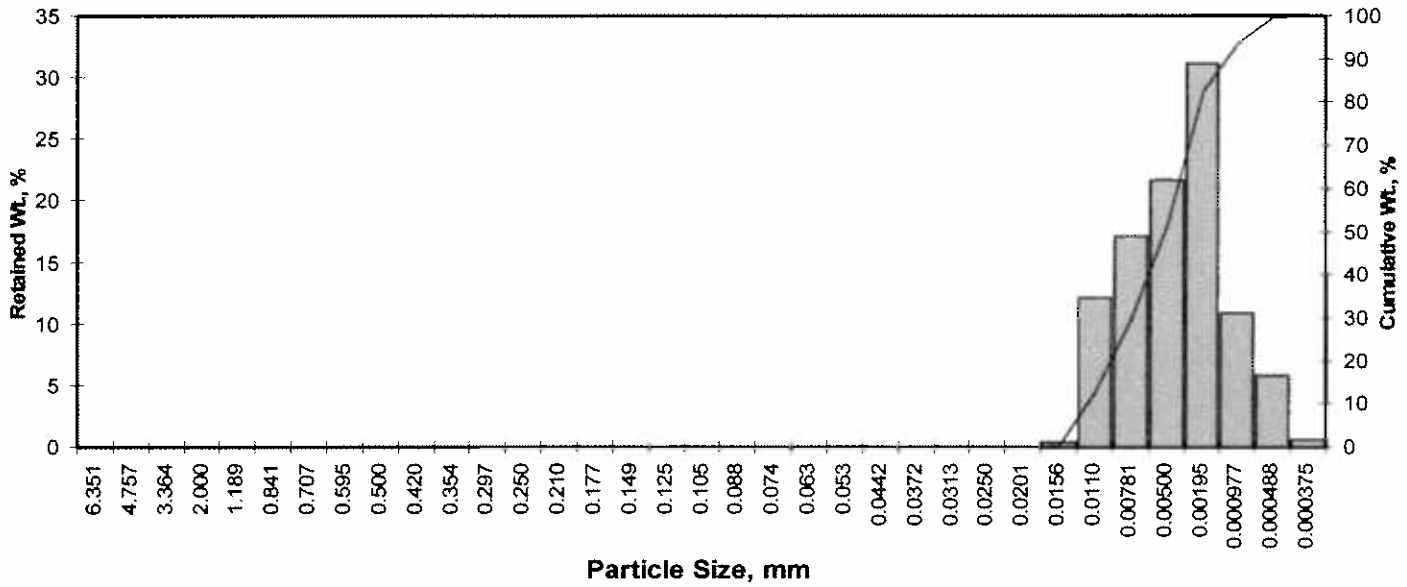
(1) Based on Mean from Trask

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-8.7 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 8.7 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.43 | 0.43 | 0.43 |
| 0.000435 | 0.0110 | 6.50 | | 12.20 | 12.20 | 12.63 |
| 0.000308 | 0.00781 | 7.00 | | 17.10 | 17.09 | 29.72 |
| 0.000197 | 0.00500 | 7.65 | | 21.70 | 21.69 | 51.41 |
| 0.000077 | 0.00195 | 9.00 | | 31.20 | 31.19 | 82.61 |
| 0.000038 | 0.000977 | 10.00 | | 10.90 | 10.90 | 93.50 |
| 0.000019 | 0.000488 | 11.00 | | 5.86 | 5.86 | 99.36 |
| 0.000015 | 0.000375 | 11.38 | | 0.64 | 0.64 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.19 | 0.0005 | 0.014 |
| 10 | 6.39 | 0.0005 | 0.012 |
| 16 | 6.60 | 0.0004 | 0.010 |
| 25 | 6.86 | 0.0003 | 0.009 |
| 40 | 7.31 | 0.0002 | 0.006 |
| 50 | 7.60 | 0.0002 | 0.005 |
| 60 | 8.02 | 0.0002 | 0.004 |
| 75 | 8.67 | 0.0001 | 0.002 |
| 84 | 9.13 | 0.0001 | 0.002 |
| 90 | 9.68 | 0.0000 | 0.001 |
| 95 | 10.26 | 0.0000 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.60 | 7.60 | 7.60 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.005 | 0.005 | 0.005 |
| Mean, phi | 7.50 | 7.86 | 7.78 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.006 | 0.004 | 0.005 |
| Sorting | 1.871 | 1.265 | 1.249 |
| Skewness | 0.893 | 0.206 | 0.255 |
| Kurtosis | 0.287 | 0.608 | 0.922 |
| **Grain Size Description** (ASTM-USCS Scale) | | Silt (based on Mean from Trask) | |

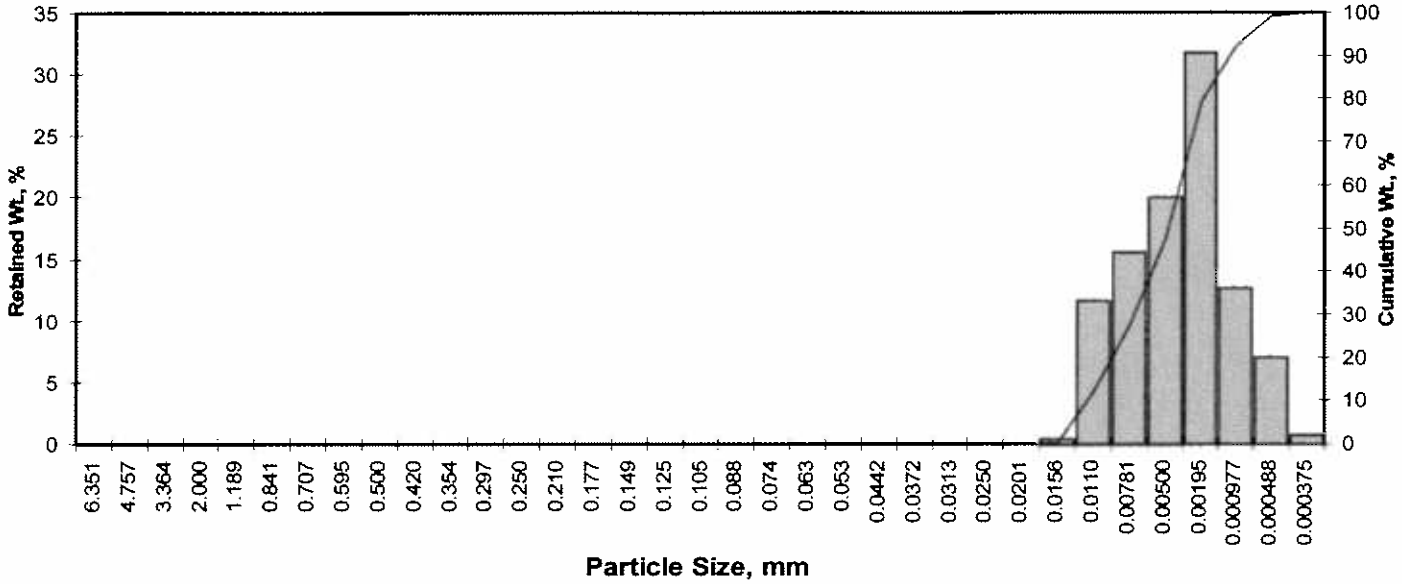
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 51.41 |
| Clay | <0.005 mm | 48.59 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-14 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 14.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.43 | 0.43 | 0.43 |
| 0.000435 | 0.0110 | 6.50 | | 11.60 | 11.60 | 12.03 |
| 0.000308 | 0.00781 | 7.00 | | 15.60 | 15.60 | 27.62 |
| 0.000197 | 0.00500 | 7.65 | | 20.10 | 20.09 | 47.72 |
| 0.000077 | 0.00195 | 9.00 | | 31.80 | 31.79 | 79.51 |
| 0.000038 | 0.000977 | 10.00 | | 12.70 | 12.70 | 92.20 |
| 0.000019 | 0.000488 | 11.00 | | 7.04 | 7.04 | 99.24 |
| 0.000015 | 0.000375 | 11.38 | | 0.76 | 0.76 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.20 | 0.0005 | 0.014 |
| 10 | 6.41 | 0.0005 | 0.012 |
| 16 | 6.63 | 0.0004 | 0.010 |
| 25 | 6.92 | 0.0003 | 0.008 |
| 40 | 7.40 | 0.0002 | 0.006 |
| 50 | 7.74 | 0.0002 | 0.005 |
| 60 | 8.17 | 0.0001 | 0.003 |
| 75 | 8.81 | 0.0001 | 0.002 |
| 84 | 9.35 | 0.0001 | 0.002 |
| 90 | 9.83 | 0.0000 | 0.001 |
| 95 | 10.40 | 0.0000 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.74 | 7.74 | 7.74 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.005 | 0.005 | 0.005 |
| Mean, phi | 7.57 | 7.99 | 7.91 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.005 | 0.004 | 0.004 |
| Sorting | 1.927 | 1.363 | 1.318 |
| Skewness | 0.920 | 0.182 | 0.223 |
| Kurtosis | 0.284 | 0.541 | 0.910 |

| Grain Size Description (ASTM-USCS Scale) | Silt (based on Mean from Trask) |
|---|---|

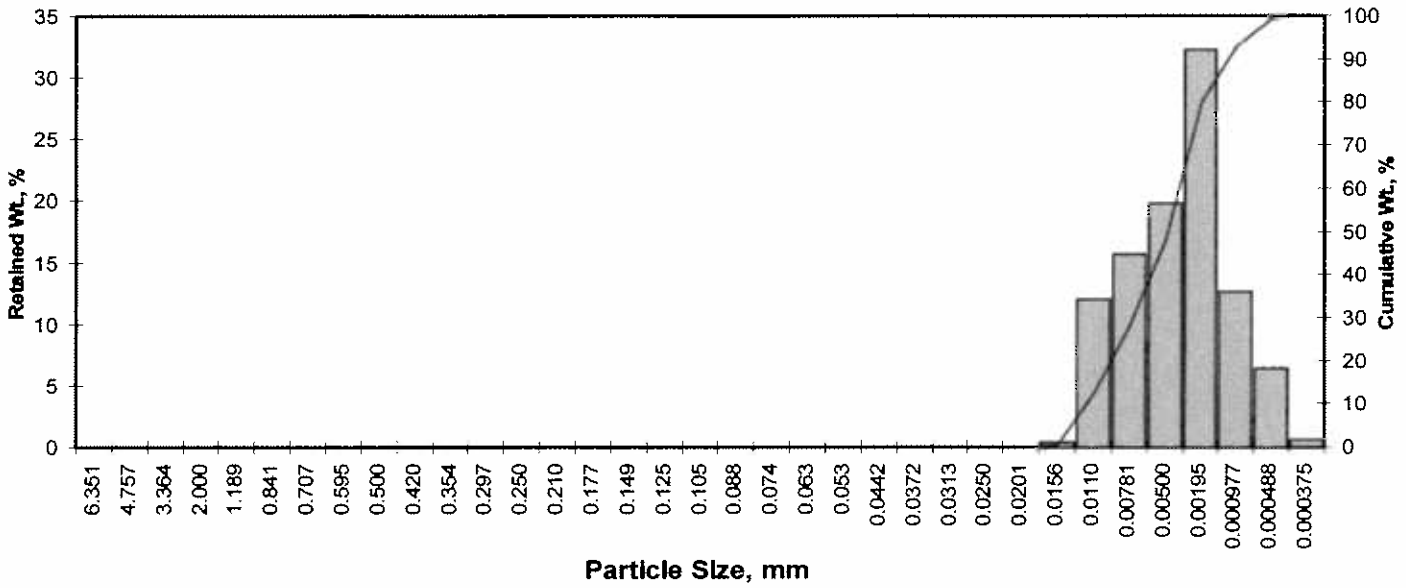
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 47.72 |
| Clay | <0.005 mm | 52.28 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-21 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 21.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.45 | 0.45 | 0.45 |
| 0.000435 | 0.0110 | 6.50 | | 12.00 | 12.00 | 12.45 |
| 0.000308 | 0.00781 | 7.00 | | 15.70 | 15.70 | 28.15 |
| 0.000197 | 0.00500 | 7.65 | | 19.80 | 19.80 | 47.95 |
| 0.000077 | 0.00195 | 9.00 | | 32.30 | 32.30 | 80.25 |
| 0.000038 | 0.000977 | 10.00 | | 12.70 | 12.70 | 92.95 |
| 0.000019 | 0.000488 | 11.00 | | 6.39 | 6.39 | 99.34 |
| 0.000015 | 0.000375 | 11.38 | | 0.66 | 0.66 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.19 | 0.0005 | 0.014 |
| 10 | 6.40 | 0.0005 | 0.012 |
| 16 | 6.61 | 0.0004 | 0.010 |
| 25 | 6.90 | 0.0003 | 0.008 |
| 40 | 7.39 | 0.0002 | 0.006 |
| 50 | 7.73 | 0.0002 | 0.005 |
| 60 | 8.15 | 0.0001 | 0.004 |
| 75 | 8.78 | 0.0001 | 0.002 |
| 84 | 9.30 | 0.0001 | 0.002 |
| 90 | 9.77 | 0.0000 | 0.001 |
| 95 | 10.32 | 0.0000 | 0.001 |

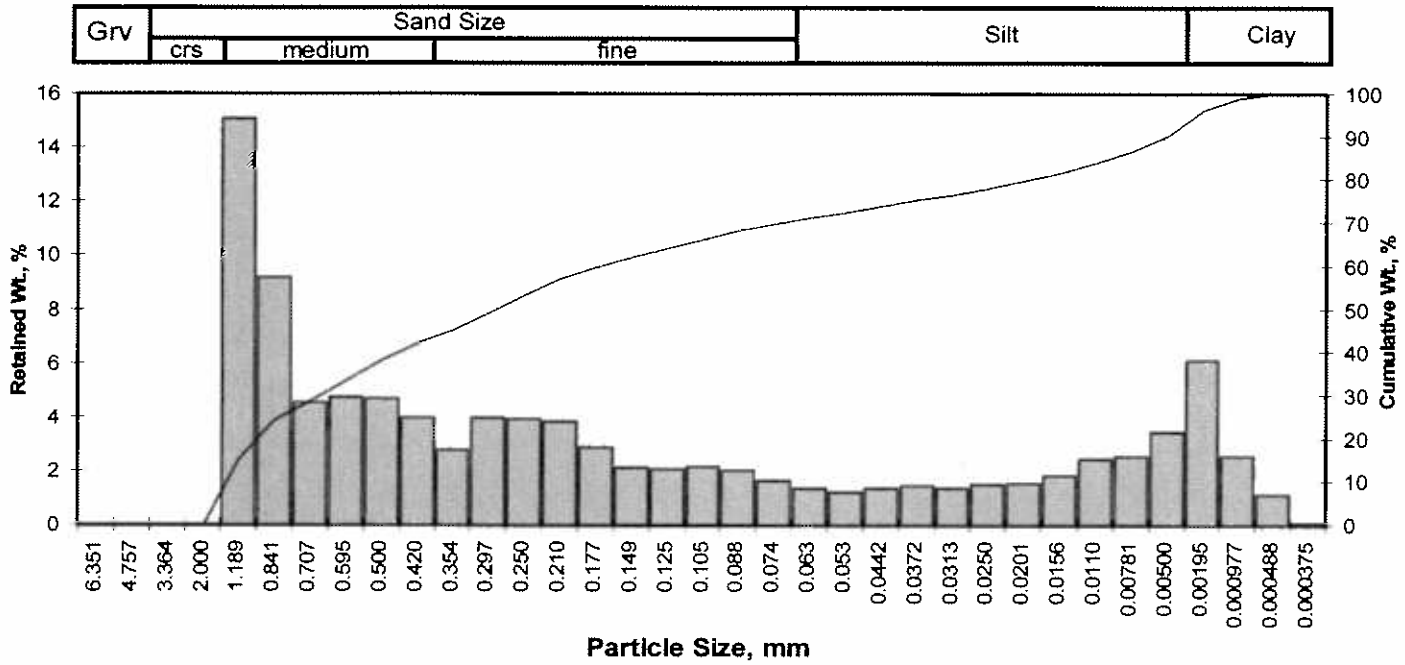
| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.73 | 7.73 | 7.73 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.005 | 0.005 | 0.005 |
| Mean, phi | 7.55 | 7.95 | 7.88 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.005 | 0.004 | 0.004 |
| Sorting | 1.919 | 1.341 | 1.296 |
| Skewness | 0.927 | 0.166 | 0.210 |
| Kurtosis | 0.285 | 0.540 | 0.901 |
| **Grain Size Description** (ASTM-USCS Scale) | | Silt (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 47.95 |
| Clay | <0.005 mm | 52.05 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-28 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 28.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 15.10 | 15.10 | 15.10 |
| 0.0331 | 0.841 | 0.25 | 20 | 9.20 | 9.20 | 24.30 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.54 | 4.54 | 28.83 |
| 0.0234 | 0.595 | 0.75 | 30 | 4.74 | 4.74 | 33.57 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.70 | 4.70 | 38.27 |
| 0.0166 | 0.420 | 1.25 | 40 | 4.00 | 4.00 | 42.27 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.81 | 2.81 | 45.08 |
| 0.0117 | 0.297 | 1.75 | 50 | 3.97 | 3.97 | 49.05 |
| 0.0098 | 0.250 | 2.00 | 60 | 3.95 | 3.95 | 53.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 3.85 | 3.85 | 56.85 |
| 0.0070 | 0.177 | 2.50 | 80 | 2.90 | 2.90 | 59.75 |
| 0.0059 | 0.149 | 2.75 | 100 | 2.14 | 2.14 | 61.89 |
| 0.0049 | 0.125 | 3.00 | 120 | 2.07 | 2.07 | 63.96 |
| 0.0041 | 0.105 | 3.25 | 140 | 2.19 | 2.19 | 66.15 |
| 0.0035 | 0.088 | 3.50 | 170 | 2.03 | 2.03 | 68.18 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.67 | 1.67 | 69.85 |
| 0.0025 | 0.063 | 4.00 | 230 | 1.36 | 1.36 | 71.21 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.25 | 1.25 | 72.46 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.37 | 1.37 | 73.83 |
| 0.00146 | 0.0372 | 4.75 | 400 | 1.48 | 1.48 | 75.30 |
| 0.00123 | 0.0313 | 5.00 | 450 | 1.37 | 1.37 | 76.67 |
| 0.000986 | 0.0250 | 5.32 | 500 | 1.51 | 1.51 | 78.18 |
| 0.000790 | 0.0201 | 5.64 | 635 | 1.56 | 1.56 | 79.74 |
| 0.000615 | 0.0156 | 6.00 | | 1.85 | 1.85 | 81.59 |
| 0.000435 | 0.0110 | 6.50 | | 2.45 | 2.45 | 84.04 |
| 0.000308 | 0.00781 | 7.00 | | 2.56 | 2.56 | 86.60 |
| 0.000197 | 0.00500 | 7.65 | | 3.49 | 3.49 | 90.09 |
| 0.000077 | 0.00195 | 9.00 | | 6.14 | 6.14 | 96.23 |
| 0.000038 | 0.000977 | 10.00 | | 2.55 | 2.55 | 98.78 |
| 0.000019 | 0.000488 | 11.00 | | 1.12 | 1.12 | 99.90 |
| 0.000015 | 0.000375 | 11.38 | | 0.10 | 0.10 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -0.75 | 0.0663 | 1.684 |
| 10 | -0.50 | 0.0558 | 1.417 |
| 16 | -0.20 | 0.0453 | 1.149 |
| 25 | 0.29 | 0.0322 | 0.819 |
| 40 | 1.11 | 0.0183 | 0.464 |
| 50 | 1.81 | 0.0112 | 0.285 |
| 60 | 2.53 | 0.0068 | 0.173 |
| 75 | 4.70 | 0.0015 | 0.039 |
| 84 | 6.49 | 0.0004 | 0.011 |
| 90 | 7.63 | 0.0002 | 0.005 |
| 95 | 8.73 | 0.0001 | 0.002 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 1.81 | 1.81 | 1.81 |
| Median, in. | 0.0112 | 0.0112 | 0.0112 |
| Median, mm | 0.285 | 0.285 | 0.285 |
| Mean, phi | 1.22 | 3.15 | 2.70 |
| Mean, in. | 0.0169 | 0.0045 | 0.0061 |
| Mean, mm | 0.429 | 0.113 | 0.154 |
| Sorting | 4.610 | 3.346 | 3.109 |
| Skewness | 0.623 | 0.399 | 0.429 |
| Kurtosis | 0.276 | 0.417 | 0.881 |
| **Grain Size Description** (ASTM-USCS Scale) | | Medium sand (based on Mean from Trask) | |

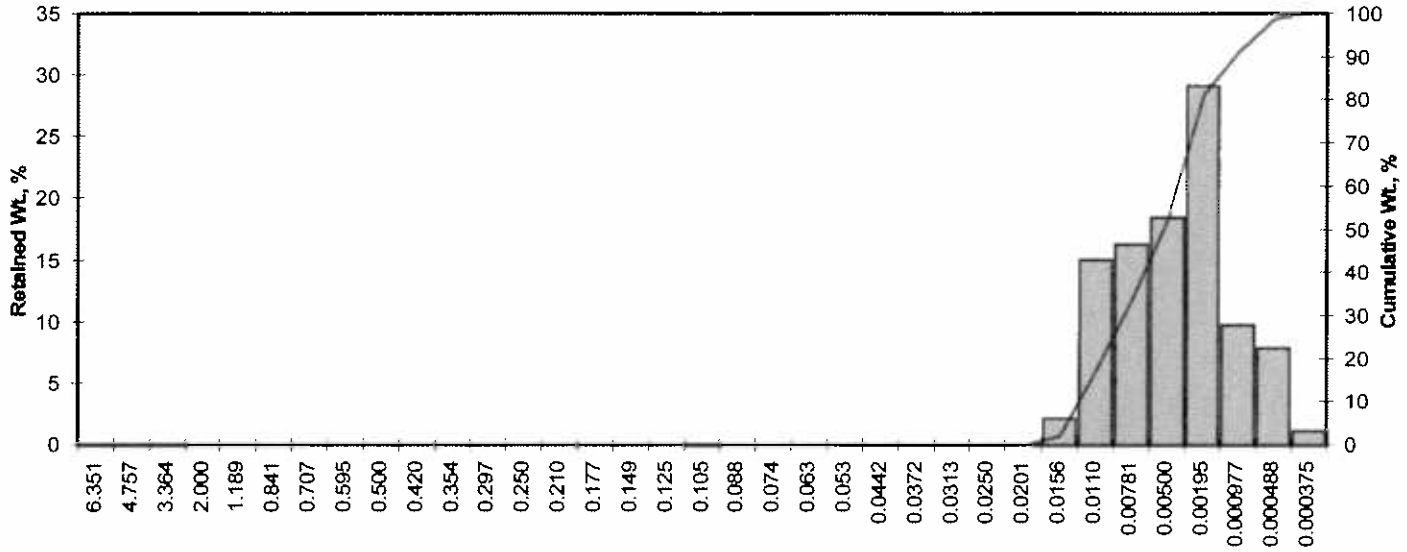
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 42.27 |
| Fine Sand | 200 | 27.57 |
| Silt | >0.005 mm | 20.25 |
| Clay | <0.005 mm | 9.91 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-35.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 35.5 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.01 | 0.01 | 0.01 |
| 0.000615 | 0.0156 | 6.00 | | 2.21 | 2.21 | 2.22 |
| 0.000435 | 0.0110 | 6.50 | | 15.10 | 15.09 | 17.31 |
| 0.000308 | 0.00781 | 7.00 | | 16.30 | 16.29 | 33.60 |
| 0.000197 | 0.00500 | 7.65 | | 18.50 | 18.49 | 52.09 |
| 0.000077 | 0.00195 | 9.00 | | 29.20 | 29.18 | 81.27 |
| 0.000038 | 0.000977 | 10.00 | | 9.76 | 9.75 | 91.03 |
| 0.000019 | 0.000488 | 11.00 | | 7.85 | 7.85 | 98.87 |
| 0.000015 | 0.000375 | 11.38 | | 1.13 | 1.13 | 100.00 |
| **TOTALS** | | | | **100.10** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.09 | 0.0006 | 0.015 |
| 10 | 6.26 | 0.0005 | 0.013 |
| 16 | 6.46 | 0.0004 | 0.011 |
| 25 | 6.74 | 0.0004 | 0.009 |
| 40 | 7.22 | 0.0003 | 0.007 |
| 50 | 7.57 | 0.0002 | 0.005 |
| 60 | 8.01 | 0.0002 | 0.004 |
| 75 | 8.71 | 0.0001 | 0.002 |
| 84 | 9.28 | 0.0001 | 0.002 |
| 90 | 9.89 | 0.0000 | 0.001 |
| 95 | 10.51 | 0.0000 | 0.001 |

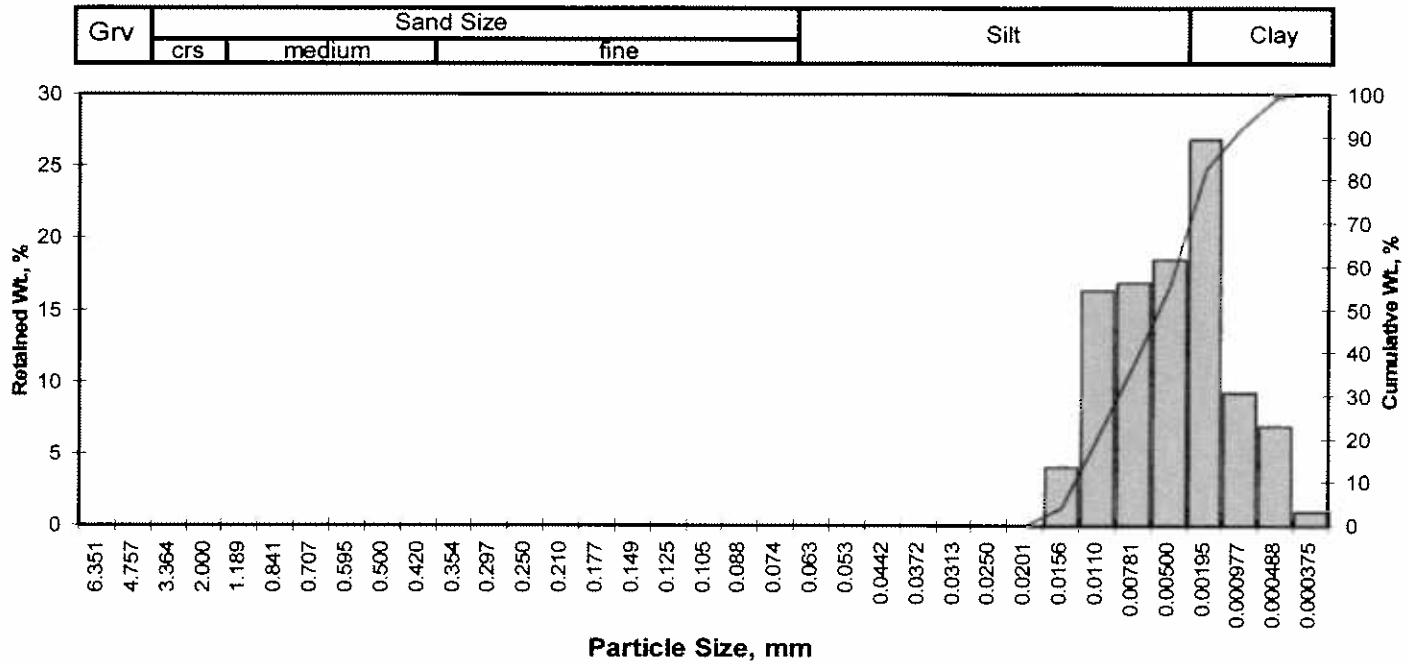
| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.57 | 7.57 | 7.57 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.005 | 0.005 | 0.005 |
| Mean, phi | 7.41 | 7.87 | 7.77 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.006 | 0.004 | 0.005 |
| Sorting | 1.981 | 1.412 | 1.375 |
| Skewness | 0.901 | 0.210 | 0.270 |
| Kurtosis | 0.291 | 0.564 | 0.917 |
| **Grain Size Description** (ASTM-USCS Scale) | | Silt (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 52.09 |
| Clay | <0.005 mm | 47.91 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-43 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 43.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.04 | 0.04 | 0.04 |
| 0.000615 | 0.0156 | 6.00 | | 4.07 | 4.07 | 4.11 |
| 0.000435 | 0.0110 | 6.50 | | 16.40 | 16.40 | 20.50 |
| 0.000308 | 0.00781 | 7.00 | | 16.90 | 16.90 | 37.40 |
| 0.000197 | 0.00500 | 7.65 | | 18.50 | 18.50 | 55.90 |
| 0.000077 | 0.00195 | 9.00 | | 26.90 | 26.90 | 82.79 |
| 0.000038 | 0.000977 | 10.00 | | 9.28 | 9.28 | 92.07 |
| 0.000019 | 0.000488 | 11.00 | | 6.96 | 6.96 | 99.03 |
| 0.000015 | 0.000375 | 11.38 | | 0.97 | 0.97 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

**Cumulative Weight Percent greater than**

| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
|---|---|---|---|
| 5 | 6.03 | 0.0006 | 0.015 |
| 10 | 6.18 | 0.0005 | 0.014 |
| 16 | 6.36 | 0.0005 | 0.012 |
| 25 | 6.63 | 0.0004 | 0.010 |
| 40 | 7.09 | 0.0003 | 0.007 |
| 50 | 7.44 | 0.0002 | 0.006 |
| 60 | 7.85 | 0.0002 | 0.004 |
| 75 | 8.61 | 0.0001 | 0.003 |
| 84 | 9.13 | 0.0001 | 0.002 |
| 90 | 9.78 | 0.0000 | 0.001 |
| 95 | 10.42 | 0.0000 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.44 | 7.44 | 7.44 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.006 | 0.006 | 0.006 |
| Mean, phi | 7.31 | 7.75 | 7.64 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.006 | 0.005 | 0.005 |
| Sorting | 1.982 | 1.384 | 1.358 |
| Skewness | 0.882 | 0.222 | 0.290 |
| Kurtosis | 0.297 | 0.588 | 0.912 |

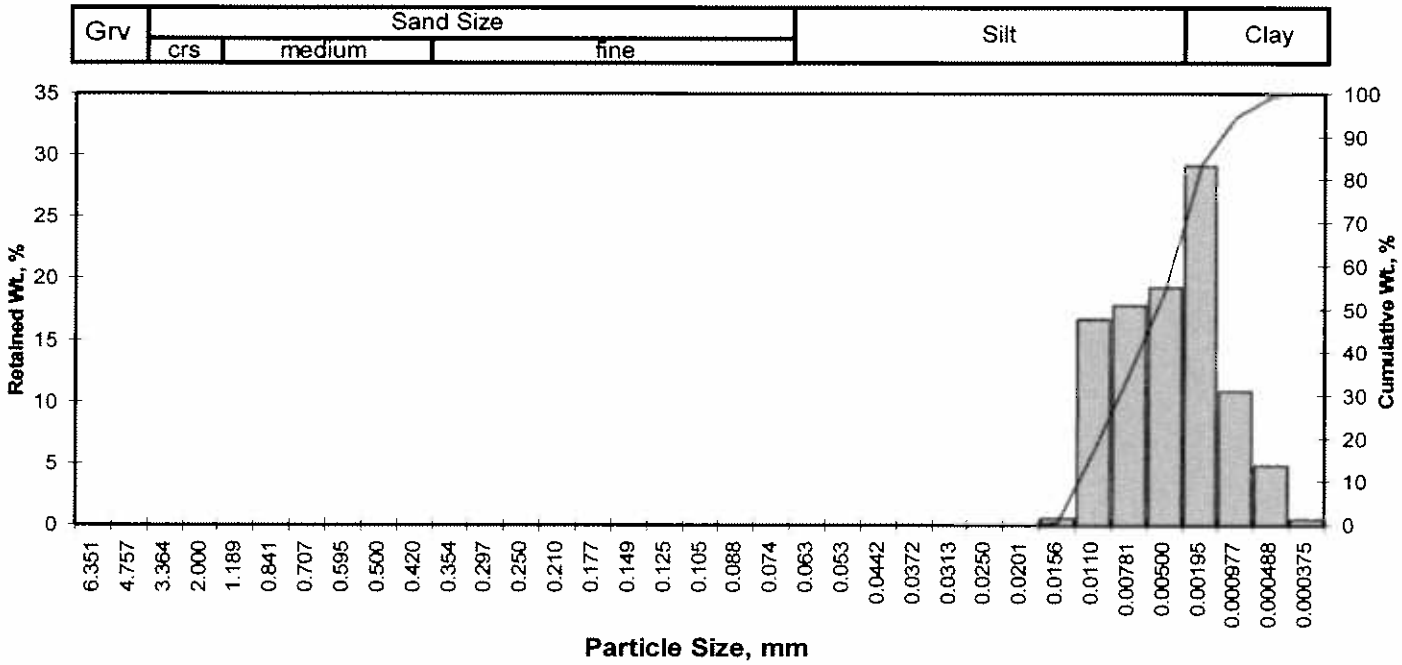
| Grain Size Description (ASTM-USCS Scale) | Silt (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 55.90 |
| Clay | <0.005 mm | 44.10 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | SSA-02-56 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 56.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.66 | 0.66 | 0.66 |
| 0.000435 | 0.0110 | 6.50 | | 16.70 | 16.70 | 17.36 |
| 0.000308 | 0.00781 | 7.00 | | 17.90 | 17.90 | 35.26 |
| 0.000197 | 0.00500 | 7.65 | | 19.30 | 19.30 | 54.55 |
| 0.000077 | 0.00195 | 9.00 | | 29.20 | 29.20 | 83.75 |
| 0.000038 | 0.000977 | 10.00 | | 10.90 | 10.90 | 94.65 |
| 0.000019 | 0.000488 | 11.00 | | 4.87 | 4.87 | 99.52 |
| 0.000015 | 0.000375 | 11.38 | | 0.48 | 0.48 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.13 | 0.0006 | 0.014 |
| 10 | 6.28 | 0.0005 | 0.013 |
| 16 | 6.46 | 0.0004 | 0.011 |
| 25 | 6.71 | 0.0004 | 0.010 |
| 40 | 7.16 | 0.0003 | 0.007 |
| 50 | 7.49 | 0.0002 | 0.006 |
| 60 | 7.90 | 0.0002 | 0.004 |
| 75 | 8.59 | 0.0001 | 0.003 |
| 84 | 9.02 | 0.0001 | 0.002 |
| 90 | 9.57 | 0.0001 | 0.001 |
| 95 | 10.07 | 0.0000 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 7.49 | 7.49 | 7.49 |
| Median, in. | 0.0002 | 0.0002 | 0.0002 |
| Median, mm | 0.006 | 0.006 | 0.006 |
| Mean, phi | 7.37 | 7.74 | 7.66 |
| Mean, in. | 0.0002 | 0.0002 | 0.0002 |
| Mean, mm | 0.006 | 0.005 | 0.005 |
| Sorting | 1.919 | 1.282 | 1.238 |
| Skewness | 0.894 | 0.194 | 0.251 |
| Kurtosis | 0.300 | 0.538 | 0.859 |
| **Grain Size Description** (ASTM-USCS Scale) | | **Silt** (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 54.55 |
| Clay | <0.005 mm | 45.45 |
| | **Total** | **100** |

PTS File No: 36836
Client: URS Corporation

# PHYSICAL PROPERTIES DATA - PORE FLUID SATURATIONS

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| | | METHODS: | API RP 40 / ASTM D2216 | API RP 40 | | API RP 40 | | API RP 40 | |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID. | DEPTH, ft. | SAMPLE ORIENTATION (1) | MOISTURE CONTENT, % weight | DENSITY BULK, g/cc | DENSITY GRAIN, g/cc | POROSITY, %Vb (2) TOTAL | POROSITY, %Vb (2) AIR FILLED | PORE FLUID SATURATIONS, % Pv (3) WATER | PORE FLUID SATURATIONS, % Pv (3) NAPL |
| SSA-02-09 | 8.7 | H | 10.9 | 1.39 | 2.55 | 45.4 | 30.3 | 33.1 | ND<0.1 |
| SSA-02-14 | 14.0 | H | 13.1 | 1.48 | 2.53 | 41.3 | 22.0 | 46.6 | ND<0.1 |
| SSA-02-21 | 21.0 | H | 16.7 | 1.44 | 2.42 | 40.3 | 16.2 | 59.5 | ND<0.1 |
| SSA-02-28 | 28.0 | H | 15.0 | 1.42 | 2.40 | 41.1 | 19.7 | 51.7 | ND<0.1 |
| SSA-02-35.5 | 35.5 | H | 16.3 | 1.41 | 2.35 | 40.2 | 17.3 | 56.6 | ND<0.1 |
| SSA-02-43 | 43.0 | H | 12.7 | 1.53 | 2.46 | 38.0 | 18.5 | 51.1 | ND<0.1 |
| SSA-02-56 | 56.0 | H | 20.6 | 1.52 | 2.57 | 40.8 | 9.0 | 71.7 | 6.3 |

(1) Sample Orientation: H = horizontal; V = vertical (2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids (3) Water = 0.9996 g/cc, Hydrocarbon = 0.780 g/cc; Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS File No: 36836
Client: URS Corporation

# ORGANIC CARBON DATA - TOC

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| | | METHOD: | WALKLEY-BLACK |
|---|---|---|---|
| SAMPLE ID. | DEPTH, ft. | SAMPLE MATRIX | TOTAL ORGANIC CARBON, mg/kg |
| SSA-02-09 | 9.0 | SOIL | 3300 |
| SSA-02-14 | 14.0 | SOIL | 2000 |
| SSA-02-21 | 21.0 | SOIL | 3450 |
| SSA-02-28 | 28.0 | SOIL | 4200 |
| SSA-02-35.5 | 35.5 | SOIL | 4000 |
| SSA-02-43 | 43.0 | SOIL | 7500 |
| SSA-02-56 | 56.0 | SOIL | 3100 |

PTS Laboratories
ENVIRONMENTAL SERVICES

November 14, 2006

Brian Partington, PG
URS Corporation
2020 E. First St., Ste. 400
Santa Ana, CA 92705

Re: Chevron PCPL Fillmore
PTS File No: 36836

Dear Mr. Partington:

Enclosed are final petrophysical data and PhotoLog™ images for Boring NSA-01, Chevron PCPL Fillmore Project 29869533.80000.

Electronic versions of the data files have been previously sent to your attention. Analyses were performed by applicable ASTM, EPA or API methodologies and all core material was discarded per your request. Also as requested, both mechanical (screen) sieve and Laser particle size (<#10 sieve fraction) was performed on each requested sample. Data is reported as two separate sets for each sample.

We appreciate the opportunity to be of service and trust these data will prove beneficial in the development of this project. Please call me at (562) 907-3607 with any questions or if you require additional information.

Sincerely,
PTS Laboratories, Inc.

Larry Kunkel
District Manager

LAK:vk

Encl.

8100 Secura Way – Santa Fe Springs, CA 90670
Phone 562 907 3607 Fax 562 907 3610
www.ptsgeolabs.com

PTS File No: 36836
Client: URS Corporation

# PHYSICAL PROPERTIES DATA - PERMEABILITY TO AIR

(METHODOLOGY: API RP40

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| SAMPLE ID. | DEPTH, ft. | SAMPLE ORIENTATION (1) | 25 PSI CONFINING STRESS EFFECTIVE (2) PERMEABILITY TO AIR millidarcy |
|---|---|---|---|
| NSA-01-13 | 13.0 | H | 5011 |
| NSA-01-13 | 13.0 | V | 4436 |
| NSA-01-25 | 25.0 | H | 4477 |
| NSA-01-25 | 25.0 | V | 2791 |
| NSA-01-35 | 35.0 | H | 4602 |
| NSA-01-35 | 35.0 | V | 2069 |
| NSA-01-51.5 | 51.5 | H | 876 |
| NSA-01-51.5 | 51.5 | V | 1111 |
| NSA-01-65 | 65.0 | H | 43.1 |
| NSA-01-65 | 65.0 | V | 2.31 |
| NSA-01-78 | 78.0 | H | 24.4 |
| NSA-01-78 | 78.0 | V | 32.4 |
| NSA-01-90.5 | 90.5 | H | 712 |
| NSA-01-90.5 | 90.5 | V | 27.3 |

(1) Sample Orientation: H = horizontal; V = vertical (2) Native State or Effective = With as-received pore fluids in place

**PTS** Laboratories, Inc.

URS Corporation
PTS File No: 36836

## PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

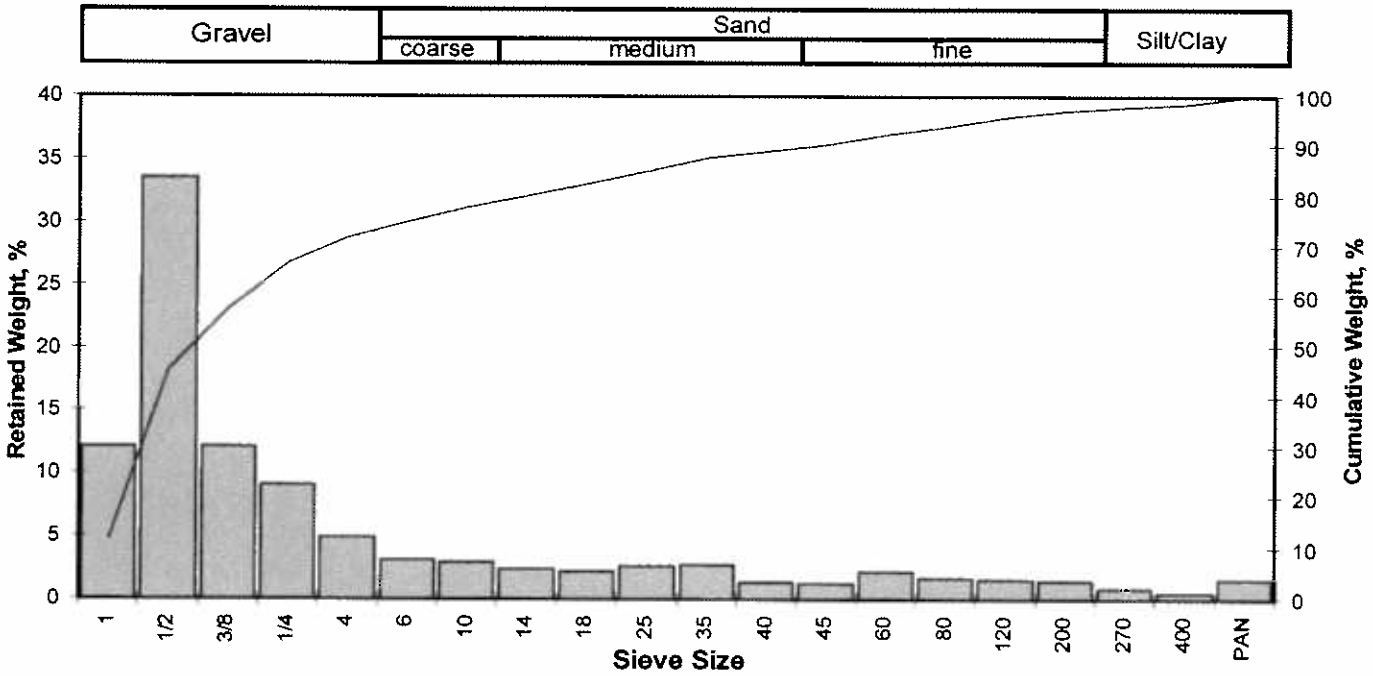
| Sample ID | Depth, ft. | Description USCS/ASTM (1) | Median Grain Size, mm | Particle Size Distribution, wt. percent | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Gravel | Sand Size | | | Silt/Clay |
| | | | | | Coarse | Medium | Fine | |
| NSA-01-13 | 13.0 | Gravel | 11.321 | 71.69 | 6.13 | 11.24 | 8.09 | 2.86 |
| NSA-01-25 | 25.0 | Gravel | 9.266 | 68.16 | 9.88 | 9.18 | 9.61 | 3.16 |
| NSA-01-35 | 35.0 | Gravel | 15.038 | 85.89 | 2.26 | 4.04 | 6.22 | 1.59 |
| NSA-01-51.5 | 51.5 | Fine sand | 0.177 | 1.39 | 0.36 | 19.95 | 61.37 | 16.93 |
| NSA-01-65 | 65.0 | Fine sand | 0.249 | 4.87 | 2.58 | 24.92 | 45.12 | 22.50 |
| NSA-01-78 | 78.0 | Gravel | 4.734 | 49.90 | 13.58 | 14.38 | 15.15 | 6.99 |
| NSA-01-90.5 | 90.5 | Gravel | 9.810 | 60.22 | 7.57 | 14.80 | 11.16 | 6.26 |

(1) based on Mean fromTrask

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-13 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 13.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 20.68 | 12.13 | 12.13 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 57.10 | 33.49 | 45.61 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 20.70 | 12.14 | 57.75 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 15.43 | 9.05 | 66.80 |
| 0.1873 | 4.757 | -2.25 | 4 | 8.33 | 4.89 | 71.69 |
| 0.1324 | 3.364 | -1.75 | 6 | 5.41 | 3.17 | 74.86 |
| 0.0787 | 2.000 | -1.00 | 10 | 5.04 | 2.96 | 77.81 |
| 0.0557 | 1.414 | -0.50 | 14 | 4.08 | 2.39 | 80.21 |
| 0.0394 | 1.000 | 0.00 | 18 | 3.77 | 2.21 | 82.42 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.46 | 2.62 | 85.03 |
| 0.0197 | 0.500 | 1.00 | 35 | 4.58 | 2.69 | 87.72 |
| 0.0166 | 0.420 | 1.25 | 40 | 2.27 | 1.33 | 89.05 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.10 | 1.23 | 90.28 |
| 0.0098 | 0.250 | 2.00 | 60 | 3.70 | 2.17 | 92.45 |
| 0.0070 | 0.177 | 2.50 | 80 | 2.83 | 1.66 | 94.11 |
| 0.0049 | 0.125 | 3.00 | 120 | 2.73 | 1.60 | 95.71 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.44 | 1.43 | 97.14 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.38 | 0.81 | 97.95 |
| 0.0015 | 0.037 | 4.75 | 400 | 0.89 | 0.52 | 98.48 |
| | | | PAN | 2.60 | 1.52 | 100.00 |
| **TOTALS** | | | | 170.52 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | -4.53 | 0.9085 | 23.077 |
| 25 | -4.26 | 0.7541 | 19.154 |
| 40 | -3.81 | 0.5528 | 14.042 |
| 50 | -3.50 | 0.4457 | 11.321 |
| 60 | -3.10 | 0.3384 | 8.596 |
| 75 | -1.71 | 0.1292 | 3.281 |
| 84 | 0.30 | 0.0319 | 0.811 |
| 90 | 1.44 | 0.0145 | 0.368 |
| 95 | 2.78 | 0.0057 | 0.146 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.50 | -3.50 | -3.50 |
| Median, in. | 0.4457 | 0.4457 | 0.4457 |
| Median, mm | 11.321 | 11.321 | 11.321 |
| Mean, phi | -3.49 | -2.11 | -2.58 |
| Mean, in. | 0.4416 | 0.1703 | 0.2347 |
| Mean, mm | 11.218 | 4.326 | 5.961 |
| Sorting | 2.416 | 2.415 | |
| Skewness | 0.700 | 0.575 | |
| Kurtosis | | | |

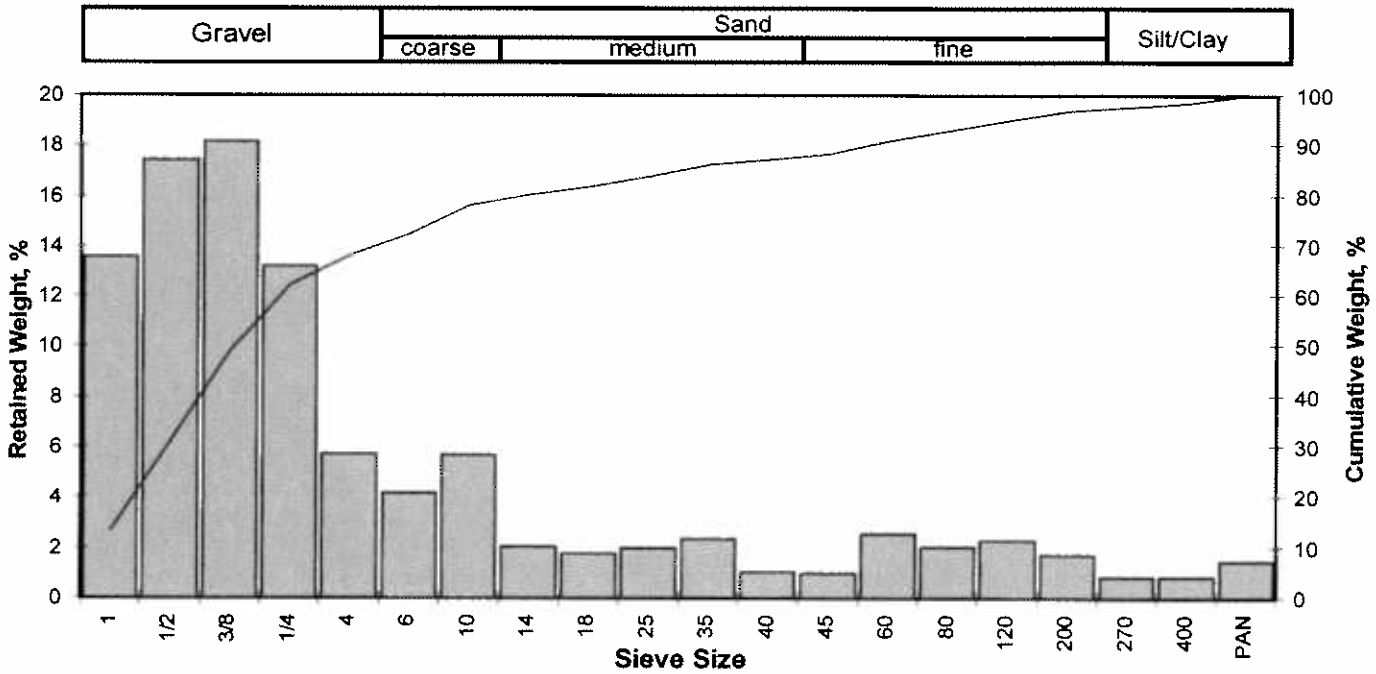
| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 71.69 |
| Coarse Sand | 10 | 6.13 |
| Medium Sand | 40 | 11.24 |
| Fine Sand | 200 | 8.09 |
| Silt/Clay | <200 | 2.86 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-25 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 25.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 20.07 | 13.60 | 13.60 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 25.70 | 17.42 | 31.02 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 26.80 | 18.16 | 49.18 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 19.53 | 13.24 | 62.42 |
| 0.1873 | 4.757 | -2.25 | 4 | 8.48 | 5.75 | 68.16 |
| 0.1324 | 3.364 | -1.75 | 6 | 6.16 | 4.17 | 72.34 |
| 0.0787 | 2.000 | -1.00 | 10 | 8.42 | 5.71 | 78.04 |
| 0.0557 | 1.414 | -0.50 | 14 | 3.02 | 2.05 | 80.09 |
| 0.0394 | 1.000 | 0.00 | 18 | 2.59 | 1.76 | 81.84 |
| 0.0278 | 0.707 | 0.50 | 25 | 2.94 | 1.99 | 83.84 |
| 0.0197 | 0.500 | 1.00 | 35 | 3.46 | 2.34 | 86.18 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.54 | 1.04 | 87.23 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.47 | 1.00 | 88.22 |
| 0.0098 | 0.250 | 2.00 | 60 | 3.81 | 2.58 | 90.80 |
| 0.0070 | 0.177 | 2.50 | 80 | 2.99 | 2.03 | 92.83 |
| 0.0049 | 0.125 | 3.00 | 120 | 3.39 | 2.30 | 95.13 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.52 | 1.71 | 96.84 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.23 | 0.83 | 97.67 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.27 | 0.86 | 98.53 |
| | | | PAN | 2.17 | 1.47 | 100.00 |
| **TOTALS** | | | | 147.56 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | -4.51 | 0.8947 | 22.726 |
| 25 | -3.99 | 0.6254 | 15.884 |
| 40 | -3.45 | 0.4297 | 10.914 |
| 50 | -3.21 | 0.3648 | 9.266 |
| 60 | -2.77 | 0.2691 | 6.835 |
| 75 | -1.40 | 0.1039 | 2.639 |
| 84 | 0.53 | 0.0272 | 0.690 |
| 90 | 1.84 | 0.0110 | 0.278 |
| 95 | 2.97 | 0.0050 | 0.127 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.21 | -3.21 | -3.21 |
| Median, in. | 0.3648 | 0.3648 | 0.3648 |
| Median, mm | 9.266 | 9.266 | 9.266 |
| Mean, phi | -3.21 | -1.99 | -2.39 |
| Mean, in. | 0.3646 | 0.1559 | 0.2070 |
| Mean, mm | 9.262 | 3.961 | 5.258 |
| Sorting | 2.453 | 2.521 | |
| Skewness | 0.699 | 0.487 | |
| Kurtosis | | | |

| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 68.16 |
| Coarse Sand | 10 | 9.88 |
| Medium Sand | 40 | 9.18 |
| Fine Sand | 200 | 9.61 |
| Silt/Clay | <200 | 3.16 |
| | Total | 100 |

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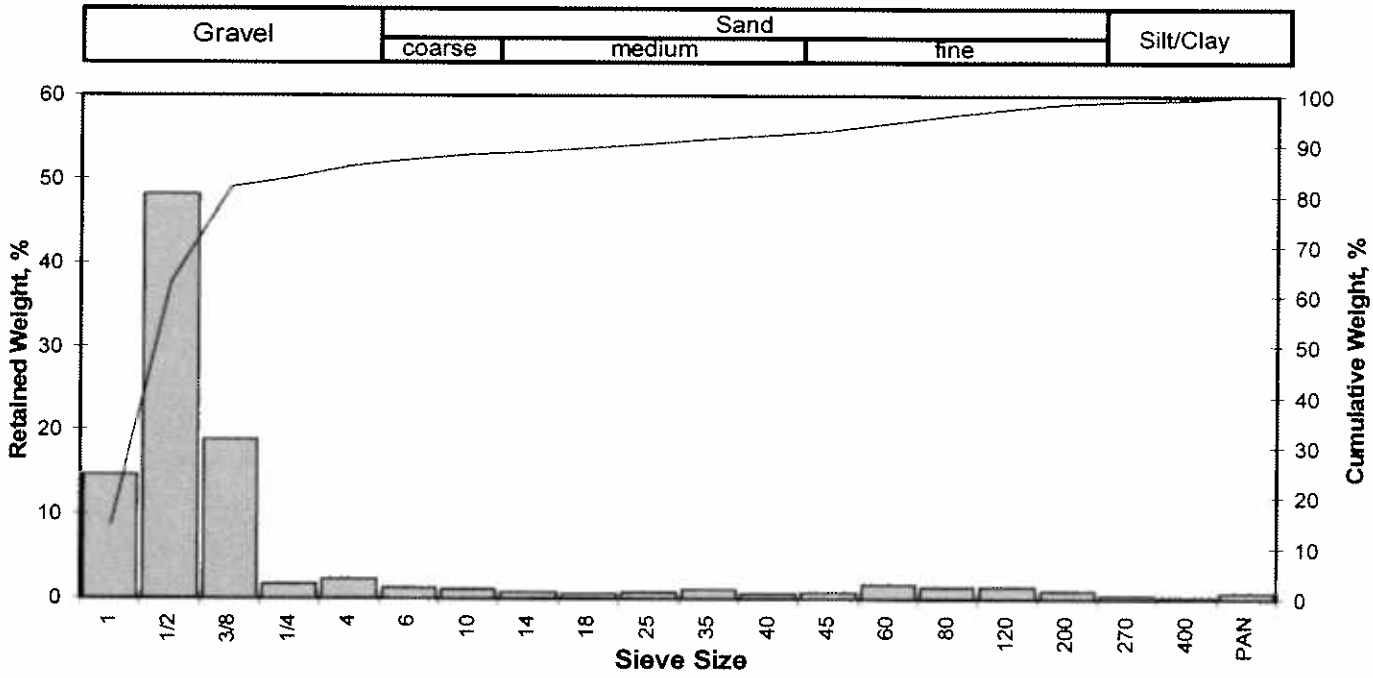
**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-35 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 35.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 16.84 | 14.65 | 14.65 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 55.40 | 48.19 | 62.84 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 21.70 | 18.88 | 81.72 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 2.07 | 1.80 | 83.52 |
| 0.1873 | 4.757 | -2.25 | 4 | 2.72 | 2.37 | 85.89 |
| 0.1324 | 3.364 | -1.75 | 6 | 1.40 | 1.22 | 87.11 |
| 0.0787 | 2.000 | -1.00 | 10 | 1.20 | 1.04 | 88.15 |
| 0.0557 | 1.414 | -0.50 | 14 | 0.84 | 0.73 | 88.88 |
| 0.0394 | 1.000 | 0.00 | 18 | 0.77 | 0.67 | 89.55 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.97 | 0.84 | 90.40 |
| 0.0197 | 0.500 | 1.00 | 35 | 1.26 | 1.10 | 91.49 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.80 | 0.70 | 92.19 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.84 | 0.73 | 92.92 |
| 0.0098 | 0.250 | 2.00 | 60 | 1.90 | 1.65 | 94.57 |
| 0.0070 | 0.177 | 2.50 | 80 | 1.67 | 1.45 | 96.02 |
| 0.0049 | 0.125 | 3.00 | 120 | 1.57 | 1.37 | 97.39 |
| 0.0029 | 0.074 | 3.75 | 200 | 1.17 | 1.02 | 98.41 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.57 | 0.50 | 98.90 |
| 0.0015 | 0.037 | 4.75 | 400 | 0.34 | 0.30 | 99.20 |
| | | | PAN | 0.92 | 0.80 | 100.00 |
| **TOTALS** | | | | 114.95 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | | | |
| 16 | -4.62 | 0.9654 | 24.522 |
| 25 | -4.43 | 0.8482 | 21.544 |
| 40 | -4.12 | 0.6836 | 17.364 |
| 50 | -3.91 | 0.5920 | 15.038 |
| 60 | -3.70 | 0.5127 | 13.023 |
| 75 | -3.39 | 0.4124 | 10.476 |
| 84 | -2.58 | 0.2359 | 5.992 |
| 90 | 0.27 | 0.0328 | 0.832 |
| 95 | 2.15 | 0.0089 | 0.226 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.91 | -3.91 | -3.91 |
| Median, in. | 0.5920 | 0.5920 | 0.5920 |
| Median, mm | 15.038 | 15.038 | 15.038 |
| Mean, phi | -4.00 | -3.60 | -3.70 |
| Mean, in. | 0.6303 | 0.4772 | 0.5128 |
| Mean, mm | 16.010 | 12.121 | 13.025 |
| Sorting | 1.434 | 1.016 | |
| Skewness | 0.999 | 0.306 | |
| Kurtosis | | | |

| Grain Size Description (ASTM-USCS Scale) | Gravel (based on Mean from Trask) |
|---|---|

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 85.89 |
| Coarse Sand | 10 | 2.26 |
| Medium Sand | 40 | 4.04 |
| Fine Sand | 200 | 6.22 |
| Silt/Clay | <200 | 1.59 |
| | Total | 100 |

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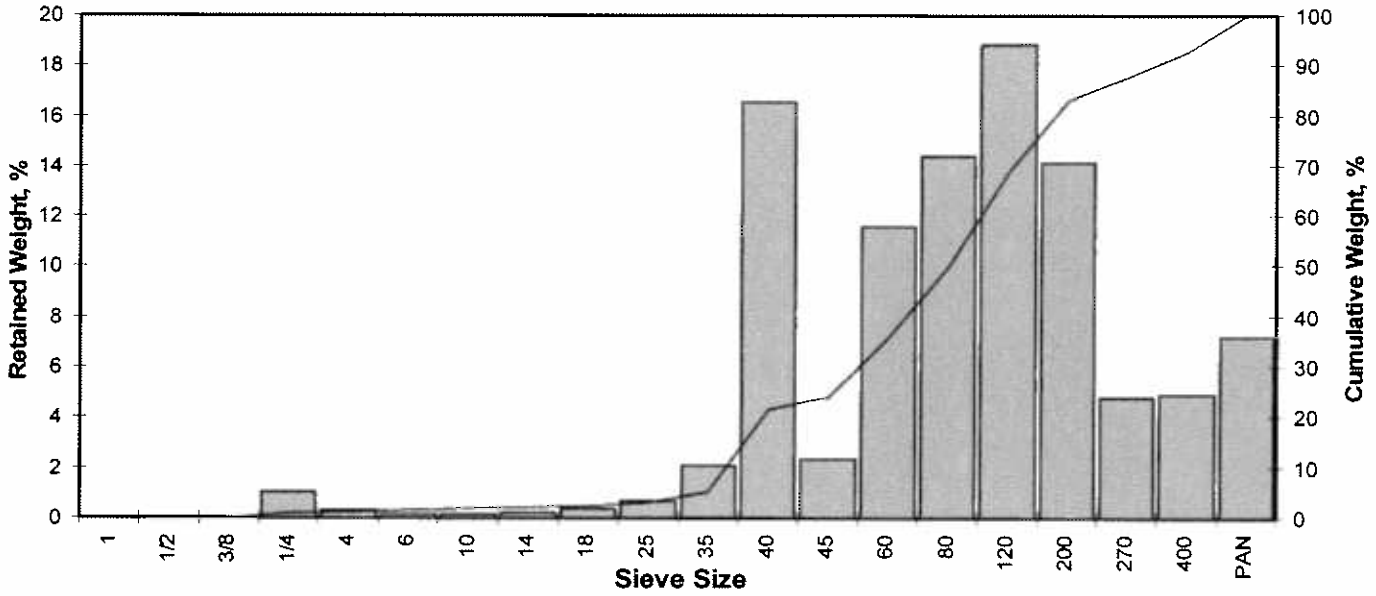
**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-51.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 51.5 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 0.00 | 0.00 | 0.00 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 0.00 | 0.00 | 0.00 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.72 | 1.07 | 1.07 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.22 | 0.33 | 1.39 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.12 | 0.18 | 1.57 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.12 | 0.18 | 1.75 |
| 0.0557 | 1.414 | -0.50 | 14 | 0.15 | 0.22 | 1.97 |
| 0.0394 | 1.000 | 0.00 | 18 | 0.25 | 0.37 | 2.34 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.46 | 0.68 | 3.02 |
| 0.0197 | 0.500 | 1.00 | 35 | 1.42 | 2.10 | 5.12 |
| 0.0166 | 0.420 | 1.25 | 40 | 11.19 | 16.57 | 21.70 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.60 | 2.37 | 24.07 |
| 0.0098 | 0.250 | 2.00 | 60 | 7.82 | 11.58 | 35.65 |
| 0.0070 | 0.177 | 2.50 | 80 | 9.74 | 14.43 | 50.07 |
| 0.0049 | 0.125 | 3.00 | 120 | 12.74 | 18.87 | 68.94 |
| 0.0029 | 0.074 | 3.75 | 200 | 9.54 | 14.13 | 83.07 |
| 0.0021 | 0.053 | 4.25 | 270 | 3.23 | 4.78 | 87.86 |
| 0.0015 | 0.037 | 4.75 | 400 | 3.32 | 4.92 | 92.77 |
| | | | PAN | 4.88 | 7.23 | 100.00 |
| **TOTALS** | | | | 67.52 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 0.97 | 0.0201 | 0.510 |
| 10 | 1.07 | 0.0187 | 0.475 |
| 16 | 1.16 | 0.0176 | 0.446 |
| 25 | 1.54 | 0.0135 | 0.344 |
| 40 | 2.15 | 0.0089 | 0.225 |
| 50 | 2.50 | 0.0070 | 0.177 |
| 60 | 2.76 | 0.0058 | 0.147 |
| 75 | 3.32 | 0.0039 | 0.100 |
| 84 | 3.85 | 0.0027 | 0.069 |
| 90 | 4.47 | 0.0018 | 0.045 |
| 95 | 3.29 | 0.0040 | 0.103 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 2.50 | 2.50 | 2.50 |
| Median, in. | 0.0070 | 0.0070 | 0.0070 |
| Median, mm | 0.177 | 0.177 | 0.177 |
| Mean, phi | 2.17 | 2.51 | 2.50 |
| Mean, in. | 0.0087 | 0.0069 | 0.0069 |
| Mean, mm | 0.222 | 0.176 | 0.176 |
| Sorting | 1.854 | 1.341 | 1.022 |
| Skewness | 1.047 | 0.006 | -0.156 |
| Kurtosis | 0.284 | -0.137 | 0.533 |
| **Grain Size Description** (ASTM-USCS Scale) | | | **Fine sand** (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 1.39 |
| Coarse Sand | 10 | 0.36 |
| Medium Sand | 40 | 19.95 |
| Fine Sand | 200 | 61.37 |
| Silt/Clay | <200 | 16.93 |
| | Total | 100 |

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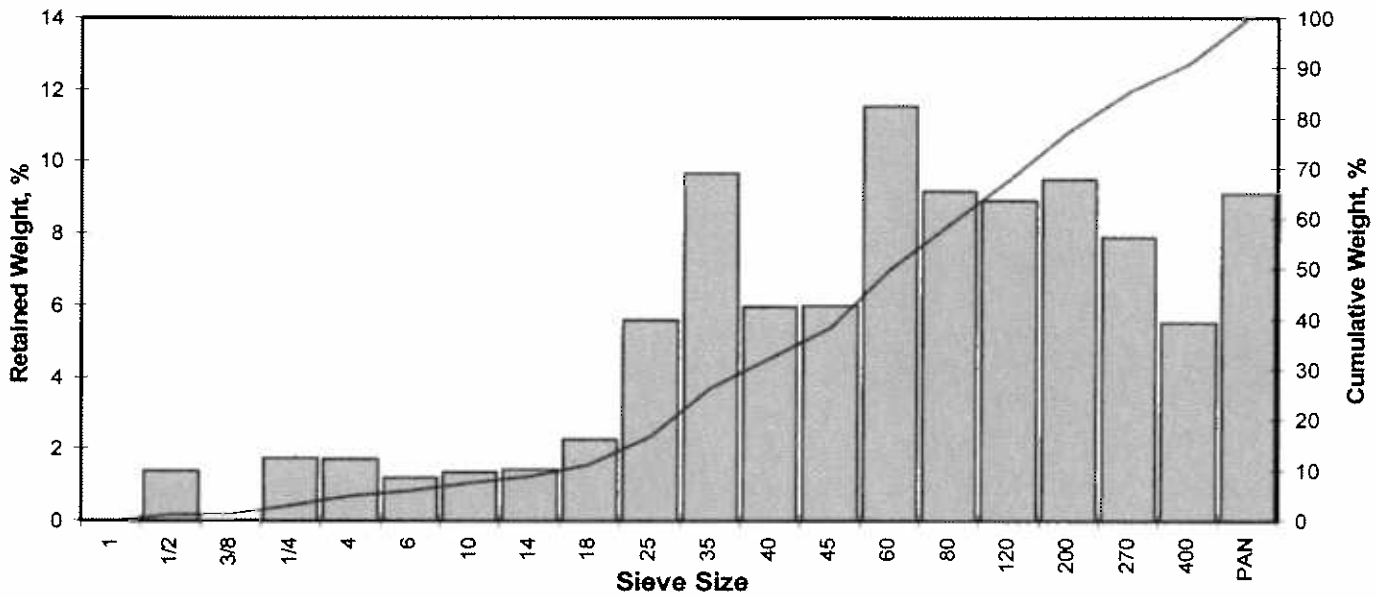
**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-65 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 65.0 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 1.10 | 1.39 | 1.39 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 0.00 | 0.00 | 1.39 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 1.38 | 1.75 | 3.14 |
| 0.1873 | 4.757 | -2.25 | 4 | 1.37 | 1.73 | 4.87 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.96 | 1.21 | 6.08 |
| 0.0787 | 2.000 | -1.00 | 10 | 1.08 | 1.37 | 7.45 |
| 0.0557 | 1.414 | -0.50 | 14 | 1.13 | 1.43 | 8.88 |
| 0.0394 | 1.000 | 0.00 | 18 | 1.78 | 2.25 | 11.13 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.42 | 5.59 | 16.72 |
| 0.0197 | 0.500 | 1.00 | 35 | 7.66 | 9.69 | 26.41 |
| 0.0166 | 0.420 | 1.25 | 40 | 4.71 | 5.96 | 32.37 |
| 0.0139 | 0.354 | 1.50 | 45 | 4.74 | 6.00 | 38.37 |
| 0.0098 | 0.250 | 2.00 | 60 | 9.13 | 11.55 | 49.92 |
| 0.0070 | 0.177 | 2.50 | 80 | 7.25 | 9.17 | 59.09 |
| 0.0049 | 0.125 | 3.00 | 120 | 7.04 | 8.91 | 67.99 |
| 0.0029 | 0.074 | 3.75 | 200 | 7.51 | 9.50 | 77.50 |
| 0.0021 | 0.053 | 4.25 | 270 | 6.25 | 7.91 | 85.40 |
| 0.0015 | 0.037 | 4.75 | 400 | 4.35 | 5.50 | 90.90 |
| | | | PAN | 7.19 | 9.10 | 100.00 |
| **TOTALS** | | | | 79.05 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -2.20 | 0.1805 | 4.584 |
| 10 | -0.25 | 0.0469 | 1.190 |
| 16 | 0.44 | 0.0291 | 0.740 |
| 25 | 0.93 | 0.0207 | 0.526 |
| 40 | 1.57 | 0.0133 | 0.337 |
| 50 | 2.00 | 0.0098 | 0.249 |
| 60 | 2.55 | 0.0067 | 0.171 |
| 75 | 3.55 | 0.0034 | 0.085 |
| 84 | 4.16 | 0.0022 | 0.056 |
| 90 | 4.67 | 0.0015 | 0.039 |
| 95 | 2.61 | 0.0064 | 0.164 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 2.00 | 2.00 | 2.00 |
| Median, in. | 0.0098 | 0.0098 | 0.0098 |
| Median, mm | 0.249 | 0.249 | 0.249 |
| Mean, phi | 1.71 | 2.30 | 2.20 |
| Mean, in. | 0.0120 | 0.0080 | 0.0086 |
| Mean, mm | 0.306 | 0.203 | 0.218 |
| Sorting | 2.485 | 1.863 | 1.660 |
| Skewness | 0.849 | 0.158 | -0.295 |
| Kurtosis | 0.191 | 0.290 | 0.750 |
| **Grain Size Description** (ASTM-USCS Scale) | | Fine sand (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 4.87 |
| Coarse Sand | 10 | 2.58 |
| Medium Sand | 40 | 24.92 |
| Fine Sand | 200 | 45.12 |
| Silt/Clay | <200 | 22.50 |
| | Total | 100 |

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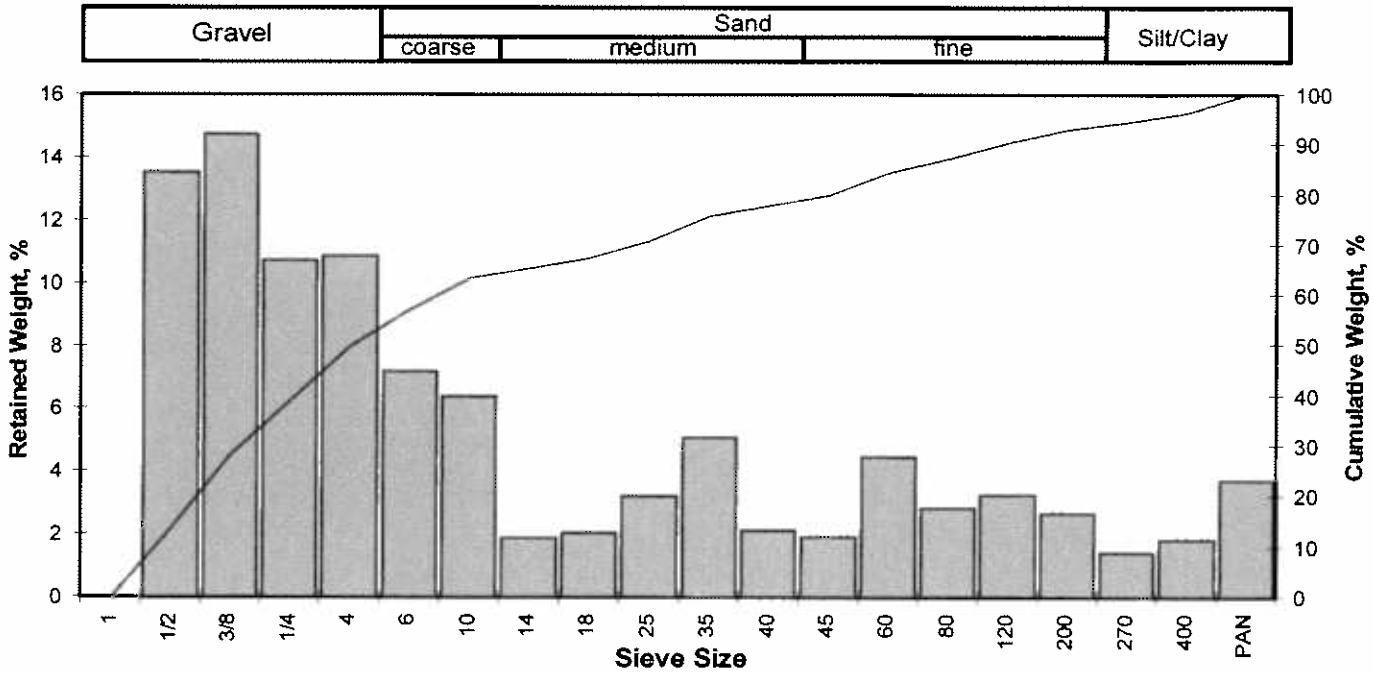
**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-78 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 78.0 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 0.00 | 0.00 | 0.00 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 19.30 | 13.55 | 13.55 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 21.00 | 14.75 | 28.30 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 15.29 | 10.74 | 39.04 |
| 0.1873 | 4.757 | -2.25 | 4 | 15.47 | 10.86 | 49.90 |
| 0.1324 | 3.364 | -1.75 | 6 | 10.25 | 7.20 | 57.10 |
| 0.0787 | 2.000 | -1.00 | 10 | 9.09 | 6.38 | 63.48 |
| 0.0557 | 1.414 | -0.50 | 14 | 2.69 | 1.89 | 65.37 |
| 0.0394 | 1.000 | 0.00 | 18 | 2.92 | 2.05 | 67.42 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.57 | 3.21 | 70.63 |
| 0.0197 | 0.500 | 1.00 | 35 | 7.25 | 5.09 | 75.72 |
| 0.0166 | 0.420 | 1.25 | 40 | 3.05 | 2.14 | 77.86 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.74 | 1.92 | 79.78 |
| 0.0098 | 0.250 | 2.00 | 60 | 6.35 | 4.46 | 84.24 |
| 0.0070 | 0.177 | 2.50 | 80 | 4.06 | 2.85 | 87.09 |
| 0.0049 | 0.125 | 3.00 | 120 | 4.65 | 3.27 | 90.36 |
| 0.0029 | 0.074 | 3.75 | 200 | 3.78 | 2.65 | 93.01 |
| 0.0021 | 0.053 | 4.25 | 270 | 2.05 | 1.44 | 94.45 |
| 0.0015 | 0.037 | 4.75 | 400 | 2.60 | 1.83 | 96.28 |
| | | | PAN | 5.30 | 3.72 | 100.00 |
| **TOTALS** | | | | 142.41 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -4.28 | 0.7622 | 19.361 |
| 10 | -3.91 | 0.5902 | 14.992 |
| 16 | -3.58 | 0.4703 | 11.944 |
| 25 | -3.34 | 0.3977 | 10.102 |
| 40 | -2.63 | 0.2437 | 6.190 |
| 50 | -2.24 | 0.1864 | 4.734 |
| 60 | -1.41 | 0.1045 | 2.655 |
| 75 | 0.93 | 0.0207 | 0.525 |
| 84 | 1.97 | 0.0100 | 0.255 |
| 90 | 2.95 | 0.0051 | 0.130 |
| 95 | 4.40 | 0.0019 | 0.047 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -2.24 | -2.24 | -2.24 |
| Median, in. | 0.1864 | 0.1864 | 0.1864 |
| Median, mm | 4.734 | 4.734 | 4.734 |
| Mean, phi | -2.41 | -0.80 | -1.28 |
| Mean, in. | 0.2092 | 0.0687 | 0.0958 |
| Mean, mm | 5.314 | 1.744 | 2.433 |
| Sorting | 4.386 | 2.776 | 2.702 |
| Skewness | 0.487 | 0.519 | 0.525 |
| Kurtosis | 0.322 | 0.563 | 0.833 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Gravel (based on Mean from Trask) |

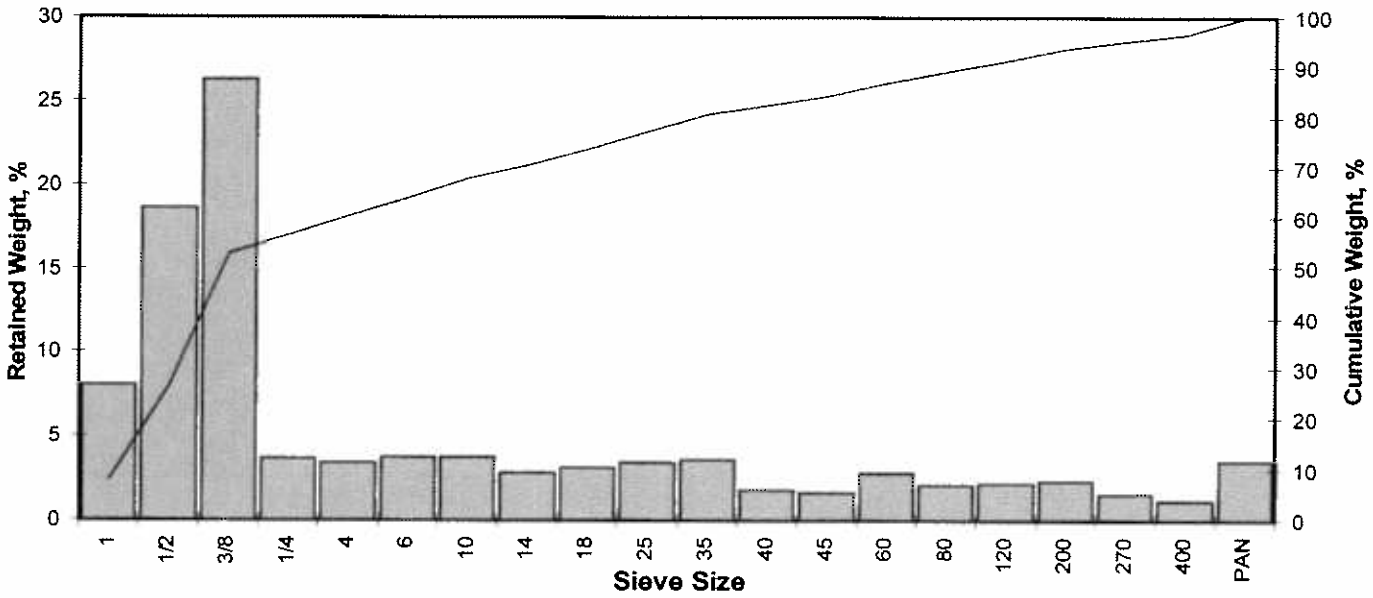
| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 49.90 |
| Coarse Sand | 10 | 13.58 |
| Medium Sand | 40 | 14.38 |
| Fine Sand | 200 | 15.15 |
| Silt/Clay | <200 | 6.99 |
| | Total | 100 |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D422M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-90.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 90.5 |

| Gravel | Sand | | | Silt/Clay |
|---|---|---|---|---|
| | coarse | medium | fine | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. Sieve No. | Sample Weight grams | Incremental Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.9844 | 25.002 | -4.64 | 1 | 11.84 | 8.04 | 8.04 |
| 0.4922 | 12.501 | -3.64 | 1/2 | 27.50 | 18.68 | 26.72 |
| 0.3740 | 9.500 | -3.25 | 3/8 | 38.80 | 26.36 | 53.08 |
| 0.2500 | 6.351 | -2.67 | 1/4 | 5.40 | 3.67 | 56.75 |
| 0.1873 | 4.757 | -2.25 | 4 | 5.11 | 3.47 | 60.22 |
| 0.1324 | 3.364 | -1.75 | 6 | 5.55 | 3.77 | 63.99 |
| 0.0787 | 2.000 | -1.00 | 10 | 5.59 | 3.80 | 67.78 |
| 0.0557 | 1.414 | -0.50 | 14 | 4.14 | 2.81 | 70.60 |
| 0.0394 | 1.000 | 0.00 | 18 | 4.62 | 3.14 | 73.73 |
| 0.0278 | 0.707 | 0.50 | 25 | 5.12 | 3.48 | 77.21 |
| 0.0197 | 0.500 | 1.00 | 35 | 5.27 | 3.58 | 80.79 |
| 0.0166 | 0.420 | 1.25 | 40 | 2.64 | 1.79 | 82.58 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.46 | 1.67 | 84.25 |
| 0.0098 | 0.250 | 2.00 | 60 | 4.15 | 2.82 | 87.07 |
| 0.0070 | 0.177 | 2.50 | 80 | 3.09 | 2.10 | 89.17 |
| 0.0049 | 0.125 | 3.00 | 120 | 3.26 | 2.21 | 91.39 |
| 0.0029 | 0.074 | 3.75 | 200 | 3.47 | 2.36 | 93.74 |
| 0.0021 | 0.053 | 4.25 | 270 | 2.27 | 1.54 | 95.29 |
| 0.0015 | 0.037 | 4.75 | 400 | 1.77 | 1.20 | 96.49 |
| | | | PAN | 5.17 | 3.51 | 100.00 |
| **TOTALS** | | | | 147.22 | 100.00 | 100.00 |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | | | |
| 10 | -4.54 | 0.9154 | 23.251 |
| 16 | -4.22 | 0.7327 | 18.610 |
| 25 | -3.74 | 0.5246 | 13.326 |
| 40 | -3.44 | 0.4286 | 10.887 |
| 50 | -3.29 | 0.3862 | 9.810 |
| 60 | -2.28 | 0.1907 | 4.843 |
| 75 | 0.18 | 0.0347 | 0.881 |
| 84 | 1.46 | 0.0143 | 0.363 |
| 90 | 2.69 | 0.0061 | 0.155 |
| 95 | 4.16 | 0.0022 | 0.056 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | -3.29 | -3.29 | -3.29 |
| Median, in. | 0.3862 | 0.3862 | 0.3862 |
| Median, mm | 9.810 | 9.810 | 9.810 |
| Mean, phi | -2.83 | -1.38 | -2.02 |
| Mean, in. | 0.2797 | 0.1023 | 0.1593 |
| Mean, mm | 7.104 | 2.599 | 4.047 |
| Sorting | 3.888 | 2.840 | |
| Skewness | 0.349 | 0.675 | |
| Kurtosis | 0.269 | | |
| **Grain Size Description** (ASTM-USCS Scale) | | Gravel (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 60.22 |
| Coarse Sand | 10 | 7.57 |
| Medium Sand | 40 | 14.80 |
| Fine Sand | 200 | 11.16 |
| Silt/Clay | <200 | 6.26 |
| | Total | 100 |

**PTS** Laboratories, Inc.

URS Corporation
PTS File No: 36836

## PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| Sample ID | Depth, ft. | Mean Grain Size Description (1) | Median Grain Size mm | Particle Size Distribution, wt. percent | | | | | | Silt & Clay |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Gravel | Sand Size | | | Silt | Clay | |
| | | | | | Coarse | Medium | Fine | | | |
| NSA-01-13 | 13.0 | Fine sand | 0.095 | 0.00 | 0.00 | 21.76 | 33.30 | 31.48 | 13.46 | 44.94 |
| NSA-01-25 | 25.0 | Fine sand | 0.128 | 0.00 | 0.00 | 23.74 | 35.38 | 26.30 | 14.58 | 40.88 |
| NSA-01-35 | 35.0 | Clay | 0.003 | 0.00 | 0.00 | 0.00 | 0.00 | 36.27 | 63.73 | 100.00 |
| NSA-01-51.5 | 51.5 | Fine sand | 0.120 | 0.00 | 0.00 | 3.32 | 58.63 | 25.63 | 12.42 | 38.05 |
| NSA-01-65 | 65.0 | Clay | 0.003 | 0.00 | 0.00 | 0.00 | 0.00 | 35.92 | 64.08 | 100.00 |
| NSA-01-78 | 78.0 | Clay | 0.003 | 0.00 | 0.00 | 0.00 | 0.00 | 28.84 | 71.16 | 100.00 |
| NSA-01-90.5 | 90.5 | Clay | 0.003 | 0.00 | 0.00 | 0.00 | 0.00 | 30.32 | 69.68 | 100.00 |

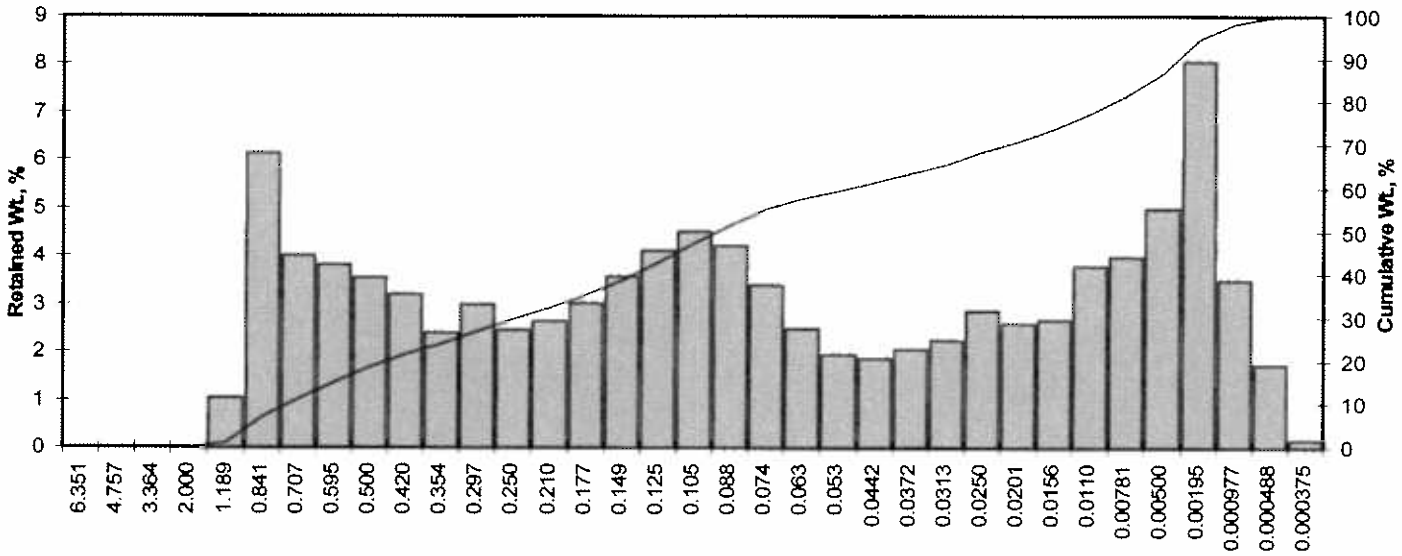
(1) Based on Mean from Trask

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-13 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 13.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 1.04 | 1.04 | 1.04 |
| 0.0331 | 0.841 | 0.25 | 20 | 6.13 | 6.13 | 7.17 |
| 0.0278 | 0.707 | 0.50 | 25 | 4.01 | 4.01 | 11.18 |
| 0.0234 | 0.595 | 0.75 | 30 | 3.83 | 3.83 | 15.01 |
| 0.0197 | 0.500 | 1.00 | 35 | 3.55 | 3.55 | 18.56 |
| 0.0166 | 0.420 | 1.25 | 40 | 3.20 | 3.20 | 21.76 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.39 | 2.39 | 24.15 |
| 0.0117 | 0.297 | 1.75 | 50 | 2.99 | 2.99 | 27.15 |
| 0.0098 | 0.250 | 2.00 | 60 | 2.45 | 2.45 | 29.60 |
| 0.0083 | 0.210 | 2.25 | 70 | 2.64 | 2.64 | 32.24 |
| 0.0070 | 0.177 | 2.50 | 80 | 3.01 | 3.01 | 35.25 |
| 0.0059 | 0.149 | 2.75 | 100 | 3.57 | 3.57 | 38.82 |
| 0.0049 | 0.125 | 3.00 | 120 | 4.12 | 4.12 | 42.94 |
| 0.0041 | 0.105 | 3.25 | 140 | 4.50 | 4.50 | 47.44 |
| 0.0035 | 0.088 | 3.50 | 170 | 4.23 | 4.23 | 51.67 |
| 0.0029 | 0.074 | 3.75 | 200 | 3.39 | 3.39 | 55.06 |
| 0.0025 | 0.063 | 4.00 | 230 | 2.47 | 2.47 | 57.53 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.94 | 1.94 | 59.47 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.86 | 1.86 | 61.33 |
| 0.00146 | 0.0372 | 4.75 | 400 | 2.05 | 2.05 | 63.38 |
| 0.00123 | 0.0313 | 5.00 | 450 | 2.23 | 2.23 | 65.61 |
| 0.000986 | 0.0250 | 5.32 | 500 | 2.85 | 2.85 | 68.46 |
| 0.000790 | 0.0201 | 5.64 | 635 | 2.60 | 2.60 | 71.06 |
| 0.000615 | 0.0156 | 6.00 | | 2.68 | 2.68 | 73.74 |
| 0.000435 | 0.0110 | 6.50 | | 3.80 | 3.80 | 77.55 |
| 0.000308 | 0.00781 | 7.00 | | 3.99 | 3.99 | 81.54 |
| 0.000197 | 0.00500 | 7.65 | | 5.00 | 5.00 | 86.54 |
| 0.000077 | 0.00195 | 9.00 | | 8.07 | 8.07 | 94.61 |
| 0.000038 | 0.000977 | 10.00 | | 3.49 | 3.49 | 98.10 |
| 0.000019 | 0.000488 | 11.00 | | 1.73 | 1.73 | 99.83 |
| 0.000015 | 0.000375 | 11.38 | | 0.17 | 0.17 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 0.07 | 0.0374 | 0.951 |
| 10 | 0.43 | 0.0293 | 0.744 |
| 16 | 0.82 | 0.0223 | 0.567 |
| 25 | 1.57 | 0.0133 | 0.337 |
| 40 | 2.82 | 0.0056 | 0.141 |
| 50 | 3.40 | 0.0037 | 0.095 |
| 60 | 4.32 | 0.0020 | 0.050 |
| 75 | 6.17 | 0.0005 | 0.014 |
| 84 | 7.32 | 0.0002 | 0.006 |
| 90 | 8.23 | 0.0001 | 0.003 |
| 95 | 9.11 | 0.0001 | 0.002 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 3.40 | 3.40 | 3.40 |
| Median, in. | 0.0037 | 0.0037 | 0.0037 |
| Median, mm | 0.095 | 0.095 | 0.095 |
| Mean, phi | 2.51 | 4.07 | 3.85 |
| Mean, in. | 0.0069 | 0.0023 | 0.0027 |
| Mean, mm | 0.175 | 0.060 | 0.070 |
| Sorting | 4.915 | 3.249 | 2.994 |
| Skewness | 0.724 | 0.205 | 0.234 |
| Kurtosis | 0.218 | 0.391 | 0.806 |
| **Grain Size Description** (ASTM-USCS Scale) | | Fine sand (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 21.76 |
| Fine Sand | 200 | 33.30 |
| Silt | >0.005 mm | 31.48 |
| Clay | <0.005 mm | 13.46 |
| | **Total** | **100** |

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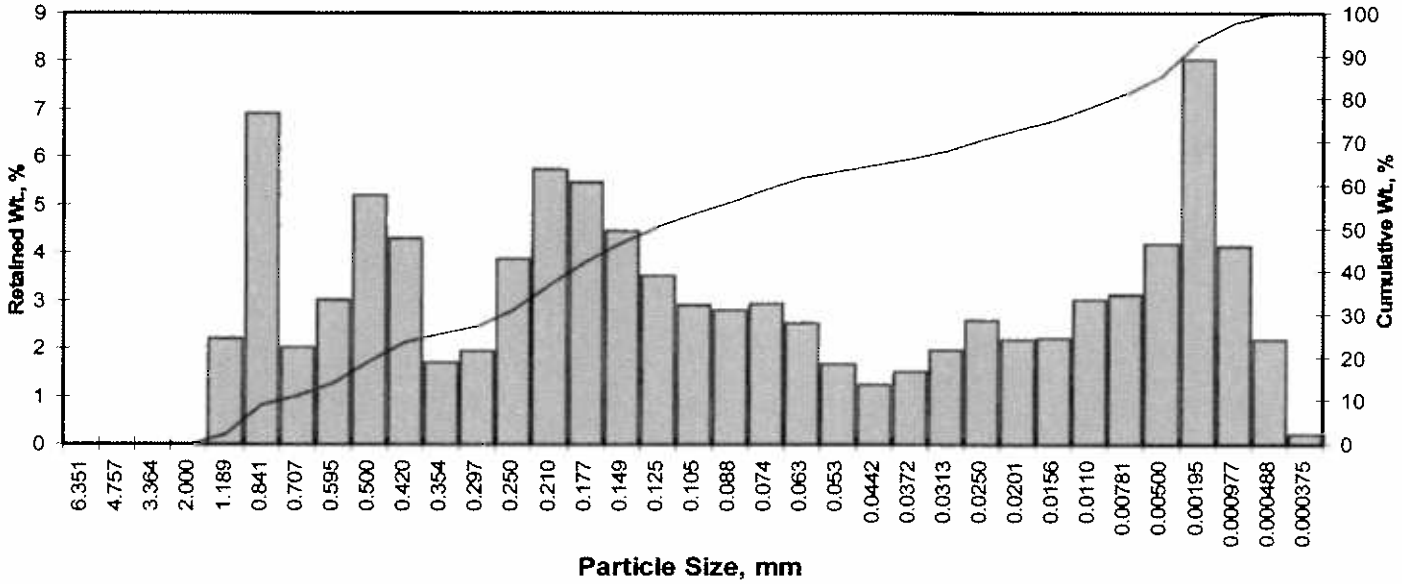
**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-25 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 25.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 2.23 | 2.23 | 2.23 |
| 0.0331 | 0.841 | 0.25 | 20 | 6.93 | 6.93 | 9.16 |
| 0.0278 | 0.707 | 0.50 | 25 | 2.03 | 2.03 | 11.19 |
| 0.0234 | 0.595 | 0.75 | 30 | 3.03 | 3.03 | 14.22 |
| 0.0197 | 0.500 | 1.00 | 35 | 5.22 | 5.22 | 19.44 |
| 0.0166 | 0.420 | 1.25 | 40 | 4.30 | 4.30 | 23.74 |
| 0.0139 | 0.354 | 1.50 | 45 | 1.71 | 1.71 | 25.44 |
| 0.0117 | 0.297 | 1.75 | 50 | 1.96 | 1.96 | 27.40 |
| 0.0098 | 0.250 | 2.00 | 60 | 3.88 | 3.88 | 31.28 |
| 0.0083 | 0.210 | 2.25 | 70 | 5.75 | 5.75 | 37.03 |
| 0.0070 | 0.177 | 2.50 | 80 | 5.47 | 5.47 | 42.50 |
| 0.0059 | 0.149 | 2.75 | 100 | 4.46 | 4.46 | 46.96 |
| 0.0049 | 0.125 | 3.00 | 120 | 3.53 | 3.53 | 50.49 |
| 0.0041 | 0.105 | 3.25 | 140 | 2.90 | 2.90 | 53.39 |
| 0.0035 | 0.088 | 3.50 | 170 | 2.80 | 2.80 | 56.19 |
| 0.0029 | 0.074 | 3.75 | 200 | 2.93 | 2.93 | 59.12 |
| 0.0025 | 0.063 | 4.00 | 230 | 2.53 | 2.53 | 61.65 |
| 0.0021 | 0.053 | 4.25 | 270 | 1.69 | 1.69 | 63.34 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.26 | 1.26 | 64.60 |
| 0.00146 | 0.0372 | 4.75 | 400 | 1.53 | 1.53 | 66.13 |
| 0.00123 | 0.0313 | 5.00 | 450 | 1.97 | 1.97 | 68.10 |
| 0.000986 | 0.0250 | 5.32 | 500 | 2.59 | 2.59 | 70.69 |
| 0.000790 | 0.0201 | 5.64 | 635 | 2.19 | 2.19 | 72.88 |
| 0.000615 | 0.0156 | 6.00 | | 2.21 | 2.21 | 75.08 |
| 0.000435 | 0.0110 | 6.50 | | 3.02 | 3.02 | 78.10 |
| 0.000308 | 0.00781 | 7.00 | | 3.13 | 3.13 | 81.23 |
| 0.000197 | 0.00500 | 7.65 | | 4.19 | 4.19 | 85.42 |
| 0.000077 | 0.00195 | 9.00 | | 8.03 | 8.03 | 93.45 |
| 0.000038 | 0.000977 | 10.00 | | 4.15 | 4.15 | 97.60 |
| 0.000019 | 0.000488 | 11.00 | | 2.18 | 2.18 | 99.78 |
| 0.000015 | 0.000375 | 11.38 | | 0.22 | 0.22 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | -0.05 | 0.0408 | 1.035 |
| 10 | 0.35 | 0.0308 | 0.783 |
| 16 | 0.84 | 0.0221 | 0.560 |
| 25 | 1.43 | 0.0146 | 0.370 |
| 40 | 2.39 | 0.0075 | 0.191 |
| 50 | 2.97 | 0.0050 | 0.128 |
| 60 | 3.84 | 0.0028 | 0.070 |
| 75 | 5.99 | 0.0006 | 0.016 |
| 84 | 7.43 | 0.0002 | 0.006 |
| 90 | 8.42 | 0.0001 | 0.003 |
| 95 | 9.37 | 0.0001 | 0.002 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 2.97 | 2.97 | 2.97 |
| Median, in. | 0.0050 | 0.0050 | 0.0050 |
| Median, mm | 0.128 | 0.128 | 0.128 |
| Mean, phi | 2.37 | 4.13 | 3.74 |
| Mean, in. | 0.0076 | 0.0022 | 0.0029 |
| Mean, mm | 0.193 | 0.057 | 0.075 |
| Sorting | 4.842 | 3.295 | 3.075 |
| Skewness | 0.597 | 0.354 | 0.357 |
| Kurtosis | 0.227 | 0.430 | 0.849 |
| **Grain Size Description** (ASTM-USCS Scale) | | Fine sand (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 23.74 |
| Fine Sand | 200 | 35.38 |
| Silt | >0.005 mm | 26.30 |
| Clay | <0.005 mm | 14.58 |
| | **Total** | **100** |

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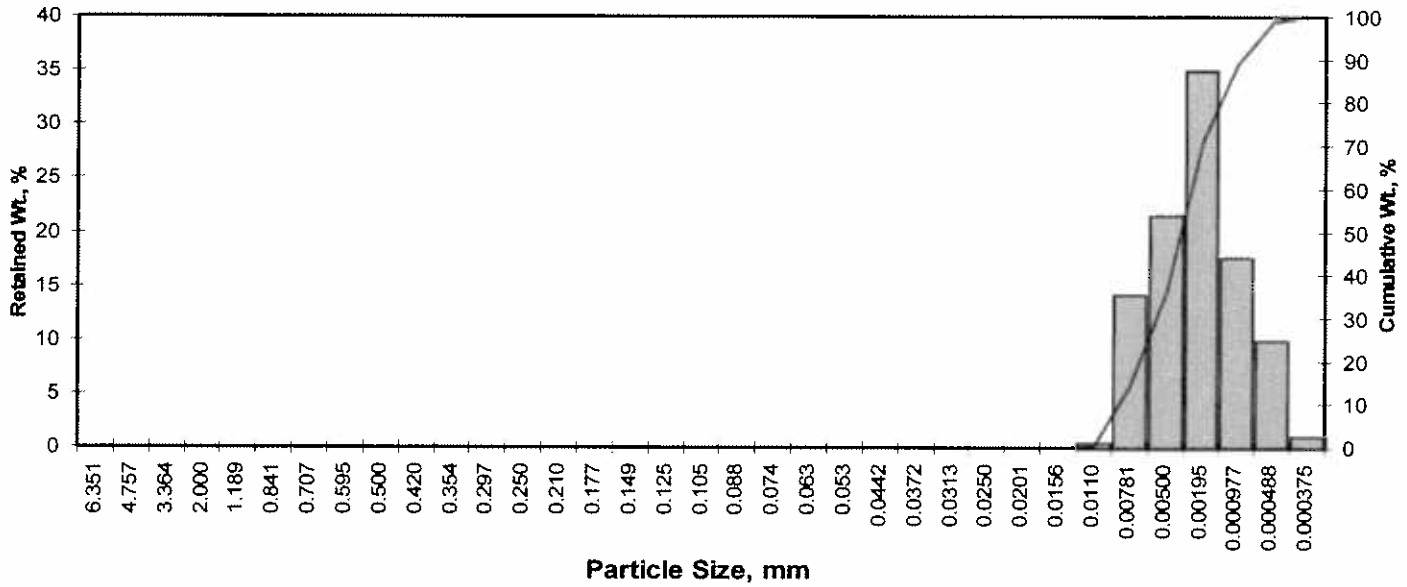
**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-35 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 35.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.00 | 0.00 | 0.00 |
| 0.000435 | 0.0110 | 6.50 | | 0.45 | 0.45 | 0.45 |
| 0.000308 | 0.00781 | 7.00 | | 14.20 | 14.21 | 14.66 |
| 0.000197 | 0.00500 | 7.65 | | 21.60 | 21.61 | 36.27 |
| 0.000077 | 0.00195 | 9.00 | | 35.00 | 35.02 | 71.29 |
| 0.000038 | 0.000977 | 10.00 | | 17.70 | 17.71 | 89.00 |
| 0.000019 | 0.000488 | 11.00 | | 9.93 | 9.94 | 98.94 |
| 0.000015 | 0.000375 | 11.38 | | 1.06 | 1.06 | 100.00 |
| **TOTALS** | | | | **99.90** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.66 | 0.0004 | 0.010 |
| 10 | 6.84 | 0.0003 | 0.009 |
| 16 | 7.04 | 0.0003 | 0.008 |
| 25 | 7.31 | 0.0002 | 0.006 |
| 40 | 7.79 | 0.0002 | 0.005 |
| 50 | 8.18 | 0.0001 | 0.003 |
| 60 | 8.56 | 0.0001 | 0.003 |
| 75 | 9.21 | 0.0001 | 0.002 |
| 84 | 9.72 | 0.0000 | 0.001 |
| 90 | 10.10 | 0.0000 | 0.001 |
| 95 | 10.60 | 0.0000 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 8.18 | 8.18 | 8.18 |
| Median, in. | 0.0001 | 0.0001 | 0.0001 |
| Median, mm | 0.003 | 0.003 | 0.003 |
| Mean, phi | 7.97 | 8.38 | 8.31 |
| Mean, in. | 0.0002 | 0.0001 | 0.0001 |
| Mean, mm | 0.004 | 0.003 | 0.003 |
| Sorting | 1.932 | 1.339 | 1.267 |
| Skewness | 0.944 | 0.151 | 0.191 |
| Kurtosis | 0.294 | 0.473 | 0.850 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Clay (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 36.27 |
| Clay | <0.005 mm | 63.73 |
| | **Total** | **100** |

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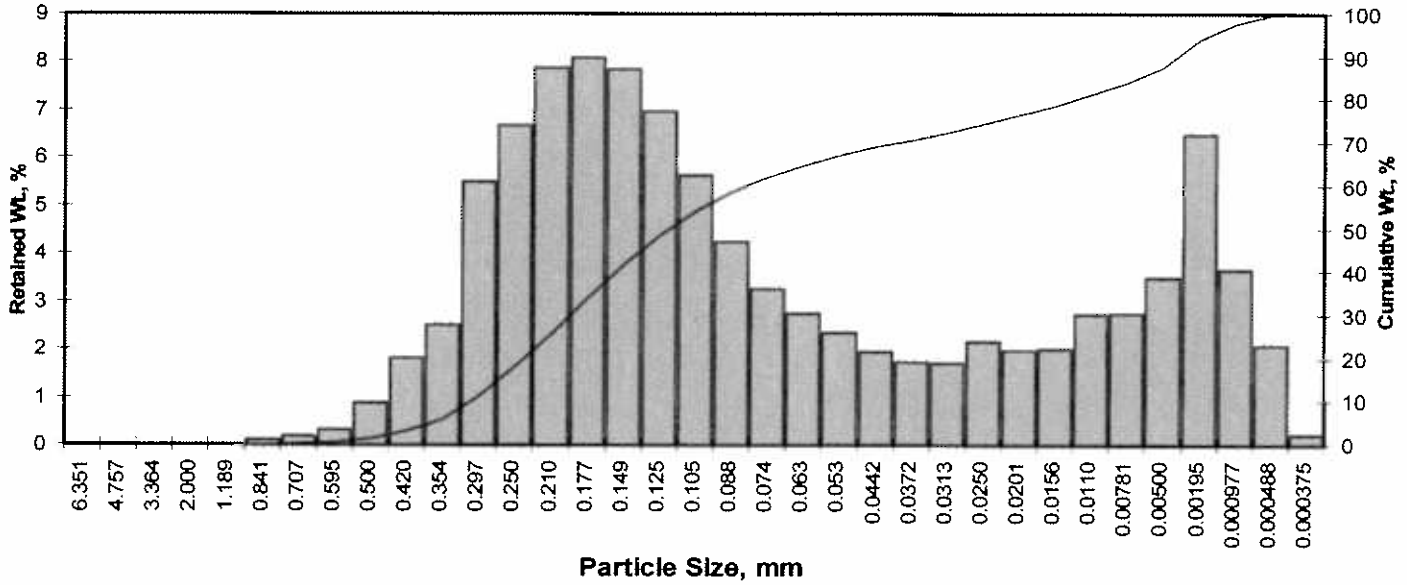
**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-51.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 51.5 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.11 | 0.11 | 0.11 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.20 | 0.20 | 0.31 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.32 | 0.32 | 0.63 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.87 | 0.87 | 1.50 |
| 0.0166 | 0.420 | 1.25 | 40 | 1.82 | 1.82 | 3.32 |
| 0.0139 | 0.354 | 1.50 | 45 | 2.50 | 2.50 | 5.82 |
| 0.0117 | 0.297 | 1.75 | 50 | 5.51 | 5.51 | 11.33 |
| 0.0098 | 0.250 | 2.00 | 60 | 6.68 | 6.68 | 18.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 7.88 | 7.88 | 25.88 |
| 0.0070 | 0.177 | 2.50 | 80 | 8.10 | 8.10 | 33.98 |
| 0.0059 | 0.149 | 2.75 | 100 | 7.85 | 7.85 | 41.83 |
| 0.0049 | 0.125 | 3.00 | 120 | 6.97 | 6.97 | 48.80 |
| 0.0041 | 0.105 | 3.25 | 140 | 5.65 | 5.65 | 54.44 |
| 0.0035 | 0.088 | 3.50 | 170 | 4.24 | 4.24 | 58.68 |
| 0.0029 | 0.074 | 3.75 | 200 | 3.27 | 3.27 | 61.95 |
| 0.0025 | 0.063 | 4.00 | 230 | 2.74 | 2.74 | 64.69 |
| 0.0021 | 0.053 | 4.25 | 270 | 2.35 | 2.35 | 67.04 |
| 0.00174 | 0.0442 | 4.50 | 325 | 1.96 | 1.96 | 69.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 1.74 | 1.74 | 70.74 |
| 0.00123 | 0.0313 | 5.00 | 450 | 1.71 | 1.71 | 72.45 |
| 0.000986 | 0.0250 | 5.32 | 500 | 2.16 | 2.16 | 74.61 |
| 0.000790 | 0.0201 | 5.64 | 635 | 1.98 | 1.98 | 76.59 |
| 0.000615 | 0.0156 | 6.00 | | 2.01 | 2.01 | 78.60 |
| 0.000435 | 0.0110 | 6.50 | | 2.73 | 2.73 | 81.33 |
| 0.000308 | 0.00781 | 7.00 | | 2.76 | 2.76 | 84.08 |
| 0.000197 | 0.00500 | 7.65 | | 3.50 | 3.50 | 87.58 |
| 0.000077 | 0.00195 | 9.00 | | 6.48 | 6.48 | 94.06 |
| 0.000038 | 0.000977 | 10.00 | | 3.65 | 3.65 | 97.71 |
| 0.000019 | 0.000488 | 11.00 | | 2.08 | 2.08 | 99.79 |
| 0.000015 | 0.000375 | 11.38 | | 0.21 | 0.21 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 1.42 | 0.0147 | 0.374 |
| 10 | 1.69 | 0.0122 | 0.310 |
| 16 | 1.92 | 0.0104 | 0.263 |
| 25 | 2.22 | 0.0084 | 0.214 |
| 40 | 2.69 | 0.0061 | 0.155 |
| 50 | 3.05 | 0.0047 | 0.120 |
| 60 | 3.60 | 0.0032 | 0.082 |
| 75 | 5.38 | 0.0009 | 0.024 |
| 84 | 6.98 | 0.0003 | 0.008 |
| 90 | 8.15 | 0.0001 | 0.004 |
| 95 | 9.26 | 0.0001 | 0.002 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 3.05 | 3.05 | 3.05 |
| Median, in. | 0.0047 | 0.0047 | 0.0047 |
| Median, mm | 0.120 | 0.120 | 0.120 |
| Mean, phi | 3.07 | 4.45 | 3.99 |
| Mean, in. | 0.0047 | 0.0018 | 0.0025 |
| Mean, mm | 0.119 | 0.046 | 0.063 |
| Sorting | 2.991 | 2.530 | 2.453 |
| Skewness | 0.595 | 0.554 | 0.568 |
| Kurtosis | 0.311 | 0.549 | 1.016 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Fine sand (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 3.32 |
| Fine Sand | 200 | 58.63 |
| Silt | >0.005 mm | 25.63 |
| Clay | <0.005 mm | 12.42 |
| | **Total** | **100** |

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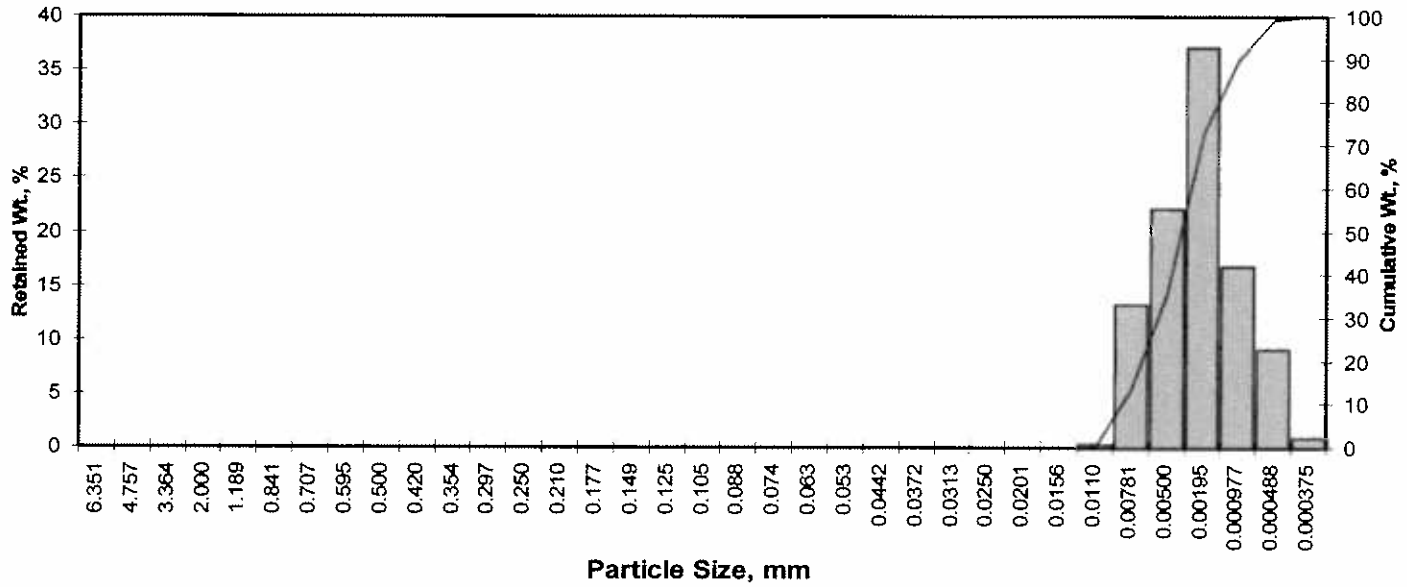
**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-65 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 65.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.00 | 0.00 | 0.00 |
| 0.000435 | 0.0110 | 6.50 | | 0.41 | 0.41 | 0.41 |
| 0.000308 | 0.00781 | 7.00 | | 13.30 | 13.30 | 13.71 |
| 0.000197 | 0.00500 | 7.65 | | 22.20 | 22.21 | 35.92 |
| 0.000077 | 0.00195 | 9.00 | | 37.10 | 37.11 | 73.03 |
| 0.000038 | 0.000977 | 10.00 | | 16.90 | 16.91 | 89.94 |
| 0.000019 | 0.000488 | 11.00 | | 9.09 | 9.09 | 99.03 |
| 0.000015 | 0.000375 | 11.38 | | 0.97 | 0.97 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.67 | 0.0004 | 0.010 |
| 10 | 6.86 | 0.0003 | 0.009 |
| 16 | 7.07 | 0.0003 | 0.007 |
| 25 | 7.33 | 0.0002 | 0.006 |
| 40 | 7.79 | 0.0002 | 0.005 |
| 50 | 8.16 | 0.0001 | 0.003 |
| 60 | 8.52 | 0.0001 | 0.003 |
| 75 | 9.12 | 0.0001 | 0.002 |
| 84 | 9.65 | 0.0000 | 0.001 |
| 90 | 10.01 | 0.0000 | 0.001 |
| 95 | 10.56 | 0.0000 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 8.16 | 8.16 | 8.16 |
| Median, in. | 0.0001 | 0.0001 | 0.0001 |
| Median, mm | 0.003 | 0.003 | 0.003 |
| Mean, phi | 7.96 | 8.36 | 8.29 |
| Mean, in. | 0.0002 | 0.0001 | 0.0001 |
| Mean, mm | 0.004 | 0.003 | 0.003 |
| Sorting | 1.859 | 1.291 | 1.234 |
| Skewness | 0.957 | 0.154 | 0.194 |
| Kurtosis | 0.290 | 0.504 | 0.890 |
| **Grain Size Description** (ASTM-USCS Scale) | | Clay (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 35.92 |
| Clay | <0.005 mm | 64.08 |
| | **Total** | **100** |

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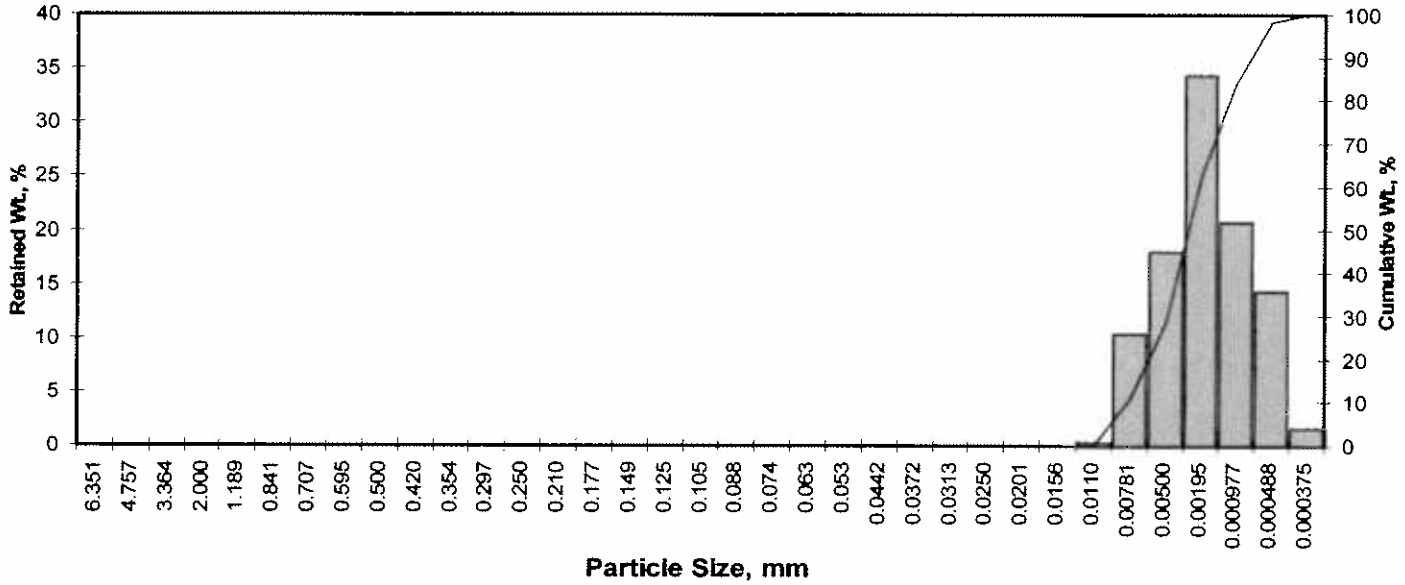
**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-78 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 78.0 |

| Grv | Sand Size | | | Silt | Clay |
|---|---|---|---|---|---|
| | crs | medium | fine | | |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.00 | 0.00 | 0.00 |
| 0.000435 | 0.0110 | 6.50 | | 0.33 | 0.33 | 0.33 |
| 0.000308 | 0.00781 | 7.00 | | 10.50 | 10.50 | 10.83 |
| 0.000197 | 0.00500 | 7.65 | | 18.00 | 18.00 | 28.84 |
| 0.000077 | 0.00195 | 9.00 | | 34.40 | 34.41 | 63.24 |
| 0.000038 | 0.000977 | 10.00 | | 20.80 | 20.80 | 84.05 |
| 0.000019 | 0.000488 | 11.00 | | 14.30 | 14.30 | 98.35 |
| 0.000015 | 0.000375 | 11.38 | | 1.65 | 1.65 | 100.00 |
| **TOTALS** | | | | **100.00** | **100.00** | **100.00** |

| Cumulative Weight Percent greater than | | | |
|---|---|---|---|
| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
| 5 | 6.72 | 0.0004 | 0.009 |
| 10 | 6.96 | 0.0003 | 0.008 |
| 16 | 7.19 | 0.0003 | 0.007 |
| 25 | 7.51 | 0.0002 | 0.005 |
| 40 | 8.08 | 0.0001 | 0.004 |
| 50 | 8.48 | 0.0001 | 0.003 |
| 60 | 8.87 | 0.0001 | 0.002 |
| 75 | 9.57 | 0.0001 | 0.001 |
| 84 | 10.00 | 0.0000 | 0.001 |
| 90 | 10.42 | 0.0000 | 0.001 |
| 95 | 10.77 | 0.0000 | 0.001 |

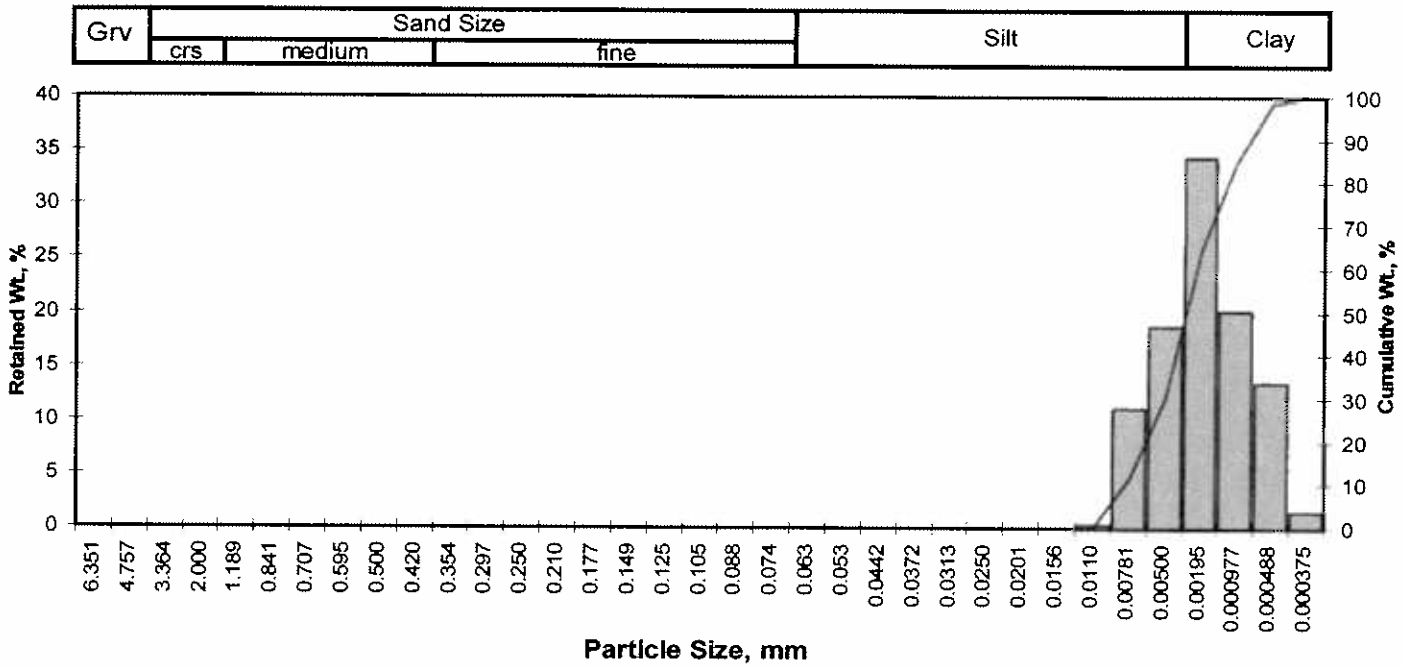
| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 8.48 | 8.48 | 8.48 |
| Median, in. | 0.0001 | 0.0001 | 0.0001 |
| Median, mm | 0.003 | 0.003 | 0.003 |
| Mean, phi | 8.20 | 8.59 | 8.55 |
| Mean, in. | 0.0001 | 0.0001 | 0.0001 |
| Mean, mm | 0.003 | 0.003 | 0.003 |
| Sorting | 2.040 | 1.406 | 1.316 |
| Skewness | 0.961 | 0.080 | 0.106 |
| Kurtosis | 0.286 | 0.438 | 0.805 |
| **Grain Size Description** (ASTM-USCS Scale) | | Clay (based on Mean from Trask) | |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 28.84 |
| Clay | <0.005 mm | 71.16 |
| | **Total** | **100** |

# PTS Laboratories, Inc.

**Particle Size Analysis - ASTM D4464M**

| | | | |
|---|---|---|---|
| **Client:** | URS Corporation | **PTS File No:** | 36836 |
| **Project:** | Chevron PCPL Fillmore, CA | **Sample ID:** | NSA-01-90.5 |
| **Project No:** | 29869533.80000 | **Depth, ft:** | 90.5 |




| Opening Inches | Opening Millimeters | Phi of Screen | U.S. No. | Sample Weight, grams | Increment Weight, percent | Cumulative Weight, percent |
|---|---|---|---|---|---|---|
| 0.2500 | 6.351 | -2.67 | 1/4 | 0.00 | 0.00 | 0.00 |
| 0.1873 | 4.757 | -2.25 | 4 | 0.00 | 0.00 | 0.00 |
| 0.1324 | 3.364 | -1.75 | 6 | 0.00 | 0.00 | 0.00 |
| 0.0787 | 2.000 | -1.00 | 10 | 0.00 | 0.00 | 0.00 |
| 0.0468 | 1.189 | -0.25 | 16 | 0.00 | 0.00 | 0.00 |
| 0.0331 | 0.841 | 0.25 | 20 | 0.00 | 0.00 | 0.00 |
| 0.0278 | 0.707 | 0.50 | 25 | 0.00 | 0.00 | 0.00 |
| 0.0234 | 0.595 | 0.75 | 30 | 0.00 | 0.00 | 0.00 |
| 0.0197 | 0.500 | 1.00 | 35 | 0.00 | 0.00 | 0.00 |
| 0.0166 | 0.420 | 1.25 | 40 | 0.00 | 0.00 | 0.00 |
| 0.0139 | 0.354 | 1.50 | 45 | 0.00 | 0.00 | 0.00 |
| 0.0117 | 0.297 | 1.75 | 50 | 0.00 | 0.00 | 0.00 |
| 0.0098 | 0.250 | 2.00 | 60 | 0.00 | 0.00 | 0.00 |
| 0.0083 | 0.210 | 2.25 | 70 | 0.00 | 0.00 | 0.00 |
| 0.0070 | 0.177 | 2.50 | 80 | 0.00 | 0.00 | 0.00 |
| 0.0059 | 0.149 | 2.75 | 100 | 0.00 | 0.00 | 0.00 |
| 0.0049 | 0.125 | 3.00 | 120 | 0.00 | 0.00 | 0.00 |
| 0.0041 | 0.105 | 3.25 | 140 | 0.00 | 0.00 | 0.00 |
| 0.0035 | 0.088 | 3.50 | 170 | 0.00 | 0.00 | 0.00 |
| 0.0029 | 0.074 | 3.75 | 200 | 0.00 | 0.00 | 0.00 |
| 0.0025 | 0.063 | 4.00 | 230 | 0.00 | 0.00 | 0.00 |
| 0.0021 | 0.053 | 4.25 | 270 | 0.00 | 0.00 | 0.00 |
| 0.00174 | 0.0442 | 4.50 | 325 | 0.00 | 0.00 | 0.00 |
| 0.00146 | 0.0372 | 4.75 | 400 | 0.00 | 0.00 | 0.00 |
| 0.00123 | 0.0313 | 5.00 | 450 | 0.00 | 0.00 | 0.00 |
| 0.000986 | 0.0250 | 5.32 | 500 | 0.00 | 0.00 | 0.00 |
| 0.000790 | 0.0201 | 5.64 | 635 | 0.00 | 0.00 | 0.00 |
| 0.000615 | 0.0156 | 6.00 | | 0.00 | 0.00 | 0.00 |
| 0.000435 | 0.0110 | 6.50 | | 0.35 | 0.35 | 0.35 |
| 0.000308 | 0.00781 | 7.00 | | 11.20 | 11.19 | 11.54 |
| 0.000197 | 0.00500 | 7.65 | | 18.80 | 18.78 | 30.32 |
| 0.000077 | 0.00195 | 9.00 | | 34.40 | 34.37 | 64.69 |
| 0.000038 | 0.000977 | 10.00 | | 20.20 | 20.18 | 84.87 |
| 0.000019 | 0.000488 | 11.00 | | 13.60 | 13.59 | 98.45 |
| 0.000015 | 0.000375 | 11.38 | | 1.55 | 1.55 | 100.00 |
| **TOTALS** | | | | **100.10** | **100.00** | **100.00** |

**Cumulative Weight Percent greater than**

| Weight percent | Phi Value | Particle Size Inches | Particle Size Millimeters |
|---|---|---|---|
| 5 | 6.71 | 0.0004 | 0.010 |
| 10 | 6.93 | 0.0003 | 0.008 |
| 16 | 7.15 | 0.0003 | 0.007 |
| 25 | 7.46 | 0.0002 | 0.006 |
| 40 | 8.03 | 0.0002 | 0.004 |
| 50 | 8.42 | 0.0001 | 0.003 |
| 60 | 8.82 | 0.0001 | 0.002 |
| 75 | 9.51 | 0.0001 | 0.001 |
| 84 | 9.96 | 0.0000 | 0.001 |
| 90 | 10.38 | 0.0000 | 0.001 |
| 95 | 10.75 | 0.0000 | 0.001 |

| Measure | Trask | Inman | Folk-Ward |
|---|---|---|---|
| Median, phi | 8.42 | 8.42 | 8.42 |
| Median, in. | 0.0001 | 0.0001 | 0.0001 |
| Median, mm | 0.003 | 0.003 | 0.003 |
| Mean, phi | 8.15 | 8.56 | 8.51 |
| Mean, in. | 0.0001 | 0.0001 | 0.0001 |
| Mean, mm | 0.004 | 0.003 | 0.003 |
| Sorting | 2.034 | 1.402 | 1.313 |
| Skewness | 0.955 | 0.096 | 0.124 |
| Kurtosis | 0.289 | 0.440 | 0.808 |
| **Grain Size Description** (ASTM-USCS Scale) | | | Clay (based on Mean from Trask) |

| Description | Retained on Sieve # | Weight Percent |
|---|---|---|
| Gravel | 4 | 0.00 |
| Coarse Sand | 10 | 0.00 |
| Medium Sand | 40 | 0.00 |
| Fine Sand | 200 | 0.00 |
| Silt | >0.005 mm | 30.32 |
| Clay | <0.005 mm | 69.68 |
| | **Total** | **100** |

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PTS File No: 36836
Client: URS Corporation

# PHYSICAL PROPERTIES DATA - PORE FLUID SATURATIONS

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| | | METHODS: | API RP 40 / ASTM D2216 | API RP 40 | | API RP 40 | | API RP 40 | |
|---|---|---|---|---|---|---|---|---|---|
| SAMPLE ID. | DEPTH, ft. | SAMPLE ORIENTATION (1) | MOISTURE CONTENT, % weight | DENSITY BULK, g/cc | DENSITY GRAIN, g/cc | POROSITY, %Vb (2) TOTAL | POROSITY, %Vb (2) AIR FILLED | PORE FLUID SATURATIONS, % Pv (3) WATER | PORE FLUID SATURATIONS, % Pv (3) NAPL |
| NSA-01-13 | 13.0 | H | 13.6 | 1.50 | 2.42 | 38.0 | 17.5 | 53.9 | ND<0.1 |
| NSA-01-25 | 25.0 | H | 15.5 | 1.37 | 2.32 | 40.9 | 19.6 | 52.0 | ND<0.1 |
| NSA-01-35 | 35.0 | H | 16.5 | 1.40 | 2.37 | 41.0 | 17.8 | 56.5 | ND<0.1 |
| NSA-01-51.5 | 51.5 | H | 14.3 | 1.31 | 2.59 | 49.3 | 30.5 | 38.0 | ND<0.1 |
| NSA-01-65 | 65.0 | H | 18.7 | 1.59 | 2.62 | 39.2 | 9.2 | 76.4 | ND<0.1 |
| NSA-01-78 | 78.0 | H | 13.0 | 1.77 | 2.57 | 31.1 | 8.0 | 74.1 | ND<0.1 |
| NSA-01-90.5 | 90.5 | H | 15.2 | 1.69 | 2.56 | 33.7 | 8.0 | 76.3 | ND<0.1 |

(1) Sample Orientation: H = horizontal; V = vertical (2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids (3) Water = 0.9996 g/cc, Hydrocarbon = 0.780 g/cc; Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS File No: 36836
Client: URS Corporation

# ORGANIC CARBON DATA - TOC

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

METHOD: WALKLEY-BLACK

| SAMPLE ID. | DEPTH, ft. | SAMPLE MATRIX | TOTAL ORGANIC CARBON, mg/kg |
|---|---|---|---|
| NSA-01-13 | 13.0 | SOIL | 4000 |
| NSA-01-13D(Duplicate) | 13.0 | SOIL | 3300 |
| NSA-01-25 | 25.0 | SOIL | 5300 |
| NSA-01-25D(Duplicate) | 25.0 | SOIL | 3900 |
| NSA-01-35 | 35.0 | SOIL | 4700 |
| NSA-01-51.5 | 51.5 | SOIL | 1700 |
| NSA-01-65 | 65.0 | SOIL | 1200 |
| NSA-01-78 | 78.0 | SOIL | 3650 |
| NSA-01-90.5 | 90.5 | SOIL | 5700 |

PTS File No: 36836
Client: URS Corporation

# PHYSICAL PROPERTIES DATA - PERMEABILITY TO AIR

(METHODOLOGY: API RP40

PROJECT NAME: Chevron PCPL Fillmore, CA
PROJECT NO: 29869533.80000

| SAMPLE ID. | DEPTH, ft. | SAMPLE ORIENTATION (1) | 25 PSI CONFINING STRESS EFFECTIVE (2) PERMEABILITY TO AIR millidarcy |
|---|---|---|---|
| NSA-01-13 | 13.0 | H | 5011 |
| NSA-01-13 | 13.0 | V | 4436 |
| NSA-01-25 | 25.0 | H | 4477 |
| NSA-01-25 | 25.0 | V | 2791 |
| NSA-01-35 | 35.0 | H | 4602 |
| NSA-01-35 | 35.0 | V | 2069 |
| NSA-01-51.5 | 51.5 | H | 876 |
| NSA-01-51.5 | 51.5 | V | 1111 |
| NSA-01-65 | 65.0 | H | 43.1 |
| NSA-01-65 | 65.0 | V | 2.31 |
| NSA-01-78 | 78.0 | H | 24.4 |
| NSA-01-78 | 78.0 | V | 32.4 |
| NSA-01-90.5 | 90.5 | H | 712 |
| NSA-01-90.5 | 90.5 | V | 27.3 |

(1) Sample Orientation: H = horizontal; V = vertical (2) Native State or Effective = With as-received pore fluids in place

TestAmerica
ANALYTICAL TESTING CORPORATION

17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

# LABORATORY REPORT

Prepared For: URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project: 29869533.80000
29869533.80000

Sampled: 10/24/06
Received: 10/25/06
Issued: 11/03/06 15:49

NELAP #01108CA California ELAP#1197 CSDLAC #10256

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*This entire report was reviewed and approved for release.*

## SAMPLE CROSS REFERENCE

| LABORATORY ID | CLIENT ID | MATRIX |
|---|---|---|
| IPJ2647-01 | SSA-01-06 | Soil |
| IPJ2647-02 | SSA-01-11 | Soil |
| IPJ2647-03 | SSA-01-21 | Soil |
| IPJ2647-04 | SSA-01-28 | Soil |
| IPJ2647-05 | SSA-01-35.5 | Soil |
| IPJ2647-06 | SSA-01-43 | Soil |
| IPJ2647-07 | SSA-01-61 | Soil |
| IPJ2647-08 | SSA-01-61D | Soil |

Reviewed By:

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

TestAmerica
ANALYTICAL TESTING CORPORATION
17461 Derian Avenue. Suite 100, Irvine, CA 92614 (949) 261-1022 Fax:(949) 260-3297

URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
29869533.80000
Report Number: IPJ2647

Sampled: 10/24/06
Received: 10/25/06

# INORGANICS

| Analyte | Method | Batch | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|
| **Sample ID: IPJ2647-01 (SSA-01-06 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |
| **Sample ID: IPJ2647-02 (SSA-01-11 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |
| **Sample ID: IPJ2647-03 (SSA-01-21 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |
| **Sample ID: IPJ2647-04 (SSA-01-28 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |
| **Sample ID: IPJ2647-05 (SSA-01-35.5 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |
| **Sample ID: IPJ2647-06 (SSA-01-43 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |
| **Sample ID: IPJ2647-07 (SSA-01-61 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |
| **Sample ID: IPJ2647-08 (SSA-01-61D - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K01107 | 1.0 | ND | 1 | 11/1/2006 | 11/1/2006 | |

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
29869533.80000
Report Number: IPJ2647

Sampled: 10/24/06
Received: 10/25/06

# METHOD BLANK/QC DATA

## INORGANICS

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 6K01107 Extracted: 11/01/06** | | | | | | | | | | |
| **Duplicate Analyzed: 11/01/2006 (6K01107-DUP1)** | | | | | **Source: IPJ2647-01** | | | | | |
| Salinity | 0.292 | 1.0 | g/l | | 0.29 | | | 1 | 20 | |

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Sushmitha Reddy
Project Manager

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| | | | |
|---|---|---|---|
| URS Santa Ana | Project ID: | 29869533.80000 | |
| 2020 East First Street Suite 400 | | 29869533.80000 | Sampled: 10/24/06 |
| Santa Ana, CA 92705 | Report Number: | IPJ2647 | Received: 10/25/06 |
| Attention: Brian Partington | | | |

## DATA QUALIFIERS AND DEFINITIONS

**ND** Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.

**RPD** Relative Percent Difference

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
29869533.80000
Report Number: IPJ2647

Sampled: 10/24/06
Received: 10/25/06

## Certification Summary

**TestAmerica - Irvine, CA**

| Method | Matrix | Nelac | California |
|---|---|---|---|
| EPA 120.1 | Soil | N/A | N/A |

*Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at www.testamericainc.com*

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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# Del Mar Analytical

A TEST AMERICA COMPANY

## CHAIN OF CUSTODY FORM

TP2647

Client Name/Address: DRS 2000 E FIRST ST #400

Project/PO Number: 29869533.80000

Project Manager: BRIAN PARTINGTON / DAVID GRAD

Phone Number: 714 648 2803

Sampler: B. PARTINGTON

Fax Number: 714 6617147

Analysis Required: SALINITY EPA 120.1 (402 JAR)

| Sample Description | Sample Matrix | Container Type | # of Cont. | Sampling Date | Sampling Time | Preservatives | SALINITY EPA 120.1 (402 JAR) | Special Instructions |
|---|---|---|---|---|---|---|---|---|
| SSA-01-06 | SOIL | 402 JAR | 1 | 10/24/06 | 0945 | NONE | 1 | |
| SSA-01-11 | | | 1 | | 0950 | | 1 | |
| SSA-01-21 | | | 1 | | 0955 | | 1 | |
| SSA-01-28 | | | 1 | | 1000 | | 1 | |
| SSA-01-35.5 | | | 1 | | 1005 | | 1 | |
| SSA-01-43 | | | 1 | | 1010 | | 1 | |
| SSA-01-61 | | | 1 | | 1015 | | 1 | |
| SSA-01-61D | | | 1 | | 1020 | | 1 | |
| TEMP BLANK | | | | | | | | RECORD UPON ARRIVAL |
| TRIP BLANK (MW) | W | VOAS | 2 | | | HCL | | ZA 10 2606 HOLD 15:25 |

| | | | |
|---|---|---|---|
| Relinquished By: [signature] | Date/Time: 10/25/06 1400 | Received By: | Date/Time: |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |
| Relinquished By: | Date/Time: | Received in Lab By: [signature] | Date/Time: 10/25/06 1400 |

Turnaround Time: (Check)
same day ____ 72 hours ____
24 hours ____ 5 days ____
48 hours ____ normal ____

Sample Integrity: (Check)
intact ✓ on ice ✓ 6°C

**Note:** By relinquishing samples to Del Mar Analytical, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

#071

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ANALYTICAL TESTING CORPORATION

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# LABORATORY REPORT

Prepared For: URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project: 29869533.80000
CVX PCPL

Sampled: 10/26/06
Received: 10/26/06
Issued: 11/06/06 16:03

NELAP #01108CA California ELAP#1197 CSDLAC #10256

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*This entire report was reviewed and approved for release.*

## SAMPLE CROSS REFERENCE

| LABORATORY ID | CLIENT ID | MATRIX |
|---|---|---|
| IPJ2735-01 | SSA-02-09 | Soil |
| IPJ2735-02 | SSA-02-14 | Soil |
| IPJ2735-03 | SSA-02-21 | Soil |
| IPJ2735-04 | SSA-02-28 | Soil |
| IPJ2735-05 | SSA-02-35.5 | Soil |
| IPJ2735-06 | SSA-02-43 | Soil |
| IPJ2735-07 | SSA-02-56 | Soil |
| IPJ2735-08 | SSA-02-56D | Soil |

Reviewed By:

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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ANALYTICAL TESTING CORPORATION
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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
CVX PCPL
Report Number: IPJ2735

Sampled: 10/26/06
Received: 10/26/06

# INORGANICS

| Analyte | Method | Batch | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|
| **Sample ID: IPJ2735-01 (SSA-02-09 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.51** | 1 | 11/2/2006 | 11/2/2006 | |
| **Sample ID: IPJ2735-02 (SSA-02-14 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.19** | 1 | 11/2/2006 | 11/2/2006 | |
| **Sample ID: IPJ2735-03 (SSA-02-21 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.14** | 1 | 11/2/2006 | 11/2/2006 | |
| **Sample ID: IPJ2735-04 (SSA-02-28 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.25** | 1 | 11/2/2006 | 11/2/2006 | |
| **Sample ID: IPJ2735-05 (SSA-02-35.5 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.21** | 1 | 11/2/2006 | 11/2/2006 | |
| **Sample ID: IPJ2735-06 (SSA-02-43 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.24** | 1 | 11/2/2006 | 11/2/2006 | |
| **Sample ID: IPJ2735-07 (SSA-02-56 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.13** | 1 | 11/2/2006 | 11/2/2006 | |
| **Sample ID: IPJ2735-08 (SSA-02-56D - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| **Salinity** | EPA 120.1 | 6K02067 | 0.10 | **0.14** | 1 | 11/2/2006 | 11/2/2006 | |

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
CVX PCPL
Report Number: IPJ2735

Sampled: 10/26/06
Received: 10/26/06

# METHOD BLANK/QC DATA

## INORGANICS

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 6K02067 Extracted: 11/02/06** | | | | | | | | | | |
| **Duplicate Analyzed: 11/02/2006 (6K02067-DUP1)** | | | | | **Source: IPJ2735-01** | | | | | |
| Salinity | 0.507 | 0.10 | g/l | | 0.51 | | | 1 | 20 | |

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Sushmitha Reddy
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| | | |
|---|---|---|
| URS Santa Ana | Project ID: 29869533.80000 | |
| 2020 East First Street Suite 400 | CVX PCPL | Sampled: 10/26/06 |
| Santa Ana, CA 92705 | Report Number: IPJ2735 | Received: 10/26/06 |
| Attention: Brian Partington | | |

## DATA QUALIFIERS AND DEFINITIONS

**ND** Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.

**RPD** Relative Percent Difference

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
CVX PCPL
Report Number: IPJ2735

Sampled: 10/26/06
Received: 10/26/06

## Certification Summary

**TestAmerica - Irvine, CA**

| Method | Matrix | Nelac | California |
|---|---|---|---|
| EPA 120.1 | Soil | N/A | N/A |

*Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at www.testamericainc.com*

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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Del Mar Analytical

A TEST AMERICA COMPANY

# CHAIN OF CUSTODY FORM

Page 1 of 1

Project Name/Address: ORS (SANTA ANA, CA)

Project No.: 29869533.88000

Project Manager: BRIAN PARTINGTON / DAVID BROD

Phone Number: 714 648 2803

Sampler: BRIAN PARTINGTON

Fax Number: 714-667 7147

Analysis Required: EPA 120.1 SALINITY

IP52735

| Sample Description | Sample Matrix | Container Type | # of Cont. | Sampling Date | Sampling Time | Preservatives | EPA 120.1 SALINITY | Special Instructions |
|---|---|---|---|---|---|---|---|---|
| SSA-02-09 | SOIL | 4oz JAR | 1 | 10/26/06 | 1400 | None | 1 | |
| SSA-02-14 | | | 1 | | 1405 | | 1 | |
| SSA-02-21 | | | 1 | | 1410 | | 1 | |
| SSA-02-28 | | | 1 | | 1415 | | 1 | |
| SSA-02-35.5 | | | 1 | | 1420 | | 1 | |
| SSA-02-43 | | | 1 | | 1425 | | 1 | |
| SSA-02-56 | | | 1 | | 1430 | | 1 | |
| SSA-02-56D | | | 1 | | 1435 | | 1 | TN 1735 |

| Relinquished By: | Date/Time: | Received By: | Date/Time: |
|---|---|---|---|
| [illegible] | 10/26/06 1800 | [illegible] | 10/26/06 1800 |
| Relinquished By: | Date/Time: | Received By: | Date/Time: |
| Relinquished By: | Date/Time: | Received in Lab By: | Date/Time: |

Turnaround Time: (Check)
same day ____ 72 hours ____
24 hours ____ 5 days ____
48 hours ____ normal X

Sample Integrity: (Check)
intact X on ice 6°C

**Note:** By relinquishing samples to Del Mar Analytical, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

493

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ANALYTICAL TESTING CORPORATION

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# LABORATORY REPORT

Prepared For: URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project: 29869533.80000
29869533.80000

Sampled: 10/27/06
Received: 10/27/06
Issued: 11/07/06 16:39

NELAP #01108CA California ELAP#1197 CSDLAC #10256

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*This entire report was reviewed and approved for release.*

## SAMPLE CROSS REFERENCE

| LABORATORY ID | CLIENT ID | MATRIX |
|---|---|---|
| IPJ2926-01 | NSA-01-13 | Soil |
| IPJ2926-02 | NSA-01-25 | Soil |
| IPJ2926-03 | NSA-01-35 | Soil |
| IPJ2926-04 | NSA-01-51.5 | Soil |
| IPJ2926-05 | NSA-01-65 | Soil |
| IPJ2926-06 | NSA-01-78 | Soil |
| IPJ2926-07 | NSA-01-90.5 | Soil |

Reviewed By:

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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ANALYTICAL TESTING CORPORATION
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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
29869533.80000
Report Number: IPJ2926

Sampled: 10/27/06
Received: 10/27/06

# INORGANICS

| Analyte | Method | Batch | Reporting Limit | Sample Result | Dilution Factor | Date Extracted | Date Analyzed | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|
| **Sample ID: IPJ2926-01 (NSA-01-13 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K03073 | 1.0 | ND | 1 | 11/3/2006 | 11/3/2006 | |
| **Sample ID: IPJ2926-02 (NSA-01-25 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K03073 | 1.0 | ND | 1 | 11/3/2006 | 11/3/2006 | |
| **Sample ID: IPJ2926-03 (NSA-01-35 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K03073 | 1.0 | ND | 1 | 11/3/2006 | 11/3/2006 | |
| **Sample ID: IPJ2926-04 (NSA-01-51.5 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K03073 | 1.0 | ND | 1 | 11/3/2006 | 11/3/2006 | |
| **Sample ID: IPJ2926-05 (NSA-01-65 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K03073 | 1.0 | ND | 1 | 11/3/2006 | 11/3/2006 | |
| **Sample ID: IPJ2926-06 (NSA-01-78 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K03073 | 1.0 | ND | 1 | 11/3/2006 | 11/3/2006 | |
| **Sample ID: IPJ2926-07 (NSA-01-90.5 - Soil)** | | | | | | | | |
| **Reporting Units: g/l** | | | | | | | | |
| Salinity | EPA 120.1 | 6K03073 | 1.0 | ND | 1 | 11/3/2006 | 11/3/2006 | |

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
29869533.80000
Report Number: IPJ2926

Sampled: 10/27/06
Received: 10/27/06

# METHOD BLANK/QC DATA

## INORGANICS

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Data Qualifiers |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch: 6K03073 Extracted: 11/03/06** | | | | | | | | | | |
| **Duplicate Analyzed: 11/03/2006 (6K03073-DUP1)** | | | | | **Source: IPJ2926-01** | | | | | |
| Salinity | 0.278 | 1.0 | g/l | | 0.30 | | | 8 | 20 | |

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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| | | | |
|---|---|---|---|
| URS Santa Ana | Project ID: | 29869533.80000 | |
| 2020 East First Street Suite 400 | | 29869533.80000 | Sampled: 10/27/06 |
| Santa Ana, CA 92705 | Report Number: | IPJ2926 | Received: 10/27/06 |
| Attention: Brian Partington | | | |

## DATA QUALIFIERS AND DEFINITIONS

**ND** Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.

**RPD** Relative Percent Difference

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

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URS Santa Ana
2020 East First Street Suite 400
Santa Ana, CA 92705
Attention: Brian Partington

Project ID: 29869533.80000
29869533.80000
Report Number: IPJ2926

Sampled: 10/27/06
Received: 10/27/06

## Certification Summary

**TestAmerica - Irvine, CA**

| Method | Matrix | Nelac | California |
|---|---|---|---|
| EPA 120.1 | Soil | N/A | N/A |

*Nevada and NELAP provide analyte specific accreditations. Analyte specific information for TestAmerica may be obtained by contacting the laboratory or visiting our website at www.testamericainc.com*

**TestAmerica - Irvine, CA**
Sushmitha Reddy
Project Manager

*The results pertain only to the samples tested in the laboratory. This report shall not be reproduced, except in full, without written permission from TestAmerica.*

Del Mar Analytical

A TEST AMERICA COMPANY

# CHAIN OF CUSTODY FORM

Page 1 of 1

Client Name/Address: URS, 2020 E. First St. Ste 400, Santa Ana, CA 92705

Project/PO Number: 29869533 80000

Project Manager: B. PARTINGTON / D. DROD

Phone Number: 714-835-6886

Sampler: B PARTINGTON / J. SANKS

Fax Number: 714-667-7147

Analysis Required: SALINITY (120.1)

| Sample Description | Sample Matrix | Container Type | # of Cont. | Sampling Date | Sampling Time | Preservatives | SALINITY (120.1) | | | | | | | | | Special Instructions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NSA-01-13 | S | Jar | 1 | 10/27/06 | 1240 | NONE | X | | | | | | | | | |
| NSA-01-25 | S | Jar | 1 | 10/27/06 | 1245 | NONE | X | | | | | | | | | |
| NSA-01-35 | S | Jar | 1 | 10/27/06 | 1250 | NONE | X | | | | | | | | | |
| NSA-01-~~52~~ 51.5 | S | Jar | 1 | 10/27/06 | 1350 | NONE | X | | | | | | | | | |
| NSA-01-65 | S | Jar | 1 | 10/27/06 | 1405 | NONE | X | | | | | | | | | |
| NSA-01-78 | S | Jar | 1 | 10/27/06 | 1415 | NONE | X | | | | | | | | | |
| NSA-01-90.5 | S | Jar | 1 | 10/27/06 | 1420 | NONE | X | | | | | | | | | |
| | | | | | | | | | | | | | | | | 10.30.06 |

| Relinquished By: | Date/Time: | Received By: | Date/Time: | Turnaround Time: (Check) |
|---|---|---|---|---|
| | 10/27/06 15:32 | | | same day ____ 72 hours ____ |
| Relinquished By: | Date/Time: | Received By: | Date/Time: | 24 hours ____ 5 days ____ |
| | | | | 48 hours ____ normal X |
| Relinquished By: | Date/Time: | Received in Lab By: | Date/Time: | Sample Integrity: (Check) |
| | | | 10/27/06 15:32 | intact X on ice 5°C |

**Note:** By relinquishing samples to Del Mar Analytical, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

# Appendix G

## Preliminary Vapor Analytical Reports
(Electronic Copy)

# Appendix H

## Vapor Analytical Reports
(Electronic Copy)

# Appendix I

# Limited Data Validation Reports

URS

Data Validation Memorandum
10723 Bell Court
Rancho Cucamonga, CA 91730
Telephone – (909) 980-4000
Fax – (909) 980-1399

**TO:** David Brod **FILE:** 29869787.80000

**FROM:** Lily bayati**,** Rancho Cucamonga QA/QC Group **SITE:** Chevron- PCPL Fillmore Vapor Study

**DATE:** October 1, 2007

**SUBJECT**: Summary of Limited Data Validation for Columbia Reports: P2700754 and P2700778

**Introduction**
This report summarizes the findings of the limited data validation of thirty-two vapor samples (including two field duplicates). These samples were collected on March 19 and 20, 2007 as part of the Pacific Coast Pipeline (PCPL) Fillmore 2007 Vapor Monitoring Events. Columbia Analytical Services (Columbia) in Simi Valley, California analyzed all the samples. The samples are listed in Table 1 included at the end of this document. The data were reviewed in accordance with URS Standard Operating Procedures and the principles presented of *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 1999).

**Executive Summary**
All samples were analyzed as requested and all holding times were met. The results for one field duplicate pair for 2-propanol, 2-hexanone and naphthalene were qualified as estimated (J/UJ) due to duplicate imprecision. In addition the results for 2-hexanone for three samples were qualified as estimated (UJ) due to low LCS recovery. Due to calibration issues the results for naphthalene for three samples were qualified as estimated (UJ). No other data were qualified. Overall, based on this data validation covering the QC parameters listed below, the data as qualified are useable for their intended purpose.

**1.0 Data Validation Methodology**
The analytical data were reviewed in order to evaluate the usability of the data for meeting project objectives. The data review process performed involved evaluating the following parameters: holding times, laboratory blank results, laboratory control sample results, surrogate recoveries, matrix spike/matrix spike duplicate results. In addition, the results obtained for the following field quality control samples were evaluated: field duplicate samples, trip blanks, and equipment blanks. After evaluating each data package for all of these parameters, an overall assessment with respect to the quantitative and qualitative data quality assurance parameters of accuracy, precision, completeness, comparability, and representativeness was formulated.

The data review narrative for each data package provides a discussion of any quality assurance/quality control (QA/QC) results outside of acceptance limits, an explanation of all data qualification assigned and any professional judgment used by the reviewer, and an overall assessment of the data.

The subsections below describe how each QA/QC parameter was evaluated and what data qualification was assigned for the various conditions in which results did not meet acceptance criteria.

**1.1 Holding Times and Sample Receipt**
Holding times were calculated by computing the difference between the sample collection date found on the COC form and the sample analysis date found in the laboratory report. The holding times were

compared to the acceptance limits specified in the analytical methods. Results for analyses not performed within holding times limits were qualified as estimated ("J/UJ").

The COC and sample receipt documentation was reviewed to evaluate whether the samples were received intact, under acceptable custody procedures, and at the proper temperature. Additionally, the paperwork was reviewed to evaluate whether any transcription errors were made during sample login procedures. Any problems found are noted in the data validation result section (Section 2).

**1.2 Blanks**

The results for preparation blanks and field QC blanks were reviewed. Field QC blanks include trip blanks and equipment blanks. Sample results for analytes detected in an associated blank at concentrations less than five times the blank concentration (less than ten times for the common laboratory contaminants of acetone, methylene chloride, and 2-butanone) were qualified as non-detect ("U"). For results qualified as non-detect when the reported value was less than the reporting limit, the standard reporting limit for that analyte becomes the effective reporting limit. For results qualified as non-detect at a value above the reporting limit, the reported value becomes the effective reporting limit. It is important to note that field equipment blank results are applied to two consecutive days of sampling.

**1.3 Laboratory Control Sample Results**

Laboratory control samples (LCSs) are "clean," well-characterized samples used to monitor the laboratory's day-to-day performance or routine analytical methods. LCSs are prepared by spiking samples of a "clean" matrix with known amounts of target analytes and then processing the sample in the same fashion as all other samples. The percent recoveries obtained for the spike analytes are used to assess the accuracy of the analyses on clean sample matrices. When a LCS is prepared in duplicate, the relative percent difference (RPD) between the results can be used to assess the precision of the analysis on "clean" sample matrices.

The percent recoveries of the spiked analytes were compared to laboratory's statistically determined acceptance ranges. If the recovery of a spiked analyte in an LCS exceeded the upper limit of the acceptance range, suggesting a potential high bias in sample results, positive results for that analyte in associated samples were qualified as estimated ("J"); whereas, non-detect results for that analyte were considered to be acceptable without qualification. If the recovery of a spike analyte in an LCS was below the lower limit of the acceptance range, suggesting a potential low bias in results, both positive and non-detect results for that analyte in all associated samples were qualified as estimated ("J" or "UJ"). In addition results associated with unacceptably low LCS results (<30% for inorganics and <10% for organics) may have been qualified as unusable (R).

If the RPD between duplicate LCS results was greater than the laboratory's statistically determined limit, results for that analyte in all associated samples were qualified as estimated ("J" or "UJ").

**1.4 Surrogate Spike Compound Recovery**

With regard to organic analyses, laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds just prior to purging. Although the evaluation of the results of these surrogate compounds is not necessarily straightforward, the surrogate spike recoveries can be used to infer the accuracy of the analysis on the individual sample matrices.

The percent recoveries of the surrogate compounds were compared to the laboratory's statistically determined acceptance ranges. If the recovery of a surrogate compound exceeded the upper limit of the acceptance range, suggesting a potential high bias in sample results, positive results for that analyte in that sample were qualified as estimated ("J"); whereas, non-detect results for that analyte were considered to be acceptable without qualification. If the recovery of a surrogate compound was below the lower limit of the acceptance range, suggesting a potential low bias in results, positive or non-detect results for that

analyte the sample were qualified as estimated ("J" or "UJ"). It is important to note that professional judgment may have been used in assigning data qualification especially for methods in which more than one surrogate compound is used or in which there may have been multiple reasons for qualification.

**1.5 Matrix Spike/Matrix Spike Duplicate Sample Analysis**

In order to provide measures of accuracy and precision of the analysis on the environmental sample matrices, the laboratory prepared a matrix spike (MS) sample and a matrix spike duplicate (MSD) sample per each batch of samples of a similar matrix. The analyte recoveries obtained for MS and MSD analyses were compared to the laboratory's statistically determined acceptance ranges. It is important to note that this evaluation criterion is only considered valid for cases in which the native sample concentration is less than four times the spike concentration (as specified in the Functional Guidelines), and the native sample is a project sample. Thus, when a sample concentration of an analyte is greater than four times the spiking concentration, the results are considered to be inappropriate for assessing accuracy. Additionally, the RPD between the MS and MSD results were compared to the laboratory's statistically determined acceptance limit.

In general, data associated with matrix spike and/or matrix spike recoveries outside the acceptance range were qualified as follows in accordance with Functional Guidelines.

- If the matrix spike recovery for an analyte was greater than the upper limit of the acceptance range, suggesting a potential high bias in reported results, all positive results for that analyte in the data package were qualified as estimated ("J"); whereas, non-detect results were considered to be acceptable for use without qualification.

- If the matrix spike recovery for an analyte was below the lower limit of the acceptance range but >30%, suggesting a potential low bias in reported results, positive and non-detect results for that analyte in all samples were qualified as estimated ("J" or "UJ").

- If the matrix spike recovery for an analyte was <30%, positive sample results were qualified as estimated ("J") where as non-detect results were qualified as unusable ("R").

- If the RPD between the MS and the MSD results was greater than the laboratory's statistically determined acceptance limit, suggesting imprecision in the results, results for that analyte in all associated samples were qualified as estimated ("J/UJ").

The data reviewer may have exercised professional judgment in assigning data qualifier depending on the number of spike recoveries out (1 or 2) and the magnitude of the spike recovery (ies) out. For instance, if a MS recovery was slightly out but the corresponding MSD recovery was within limits, no qualification may have been assigned if the average recovery is within the acceptance range and the RPD between the MS and the MSD results satisfied the precision evaluation criterion.

**1.6 Field Duplicate Results**

Results for field duplicate samples analyses were compared to the following concentration-dependent evaluation criteria. For analytes in which both the sample and the field duplicate results are greater than the reporting limit (RL), the RPD between the results was compared to a criterion of <50% for water samples, and <100% for soil and vapor samples. For analytes in which either the sample or field duplicate concentration is <RL, the RL is used for calculation purposes. Results associated with a field duplicate pair exhibiting poor agreement may have been qualified as estimated ("J" or "UJ").

**1.7 Laboratory Sample Duplicate Results**

Results for sample duplicate analyses were compared to the following concentration-dependent evaluation criteria. For analytes in which both the sample and the laboratory duplicate results are greater than the reporting limit (RL), the RPD between the results was compared to a criterion of <30% for all

matrices. For analytes in which either the sample or field duplicate concentration is <RL, the RL is used for calculation purposes. Results associated with a laboratory duplicate pair exhibiting poor agreement may have been qualified as estimated ("J" or "UJ").

**1.8 Calibration Summary for Organic Analyses**

10% of the laboratory data were reviewed with respect to initial calibration (IC) and continuing calibration (CC) criteria. Typically for initial calibration the percent relative standard deviation (%RSD) and relative response factors (RRFs) are evaluated for each analyte. It is important to note that some methods allow the use of either linear or non-linear models for calibration. For continuing calibration criteria, typically the RRFs and the percent difference (%D) between the response factors for the CC and the RRF for the IC are evaluated. In addition method criteria were evaluated for instrument performance check samples, internal standards, and column agreement. Data qualification was issued using guidance from the U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (1999).

**1.9 Compound Identification**

This data review process included result recalculation and transcription error checking for 10% of the raw data.

**2.0 Data Review Narratives**

Thirty-two vapor samples were analyzed for volatile organic compounds; VOCs (EPA method TO-15 modified) and fixed gases; oxygen/argon and carbon dioxide (EPA method 3C modified). The laboratory data were reviewed to evaluate compliance with these methods and the quality of the data reported. Full validation including recalculation was performed on more than 10% of the laboratory data (samples F07-03-10, F07-03-018, F07-03-020 and F07-03-032). The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Calibrations (Full Validation)
- ✓ Internal Standards (Full Validation)
- ✓ Performance Check Samples (Full Validation)
- ✓ Method Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Laboratory Control Samples (LCS)
- ⊗ Field Duplicates
- ✓ Laboratory Duplicates
- ✓ Compound Identification

2.1 <u>Overall Assessment</u>

The data reported in this package, as qualified, are considered to be usable for meeting project objectives. All results are considered to be valid; the analytical completeness defined

as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis, for the project is 100%. Additionally, because all samples in this data set were collected and analyzed under similar prescribed conditions, the data within this set are considered to be comparable.

2.2 Data Completeness

All analyses were performed as requested on the chain-of-custody records (COCs).

2.3 Holding Times and Preservation

All analyses were performed within the method-specified holding times. In addition, all samples were collected and preserved appropriately.

2.4 Calibration (Full Validation)

2.4.1 Initial Calibration (IC)

Appropriate initial calibrations were performed for each analyte for each method. Compliance requirements for each method were met with the following exception.

| Date | Analyte | %RSD | Qualified Sample(s) | Qualifier |
|---|---|---|---|---|
| 3/19/07 GC/MS 08 | Naphthalene | 31.96 | None | NA |

2.4.2 Initial Calibration Verification, Continuing Calibration Verification (ICV, CCV)

For all target analytes the evaluation criteria were satisfied for the ICVs and CCVs with the following exception.

| Date | Analyte | %Difference | Qualified Sample(s) | Qualifier |
|---|---|---|---|---|
| CCV 3/22/07 GC/MS 08 | Naphthalene | 26.4 | **F07-03-10, F07-03-018 F07-03-020** | **UJ** |

2.5 Internal Standards (Full Validation)

All internal standard retention times and area counts were within the acceptance criteria for the EPA TO-15 analysis.

2.6 Performance Check Samples (Full Validation)

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis for the TO-15 analyses. All samples were analyzed within the 12-hour period. All ion abundance criteria were met.

2.7 Method Blanks

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed. Target analytes were not detected in the associated method blanks.

2.8 System Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the EPA TO-15 analysis. All surrogate compound recoveries were within the laboratory's statistically determined acceptance ranges.

2.9 Laboratory Control Samples (LCS)

LCS's were prepared and analyzed for EPA TO-15 analysis at the proper frequency. The recoveries of all spiked analytes were within the laboratory's statistically determined

acceptance ranges with the following exception. The majority of the LCS results indicate that the level of accuracy demonstrated by the analytical method with respect to a clean sample matrix is acceptable.

| LCS Batch # | Analysis | Analyte | LCS Recovery | Qualified Samples | Qualifier |
|---|---|---|---|---|---|
| **P070321-LCS** | TO-15 | 2-Hexanone | 74% | **F07-03-011, F07-03-012 F07-03-013** | **UJ** |

2.10 Field Duplicates

Samples **F07-03-010 / F07-03-011**, **F07-03-022 / F07-03-024** and **F07-03-027/F07-03-029** were submitted to the laboratory as blind field duplicate pairs. Acceptable field and analytical precision was demonstrated for all analytes for the field duplicate pairs with the following exceptions.

| Duplicate Pair | Analyte | RPD | Qualifier |
|---|---|---|---|
| **F07-03-010/ F07-03-011** | 2-Propanol | 168 | **J/UJ** |
| | 2-Hexanone | 180 | |
| **F07-03-027/F07-03-029** | Naphthalene | 104 | |
| Note: The results for the field duplicate pair were qualified as estimated if the RPD between the results was greater than 100%. | | | |

2.11 Laboratory Duplicates

Laboratory duplicates were analyzed for both TO-15 and EPA 3C analyses. Acceptable analytical precision was demonstrated for all analytes for the laboratory duplicates.

2.12 Compound Identification

All detection limits comply with project specifications. All dilutions were appropriate. In addition the 10% full validation review process included result recalculation and transcription error checking from the raw data. All results reported by the laboratory were confirmed.

Table I
Columbia

| Sample Control Number | SDG | Sample Number | Date Sampled | Analyses Performed |
|---|---|---|---|---|
| F07-03-001 | P2700754 | P2700754-001 | 3/19/07 | EPA TO-15, 3C |
| F07-03-002 | P2700754 | P2700754-002 | 3/19/07 | EPA TO-15, 3C |
| F07-03-003 | P2700754 | P2700754-003 | 3/19/07 | EPA TO-15, 3C |
| F07-03-004 | P2700754 | P2700754-004 | 3/19/07 | EPA TO-15, 3C |
| F07-03-005 | P2700754 | P2700754-005 | 3/19/07 | EPA TO-15, 3C |
| F07-03-006 | P2700754 | P2700754-006 | 3/19/07 | EPA TO-15, 3C |
| F07-03-007 | P2700754 | P2700754-007 | 3/19/07 | EPA TO-15, 3C |
| F07-03-008 | P2700754 | P2700754-008 | 3/19/07 | EPA TO-15, 3C |
| F07-03-009 | P2700754 | P2700754-009 | 3/19/07 | EPA TO-15, 3C |
| F07-03-010 | P2700754 | P2700754-010 | 3/19/07 | EPA TO-15, 3C |
| F07-03-012 | P2700754 | P2700754-011 | 3/19/07 | EPA TO-15, 3C |
| F07-03-011 (Field duplicate of F07-03-010) | P2700754 | P2700754-012 | 3/19/07 | EPA TO-15, 3C |
| F07-03-013 | P2700754 | P2700754-013 | 3/19/07 | EPA TO-15, 3C |
| F07-03-014 | P2700754 | P2700754-014 | 3/19/07 | EPA TO-15, 3C |
| F07-03-015 | P2700754 | P2700754-015 | 3/19/07 | EPA TO-15, 3C |
| F07-03-016 | P2700754 | P2700754-016 | 3/19/07 | EPA TO-15, 3C |
| F07-03-017 | P2700778 | P2700778-001 | 3/20/07 | EPA TO-15, 3C |
| F07-03-018 | P2700778 | P2700778-002 | 3/20/07 | EPA TO-15, 3C |
| F07-03-019 | P2700778 | P2700778-003 | 3/20/07 | EPA TO-15, 3C |
| F07-03-020 | P2700778 | P2700778-004 | 3/20/07 | EPA TO-15, 3C |
| F07-03-021 | P2700778 | P2700778-005 | 3/20/07 | EPA TO-15, 3C |
| F07-03-022 | P2700778 | P2700778-006 | 3/20/07 | EPA TO-15, 3C |
| F07-03-024 (Field duplicate of F07-03-022) | P2700778 | P2700778-007 | 3/20/07 | EPA TO-15, 3C |
| F07-03-023 | P2700778 | P2700778-008 | 3/20/07 | EPA TO-15, 3C |
| F07-03-025 | P2700778 | P2700778-009 | 3/20/07 | EPA TO-15, 3C |
| F07-03-026 | P2700778 | P2700778-010 | 3/20/07 | EPA TO-15, 3C |
| F07-03-027 | P2700778 | P2700778-011 | 3/20/07 | EPA TO-15, 3C |
| F07-03-028 | P2700778 | P2700778-012 | 3/20/07 | EPA TO-15, 3C |
| F07-03-029 (Field duplicate of F07-03-027) | P2700778 | P2700778-013 | 3/20/07 | EPA TO-15, 3C |
| F07-03-030 | P2700778 | P2700778-014 | 3/20/07 | EPA TO-15, 3C |
| F07-03-031 | P2700778 | P2700778-015 | 3/20/07 | EPA TO-15, 3C |
| F07-03-032 | P2700778 | P2700778-016 | 3/20/07 | EPA TO-15, 3C |

Notes;
SDG: Sample Delivery Group
EPA TO-15: Volatile Organic Compounds
EPA 3C: Fixed Gases (Oxygen/Argon and Carbon Dioxide)

# ATTACHMENT A
## DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
### Assigned by URS's Data Review Team

**DATA QUALIFIER DEFINITIONS FOR ORGANIC ANALYES**

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

**DATA QUALIFIER DEFINITIONS FOR INORGANIC ANALYSES**

U The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

UJ The analyte was analyzed for, but was not detected. The reported sample quantitation limit is approximate and may be inaccurate or imprecise.

R The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control (QC) criteria. The analyte may or may not be present in the sample.

**URS DATA QUALIFIER DEFINITIONS — REASON CODE DEFINITIONS**

a Analytical sequence deficiency or omission.
b Gross compound breakdown (4,4'-DDT/Endrin).
c Calibration failure; poor or unstable response.
d Laboratory duplicate imprecision.
e Laboratory duplicate control sample imprecision.
f Field duplicate imprecision.
g Poor chromatography.
h Holding time violation.
i Internal standard failure.
j Poor mass spectrographic performance.
k Serial dilution imprecision.
l Laboratory control sample recovery failure.
m Matrix spike/matrix spike duplicate recovery failure.
n Interference check sample recovery failure.
o Calibration blank contamination (metals/inorganics only).
p Preparation blank contamination (metals/inorganics only).
q Quantitation outside linear range.
r Linearity failure in initial calibration.
s Surrogate spike recovery failure (GC organics and GC/MS organics only).
t Instrument tuning failure.
u No valid confirmation column (GC Organics only).
v Value is estimated below the MDA (Rads only).
w Retention time (RT) outside of RT window.
x Field blank contamination.
y Trip blank contamination.
z Method blank contamination.
a1 Poor agreement between columns (GC Organics only).

INTERPRETATION KEY

The following example shows how an analytical result which includes qualifiers assigned by both the URS data review team and the analytical laboratory could be displayed in the data tables:

**<5.20 Uz | JB**

The qualifier assigned by the URS data review team precedes the "|"; the qualifier assigned by the laboratory follows it. In this example, the result is qualified as a non-detection data to the bias introduced by contamination of the associated method blank. Presence of the analyte in the method blank is indicated by the laboratory qualifier (B). The qualifier assigned by the URS data review team (Uz) indicates that the analyte concentration is considered to be below the adjusted detection limit (quantitation limit) based on the level of contamination in the method blank.

URS

Data Validation Memorandum
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Rancho Cucamonga, CA 91730
Telephone – (909) 980-4000
Fax – (909) 980-1399

**TO:** David Brod **FILE:** 29869787.80000

**FROM:** Lily bayati, Rancho Cucamonga QA/QC Group **SITE:** Chevron- PCPL Fillmore Vapor Study

**DATE:** October 11, 2007

**SUBJECT**: Summary of Data Validation for Columbia Reports: P2702399, P2702402 and P2702824

**Introduction**

This report summarizes the findings of the limited data validation of thirty-six vapor samples (including three field duplicates). These samples were collected on August 6, and 7 and September 13, 2007 as part of the Pacific Coast Pipeline (PCPL) Fillmore 2007 Vapor Monitoring Events. Columbia Analytical Services (Columbia) in Simi Valley, California analyzed all the samples. The samples are listed in Table 1 included at the end of this document. The data were reviewed in accordance with URS Standard Operating Procedures and the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 1999).

**Executive Summary**

All samples were analyzed as requested and all holding times were met. The results for vinyl acetate for eight samples were qualified as estimated (UJ) due to calibration issues. No other data were qualified. Overall, based on this data validation covering the QC parameters listed below, the data as qualified are useable for their intended purpose.

**1.0 Data Validation Methodology**

The analytical data were reviewed in order to evaluate the usability of the data for meeting project objectives. The data review process performed involved evaluating the following parameters: holding times, laboratory blank results, laboratory control sample results, surrogate recoveries, matrix spike/matrix spike duplicate results. In addition, the results obtained for the following field quality control samples were evaluated: field duplicate samples, trip blanks, and equipment blanks. After evaluating each data package for all of these parameters, an overall assessment with respect to the quantitative and qualitative data quality assurance parameters of accuracy, precision, completeness, comparability, and representativeness was formulated.

The data review narrative for each data package provides a discussion of any quality assurance/quality control (QA/QC) results outside of acceptance limits, an explanation of all data qualification assigned and any professional judgment used by the reviewer, and an overall assessment of the data.

The subsections below describe how each QA/QC parameter was evaluated and what data qualification was assigned for the various conditions in which results did not meet acceptance criteria.

**1.1 Holding Times and Sample Receipt**

Holding times were calculated by computing the difference between the sample collection date found on the COC form and the sample analysis date found in the laboratory report. The holding times were compared to the acceptance limits specified in the analytical methods. Results for analyses not performed within holding times limits were qualified as estimated ("J/UJ").

The COC and sample receipt documentation was reviewed to evaluate whether the samples were received intact, under acceptable custody procedures, and at the proper temperature. Additionally, the paperwork was reviewed to evaluate whether any transcription errors were made during sample login procedures. Any problems found are noted in the data validation result section (Section 2).

**1.2 Blanks**

The results for preparation blanks and field QC blanks were reviewed. Field QC blanks include trip blanks and equipment blanks. Sample results for analytes detected in an associated blank at concentrations less than five times the blank concentration (less than ten times for the common laboratory contaminants of acetone, methylene chloride, and 2-butanone) were qualified as non-detect ("U"). For results qualified as non-detect when the reported value was less than the reporting limit, the standard reporting limit for that analyte becomes the effective reporting limit. For results qualified as non-detect at a value above the reporting limit, the reported value becomes the effective reporting limit. It is important to note that field equipment blank results are applied to two consecutive days of sampling.

**1.3 Laboratory Control Sample Results**

Laboratory control samples (LCSs) are "clean," well-characterized samples used to monitor the laboratory's day-to-day performance or routine analytical methods. LCSs are prepared by spiking samples of a "clean" matrix with known amounts of target analytes and then processing the sample in the same fashion as all other samples. The percent recoveries obtained for the spike analytes are used to assess the accuracy of the analyses on clean sample matrices. When a LCS is prepared in duplicate, the relative percent difference (RPD) between the results can be used to assess the precision of the analysis on "clean" sample matrices.

The percent recoveries of the spiked analytes were compared to laboratory's statistically determined acceptance ranges. If the recovery of a spiked analyte in an LCS exceeded the upper limit of the acceptance range, suggesting a potential high bias in sample results, positive results for that analyte in associated samples were qualified as estimated ("J"); whereas, non-detect results for that analyte were considered to be acceptable without qualification. If the recovery of a spike analyte in an LCS was below the lower limit of the acceptance range, suggesting a potential low bias in results, both positive and non-detect results for that analyte in all associated samples were qualified as estimated ("J" or "UJ"). In addition results associated with unacceptably low LCS results (<30% for inorganics and <10% for organics) may have been qualified as unusable (R).

If the RPD between duplicate LCS results was greater than the laboratory's statistically determined limit, results for that analyte in all associated samples were qualified as estimated ("J" or "UJ").

**1.4 Surrogate Spike Compound Recovery**

With regard to organic analyses, laboratory performance on individual samples is established by means of spiking activities. All samples are spiked with surrogate compounds just prior to purging. Although the evaluation of the results of these surrogate compounds is not necessarily straightforward, the surrogate spike recoveries can be used to infer the accuracy of the analysis on the individual sample matrices.

The percent recoveries of the surrogate compounds were compared to the laboratory's statistically determined acceptance ranges. If the recovery of a surrogate compound exceeded the upper limit of the acceptance range, suggesting a potential high bias in sample results, positive results for that analyte in that sample were qualified as estimated ("J"); whereas, non-detect results for that analyte were considered to be acceptable without qualification. If the recovery of a surrogate compound was below the lower limit of the acceptance range, suggesting a potential low bias in results, positive or non-detect results for that analyte the sample were qualified as estimated ("J" or "UJ"). It is important to note that professional

judgment may have been used in assigning data qualification especially for methods in which more than one surrogate compound is used or in which there may have been multiple reasons for qualification.

**1.5 Matrix Spike/Matrix Spike Duplicate Sample Analysis**

In order to provide measures of accuracy and precision of the analysis on the environmental sample matrices, the laboratory prepared a matrix spike (MS) sample and a matrix spike duplicate (MSD) sample per each batch of samples of a similar matrix. The analyte recoveries obtained for MS and MSD analyses were compared to the laboratory's statistically determined acceptance ranges. It is important to note that this evaluation criterion is only considered valid for cases in which the native sample concentration is less than four times the spike concentration (as specified in the Functional Guidelines), and the native sample is a project sample. Thus, when a sample concentration of an analyte is greater than four times the spiking concentration, the results are considered to be inappropriate for assessing accuracy. Additionally, the RPD between the MS and MSD results were compared to the laboratory's statistically determined acceptance limit.

In general, data associated with matrix spike and/or matrix spike recoveries outside the acceptance range were qualified as follows in accordance with Functional Guidelines.

- If the matrix spike recovery for an analyte was greater than the upper limit of the acceptance range, suggesting a potential high bias in reported results, all positive results for that analyte in the data package were qualified as estimated ("J"); whereas, non-detect results were considered to be acceptable for use without qualification.

- If the matrix spike recovery for an analyte was below the lower limit of the acceptance range but >30%, suggesting a potential low bias in reported results, positive and non-detect results for that analyte in all samples were qualified as estimated ("J" or "UJ").

- If the matrix spike recovery for an analyte was <30%, positive sample results were qualified as estimated ("J") where as non-detect results were qualified as unusable ("R").

- If the RPD between the MS and the MSD results was greater than the laboratory's statistically determined acceptance limit, suggesting imprecision in the results, results for that analyte in all associated samples were qualified as estimated ("J/UJ").

The data reviewer may have exercised professional judgment in assigning data qualifier depending on the number of spike recoveries out (1 or 2) and the magnitude of the spike recovery (ies) out. For instance, if a MS recovery was slightly out but the corresponding MSD recovery was within limits, no qualification may have been assigned if the average recovery is within the acceptance range and the RPD between the MS and the MSD results satisfied the precision evaluation criterion.

**1.6 Field Duplicate Results**

Results for field duplicate samples analyses were compared to the following concentration-dependent evaluation criteria. For analytes in which both the sample and the field duplicate results are greater than the reporting limit (RL), the RPD between the results was compared to a criterion of <50% for water samples, and <100% for soil and vapor samples. For analytes in which either the sample or field duplicate concentration is <RL, the RL is used for calculation purposes. Results associated with a field duplicate pair exhibiting poor agreement may have been qualified as estimated ("J" or "UJ").

**1.7 Laboratory Sample Duplicate Results**

Results for sample duplicate analyses were compared to the following concentration-dependent evaluation criteria. For analytes in which both the sample and the laboratory duplicate results are greater than the reporting limit (RL), the RPD between the results was compared to a criterion of <30% for all

matrices. For analytes in which either the sample or field duplicate concentration is <RL, the RL is used for calculation purposes. Results associated with a laboratory duplicate pair exhibiting poor agreement may have been qualified as estimated ("J" or "UJ").

**1.8 Calibration Summary for Organic Analyses**

10% of the laboratory data were reviewed with respect to initial calibration (IC) and continuing calibration (CC) criteria. Typically, for initial calibration the percent relative standard deviation (%RSD) and relative response factors (RRFs) are evaluated for each analyte. It is important to note that some methods allow the use of either linear or non-linear models for calibration. For continuing calibration criteria, typically, the RRFs and the percent difference (%D) between the response factors for the CC and the RRF for the IC are evaluated. In addition, method criteria were evaluated for instrument performance check samples, internal standards, and column agreement. Data qualification was issued using guidance from the U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review (1999).

**1.9 Compound Identification**

This data review process included result recalculation and transcription error checking for 10% of the raw data.

**2.0 Data Review Narratives**

Thirty-six vapor samples were analyzed for volatile organic compounds; VOCs (EPA method TO-15 modified) and fixed gases; oxygen/argon and carbon dioxide (EPA method 3C modified). In addition four samples were analyzed for helium (EPA method 3C modified). The laboratory data were reviewed to evaluate compliance with these methods and the quality of the data reported. Full validation including recalculation was performed on more than 10% of the laboratory data (samples F07-08-204, F07-08-215, F07-08-218 and F07-08-222). The following summarizes the results of this review.

The areas of review are listed below. A check mark (✓) indicates an area of review in which all data were acceptable. A crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Calibrations (Full Validation)
- ✓ Internal Standards (Full Validation)
- ✓ Performance Check Samples (Full Validation)
- ✓ Method Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Laboratory Control Samples (LCS)
- ✓ Field Duplicates
- ✓ Laboratory Duplicates
- ✓ Compound Identification

2.1 <u>Overall Assessment</u>

The data reported in this package, as qualified, are considered to be usable for meeting project objectives. All results are considered to be valid; the analytical completeness defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis, for the project is 100%. Additionally, because all samples in this data set were collected and analyzed under similar prescribed conditions, the data within this set are considered to be comparable.

2.2 Data Completeness
All analyses were performed as requested on the chain-of-custody records (COCs).

2.3 Holding Times and Preservation
All analyses were performed within the method-specified holding times. In addition, all samples were collected and preserved appropriately.

2.4 Calibration (Full Validation)

2.4.1 Initial Calibration (IC)
Appropriate initial calibrations were performed for each analyte for each method. Compliance requirements for each method were met.

2.4.2 Initial Calibration Verification, Continuing Calibration Verification (ICV, CCV)
For all target analytes, the evaluation criteria were satisfied for the ICVs and CCVs with the following exceptions.

| Date | Analyte | %Difference | Qualified Sample(s) | Qualifier |
|---|---|---|---|---|
| CCV 8/07/07 GC/MS 09 | Vinyl Acetate | 44.3%[1] | **F07-08-204, F07-08-205, F07-08-209, F07-08-210 F07-08-211, F07-08-212, F07-08-213, F07-08-214** | **UJ** |
| | Naphthalene | 42.5%[2] | None | NA |
| Notes: 1 – Biased low 2 – Biased high | | | | |

2.5 Internal Standards (Full Validation)
All internal standard retention times and area counts were within the acceptance criteria for the EPA TO-15 analysis.

2.6 Performance Check Samples (Full Validation)
An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis for EPA TO-15 analyses. All samples were analyzed within the 12-hour period. All ion abundance criteria were met.

2.7 Method Blanks
Method blanks were analyzed at the proper frequency for the number and types of samples analyzed. Target analytes were not detected in the associated method blanks.

2.8 System Monitoring Compounds (Surrogates)
Appropriate numbers of surrogate compounds were spiked into each sample for EPA TO-15 analysis. All surrogate compound recoveries were within the laboratory's statistically determined acceptance ranges.

2.9 Laboratory Control Samples (LCS)
LCS's were prepared and analyzed for EPA TO-15 analysis at the proper frequency. The recoveries of all spiked analytes were within the laboratory's statistically determined acceptance ranges with the following exceptions. The majority of the LCS results indicate that the level of accuracy demonstrated by the analytical method with respect to a clean sample matrix is acceptable.

| LCS Batch # | Analysis | Analyte | LCS Recovery | Qualified Samples | Qualifier |
|---|---|---|---|---|---|

| LCS Batch # | Analysis | Analyte | LCS Recovery | Qualified Samples | Qualifier |
|---|---|---|---|---|---|
| **P070808-LCS** | TO-15 | Acetone | 141% | None | NA |
| **P07070807-LCS** | TO-15 | Acetone | 140% | | |
| Note:<br>Data qualification was not considered necessary since the results for applicable project samples are non-detect and the potential bias is high. | | | | | |

2.10 Field Duplicates

Samples **F07-08-210 / F07-08-212**, **F07-08-219 / F07-08-220** and **F07-08-227/F07-08-230** were submitted to the laboratory as blind field duplicate pairs. Acceptable field and analytical precision was demonstrated for all analytes for the field duplicate pairs.

2.11 Laboratory Duplicates

Laboratory duplicates were analyzed for EPA TO-15 and EPA 3C analyses. Acceptable analytical precision was demonstrated for all analytes for the project specific laboratory duplicates.

2.12 Compound Identification

All detection limits comply with project specifications. All dilutions were appropriate. In addition, the 10% full validation review process included result recalculation and transcription error checking from the raw data. All results reported by the laboratory were confirmed.

Table I
Columbia

| Sample Control Number | SDG | Sample Number | Date Sampled | Analyses Performed |
|---|---|---|---|---|
| F07-08-200 | P2702399 | P2702399-001 | 8/06/07 | EPA TO-15, 3C |
| F07-08-201 | P2702399 | P2702399-002 | 8/06/07 | EPA TO-15, 3C |
| F07-08-202 | P2702399 | P2702399-003 | 8/06/07 | EPA TO-15, 3C |
| F07-08-203 | P2702399 | P2702399-004 | 8/06/07 | Not Analyzed |
| F07-08-204 | P2702399 | P2702399-005 | 8/06/07 | EPA TO-15, 3C |
| F07-08-205 | P2702399 | P2702399-006 | 8/06/07 | EPA TO-15, 3C |
| F07-08-206 | P2702399 | P2702399-007 | 8/06/07 | EPA TO-15, 3C |
| F07-08-207 | P2702399 | P2702399-008 | 8/06/07 | EPA TO-15, 3C |
| F07-08-208 | P2702399 | P2702399-009 | 8/06/07 | EPA TO-15, 3C |
| F07-08-209 | P2702399 | P2702399-010 | 8/06/07 | EPA TO-15, 3C |
| F07-08-210 | P2702399 | P2702399-011 | 8/06/07 | EPA TO-15, 3C |
| F07-08-211 | P2702399 | P2702399-012 | 8/06/07 | EPA TO-15, 3C |
| F07-08-212 (Field duplicate of F07-08-210) | P2702399 | P2702399-013 | 8/06/07 | EPA TO-15, 3C |
| F07-08-213 | P2702399 | P2702399-014 | 8/06/07 | EPA TO-15, 3C |
| F07-08-214 | P2702399 | P2702399-015 | 8/06/07 | EPA TO-15, 3C |
| F07-08-215 | P2702399 | P2702399-016 | 8/06/07 | EPA TO-15, 3C |
| F07-08-216 | P2702399 | P2702399-017 | 8/06/07 | EPA TO-15, 3C |
| F07-08-217 | P2702399 | P2702399-018 | 8/06/07 | EPA TO-15, 3C |
| F07-08-218 | P2702399 | P2702399-019 | 8/06/07 | EPA TO-15, 3C |
| F07-08-219 | P2702399 | P2702399-020 | 8/06/07 | EPA TO-15, 3C |
| F07-08-220 (Field duplicate of F07-08-219) | P2702399 | P2702399-021 | 8/06/07 | EPA TO-15, 3C |
| F07-08-221 | P2702399 | P2702399-022 | 8/06/07 | EPA TO-15, 3C |
| F07-08-222 | P2702399 | P2702399-023 | 8/06/07 | EPA TO-15, 3C |
| F07-08-223 | P2702399 | P2702399-024 | 8/06/07 | EPA TO-15, 3C |
| F07-08-224 | P2702399 | P2702399-025 | 8/06/07 | EPA TO-15, 3C |
| F07-08-225 | P2702399 | P2702399-026 | 8/06/07 | EPA TO-15, 3C |
| F07-08-226 | P2702402 | P2702402-001 | 8/07/07 | EPA TO-15, 3C |
| F07-08-227 | P2702399 | P2702399-002 | 8/06/07 | F07-08- |
| F07-08-228 | P2702402 | P2702402-003 | 8/07/07 | EPA TO-15, 3C |
| F07-08-229 | P2702402 | P2702402-004 | 8/07/07 | EPA TO-15, 3C |
| F07-08-230 (Field duplicate of F07-08-227) | P2702402 | P2702402-005 | 8/07/07 | EPA TO-15, 3C |
| F07-08-231 | P2702402 | P2702402-006 | 8/07/07 | Not Analyzed |
| F07-08-232 | P2702402 | P2702402-007 | 8/07/07 | EPA TO-15, 3C |
| F07-08-233 | P2702402 | P2702402-008 | 8/07/07 | EPA TO-15, 3C |

Table I
Columbia

| Sample Control Number | SDG | Sample Number | Date Sampled | Analyses Performed |
|---|---|---|---|---|
| F07-09-100 | P2702824 | P2702824-001 | 9/13/07 | EPA TO-15, 3C* |
| F07-09-101 | P2702824 | P2702824-002 | 9/13/07 | EPA TO-15, 3C* |
| F07-09-102 | P2702824 | P2702824-003 | 9/13/07 | EPA TO-15, 3C* |
| F07-09-103 | P2702824 | P2702824-004 | 9/13/07 | EPA TO-15, 3C* |

Notes;
SDG: Sample Delivery Group
EPA TO-15: Volatile Organic Compounds
EPA 3C: Fixed Gases (Oxygen/Argon and Carbon Dioxide)
EPQA 3C *: Fixed Gases (Oxygen/Argon and Carbon Dioxide), Helium

# ATTACHMENT A
# DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
## Assigned by URS's Data Review Team

### DATA QUALIFIER DEFINITIONS FOR ORGANIC ANALYES

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

### DATA QUALIFIER DEFINITIONS FOR INORGANIC ANALYSES

U The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

UJ The analyte was analyzed for, but was not detected. The reported sample quantitation limit is approximate and may be inaccurate or imprecise.

R The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control (QC) criteria. The analyte may or may not be present in the sample.

### URS DATA QUALIFIER DEFINITIONS — REASON CODE DEFINITIONS

a Analytical sequence deficiency or omission.
b Gross compound breakdown (4,4'-DDT/Endrin).
c Calibration failure; poor or unstable response.
d Laboratory duplicate imprecision.
e Laboratory duplicate control sample imprecision.
f Field duplicate imprecision.
g Poor chromatography.
h Holding time violation.
i Internal standard failure.
j Poor mass spectrographic performance.
k Serial dilution imprecision.
l Laboratory control sample recovery failure.
m Matrix spike/matrix spike duplicate recovery failure.
n Interference check sample recovery failure.
o Calibration blank contamination (metals/inorganics only).
p Preparation blank contamination (metals/inorganics only).
q Quantitation outside linear range.
r Linearity failure in initial calibration.
s Surrogate spike recovery failure (GC organics and GC/MS organics only).
t Instrument tuning failure.
u No valid confirmation column (GC Organics only).
v Value is estimated below the MDA (Rads only).
w Retention time (RT) outside of RT window.
x Field blank contamination.
y Trip blank contamination.
z Method blank contamination.

INTERPRETATION KEY

The following example shows how an analytical result which includes qualifiers assigned by both the URS data review team and the analytical laboratory could be displayed in the data tables:

**<5.20 Uz | JB**

The qualifier assigned by the URS data review team precedes the "|"; the qualifier assigned by the laboratory follows it. In this example, the result is qualified as a non-detection data to the bias introduced by contamination of the associated method blank. Presence of the analyte in the method blank is indicated by the laboratory qualifier (B). The qualifier assigned by the URS data review team (Uz) indicates that the analyte concentration is considered to be below the adjusted detection limit (quantitation limit) based on the level of contamination in the method blank.

a1 Poor agreement between columns (GC Organics only).

# Sample Control Key

| Task | Matrix | Sample Number | QC Code | Location | Depth | Sample Date |
|---|---|---|---|---|---|---|
| FILLMORE | CN | F07-03-001 | | SSA-11 | 7.0 | 03/19/07 |
| FILLMORE | CN | F07-03-002 | | SSA-11 | 13.0 | 03/19/07 |
| FILLMORE | CN | F07-03-003 | | SSA-11 | 21.0 | 03/19/07 |
| FILLMORE | CN | F07-03-004 | | SSA-11 | 27.0 | 03/19/07 |
| FILLMORE | CN | F07-03-005 | | SSA-11 | 36.0 | 03/19/07 |
| FILLMORE | CN | F07-03-006 | | SSA-11 | 43.0 | 03/19/07 |
| FILLMORE | CN | F07-03-007 | | SSA-10 | 7.0 | 03/19/07 |
| FILLMORE | CN | F07-03-008 | | SSA-10 | 13.0 | 03/19/07 |
| FILLMORE | CN | F07-03-009 | | SSA-10 | 21.0 | 03/19/07 |
| FILLMORE | CN | F07-03-010 | F1 | SSA-10 | 28.0 | 03/19/07 |
| FILLMORE | CN | F07-03-011 | F2 | SSA-10 | 28.0 | 03/19/07 |
| FILLMORE | CN | F07-03-012 | | SSA-10 | 33.0 | 03/19/07 |
| FILLMORE | CN | F07-03-013 | | SSA-09 | 7.0 | 03/19/07 |
| FILLMORE | CN | F07-03-014 | | SSA-10 | 42.0 | 03/19/07 |
| FILLMORE | CN | F07-03-015 | | SSA-09 | 15.0 | 03/19/07 |
| FILLMORE | CN | F07-03-016 | | SSA-09 | 21.0 | 03/19/07 |
| FILLMORE | CN | F07-03-017 | | SSA-09 | 28.0 | 03/20/07 |
| FILLMORE | CN | F07-03-018 | | SSA-09 | 35.0 | 03/20/07 |
| FILLMORE | CN | F07-03-019 | | SSA-09 | 44.0 | 03/20/07 |
| FILLMORE | CN | F07-03-020 | | SSA-07 | 7.0 | 03/20/07 |
| FILLMORE | CN | F07-03-021 | | SSA-07 | 13.0 | 03/20/07 |
| FILLMORE | CN | F07-03-022 | F1 | SSA-07 | 21.0 | 03/20/07 |
| FILLMORE | CN | F07-03-023 | | SSA-07 | 28.0 | 03/20/07 |
| FILLMORE | CN | F07-03-024 | F2 | SSA-07 | 21.0 | 03/20/07 |
| FILLMORE | CN | F07-03-025 | | SSA-07 | 33.0 | 03/20/07 |
| FILLMORE | CN | F07-03-026 | | SSA-07 | 43.0 | 03/20/07 |
| FILLMORE | CN | F07-03-027 | F1 | NSA-03 | 13.0 | 03/20/07 |
| FILLMORE | CN | F07-03-028 | | NSA-03 | 26.0 | 03/20/07 |
| FILLMORE | CN | F07-03-029 | F2 | NSA-03 | 13.0 | 03/20/07 |
| FILLMORE | CN | F07-03-030 | | NSA-03 | 38.0 | 03/20/07 |
| FILLMORE | CN | F07-03-031 | | NSA-03 | 69.0 | 03/20/07 |
| FILLMORE | CN | F07-03-032 | | NSA-03 | 78.0 | 03/20/07 |
| FILLMORE | CN | F07-04-001 | | NSA-03 | 69.0 | 04/23/07 |
| FILLMORE | CN | F07-04-002 | | NSA-03 | 78.0 | 04/23/07 |
| FILLMORE | CN | F07-08-200 | | SSA-11 | 7.0 | 08/06/07 |
| FILLMORE | CN | F07-08-201 | | SSA-11 | 13.0 | 08/06/07 |
| FILLMORE | CN | F07-08-202 | | SSA-11 | 21.0 | 08/06/07 |
| FILLMORE | CN | F07-08-204 | | SSA-11 | 27.0 | 08/06/07 |
| FILLMORE | CN | F07-08-205 | | SSA-11 | 36.0 | 08/06/07 |
| FILLMORE | CN | F07-08-206 | | SSA-11 | 43.0 | 08/06/07 |
| FILLMORE | CN | F07-08-207 | | SSA-10 | 7.0 | 08/06/07 |
| FILLMORE | CN | F07-08-208 | | SSA-10 | 13.0 | 08/06/07 |
| FILLMORE | CN | F07-08-209 | | SSA-10 | 21.0 | 08/06/07 |
| FILLMORE | CN | F07-08-210 | F1 | SSA-10 | 28.0 | 08/06/07 |
| FILLMORE | CN | F07-08-211 | | SSA-10 | 33.0 | 08/06/07 |
| FILLMORE | CN | F07-08-212 | F2 | SSA-10 | 28.0 | 08/06/07 |
| FILLMORE | CN | F07-08-213 | | SSA-10 | 42.0 | 08/06/07 |
| FILLMORE | CN | F07-08-214 | | SSA-09 | 7.0 | 08/06/07 |
| FILLMORE | CN | F07-08-215 | | SSA-09 | 15.0 | 08/06/07 |
| FILLMORE | CN | F07-08-216 | | SSA-09 | 21.0 | 08/06/07 |

# Sample Control Key

| Task | Matrix | Sample Number | QC Code | Location | Depth | Sample Date |
|---|---|---|---|---|---|---|
| FILLMORE | CN | F07-08-217 | | SSA-09 | 28.0 | 08/06/07 |
| FILLMORE | CN | F07-08-218 | | SSA-09 | 35.0 | 08/06/07 |
| FILLMORE | CN | F07-08-219 | F1 | SSA-09 | 44.0 | 08/06/07 |
| FILLMORE | CN | F07-08-220 | F2 | SSA-09 | 44.0 | 08/06/07 |
| FILLMORE | CN | F07-08-221 | | SSA-07 | 7.0 | 08/06/07 |
| FILLMORE | CN | F07-08-222 | | SSA-07 | 13.0 | 08/06/07 |
| FILLMORE | CN | F07-08-223 | | SSA-07 | 21.0 | 08/06/07 |
| FILLMORE | CN | F07-08-224 | | SSA-07 | 28.0 | 08/06/07 |
| FILLMORE | CN | F07-08-225 | | SSA-07 | 33.0 | 08/06/07 |
| FILLMORE | CN | F07-08-226 | | SSA-07 | 43.0 | 08/07/07 |
| FILLMORE | CN | F07-08-227 | F1 | NSA-03 | 13.0 | 08/07/07 |
| FILLMORE | CN | F07-08-228 | | NSA-03 | 26.0 | 08/07/07 |
| FILLMORE | CN | F07-08-229 | | NSA-03 | 38.0 | 08/07/07 |
| FILLMORE | CN | F07-08-230 | F2 | NSA-03 | 13.0 | 08/07/07 |
| FILLMORE | CN | F07-08-232 | | NSA-03 | 78.0 | 08/07/07 |
| FILLMORE | CN | F07-08-233 | | NSA-03 | 69.0 | 08/07/07 |
| FILLMORE | CN | F07-09-100 | | SSA-07 | 33.0 | 09/13/07 |
| FILLMORE | CN | F07-09-101 | | SSA-07 | 43.0 | 09/13/07 |
| FILLMORE | CN | F07-09-102 | | SSA-10 | 21.0 | 09/13/07 |
| FILLMORE | CN | F07-09-103 | | SSA-11 | 43.0 | 09/13/07 |