# PERCHLORATE GROUNDWATER INVESTIGATION REPORT, 30433 POPLAR STREET, BARSTOW, CALIFORNIA

*Prepared for*

Lahontan Regional Water Quality Control Board
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URS Project No. 29403643

Date: April 9, 2012

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April 9, 2012

Mr. Tim E. Post
Regional Water Quality Control Board – Lahontan Region
14440 Civic Drive, Suite 200
Victorville, CA 92392-9509

**Subject:** **Transmittal of "Perchlorate Groundwater Investigation Report, 30433 Poplar Street, Barstow, California**

Dear Mr. Post,

Please find enclosed the Perchlorate Groundwater Investigation Report, 30433 Poplar Street, Barstow, California. The report was prepared to describe groundwater sampling activities conducted at the above mentioned site from December 12 through 21, 2011.

If you have questions or require clarification, please do not hesitate to contact the undersigned at (213) 996-2200.

Sincerely,

**URS Corporation**

Roberto Piñón, P.Eng., P.E.
Senior Engineer
Certified URS Project Manager

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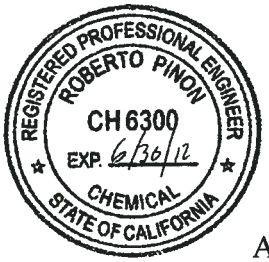
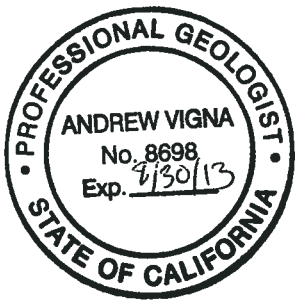
# PERCHLORATE GROUNDWATER INVESTIGATION REPORT, 30433 POPLAR STREET, BARSTOW, CALIFORNIA

This Perchlorate Groundwater Investigation Report, 30433 Poplar Street, Barstow, California was prepared by URS Corporation on behalf of the Lahontan Regional Water Quality Control Board in a manner consistent with the level of care and skill ordinarily exercised by professional engineers, geologists, and environmental scientists.

**URS Corporation**

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## Table of Contents



## List of Tables

## List of Figures



## List of Appendices

## List of Abbreviations

| | |
|---|---|
| BC2 | BC2 Environmental |
| Calscience | Calscience Environmental Laboratories |
| CDPH | California Department of Public Health |
| $ClO4^-$ | Perchlorate |
| $Cl^-$ | Chloride |
| DOD | Department of Defense |
| DOT | Department of Transportation |
| EPA | United States Environmental Protection Agency |
| $ft^2/ft^3$ | Square feet per cubic foot. |
| GPS | Global Positioning System |
| HASP | Health and Safety Plan |
| IDW | Investigation Derived Waste |
| LRWQCB | Lahontan Regional Water Quality Control Board |
| MCL | Maximum Contaminant Limit |
| mL | Milliliter |
| mg/kg | Milligrams per Kilogram |
| mg/L | Milligrams per Liter |
| NA | Not Analyzed |
| ND | Not detected above laboratory reporting limits |
| NPDES | National Pollutant Discharge Elimination System |
| OEHHA | Environmental Health Hazard Assessment |
| $OH^-$ | Hydroxide |
| PHG | Public Heath Goal |
| QA/QC | Quality Assurance/Quality Control |
| TPH | Total Petroleum Hydrocarbons |
| VOCs | Volatile Organic Compounds |
| URS | URS Corporation |
| USA | Underground Service Alert |
| USCS | Unified Soil Classification System |
| USGS | United States Geological Survey |
| µg/kg | Micrograms per Kilogram |
| µg/L | Micrograms per Liter |

# 1.0 INTRODUCTION

URS Corporation (URS) prepared this Perchlorate Groundwater Investigation Report, 30433 Poplar Street, Barstow, California on behalf of the Lahontan Regional Water Quality Control Board (LRWQCB) to document the groundwater sampling activities performed to delineate a plume of perchlorate in groundwater. The perchlorate plume is located in the area hydraulically downgradient of a residential property located at 30433 Poplar Street in Barstow, California (the Site) and extends approximately 1.25 miles south-southeast (the investigation area).

Groundwater sampling activities were performed from December 9 through December 21, 2011. The purpose of the groundwater investigation was to collect groundwater samples, confirm the suspected presence of perchlorate in groundwater, delineate the lateral extent of the plume, and estimate the direction of the plume migration.

Soil lithology data were collected during drilling activities to provide additional information about the subsurface hydrogeologic conditions within the investigation area and impacted groundwater.

# 2.0 BACKGROUND

The following sections provide a background on perchlorate, the Site location, and Site history including regional geology and hydrogeology.

## 2.1 PERCHLORATE

Perchlorate is a known thyroid gland disruptor and its concentration in soil and groundwater is regulated. Its maximum contaminant limit (MCL) in the State of California is six micrograms per liter (µg/L). In January 2011, the Office of Environmental Health Hazard Assessment (OEHHA) proposed a one µg/L public heath goal (PHG) for perchlorate in drinking water.

In the United States, soil and groundwater at several properties have been impacted with perchlorate. Historical releases of perchlorate to the environment have resulted from the perchlorate manufacturing process, and the manufacture of perchlorate-containing products which includes matches, fireworks, flares and perchlorate containing waste associated with these products. Perchlorate was also used to manufacture and test ordnance, explosives, and solid rocket-fuel propulsion based systems.

Solid perchlorate is used as an oxidant since it decomposes exothermically to produce oxygen; however, the perchlorate molecule is very stable in solution as a result of its chemical structure which consists of a chlorine molecule encased in four oxygen molecules. When perchlorate impacts groundwater, it is stable, and generally will not be reduced.

Perchlorate in groundwater may be difficult to contain since it is stable and very soluble. This causes perchlorate to disperse quickly when compared to other chemicals of concern such as petroleum hydrocarbons.

## 2.2 LOCATION

The Site is a five-acre parcel located at 30433 Poplar Street (Figure 1). The Site is within the Mojave Desert Geomorphic Province, a broad interior region of isolated mountain ranges separated by expanses of desert in Southern California. The Site is immediately bounded to the north by Poplar Street, to the south by undeveloped land, and to the east and west by residential properties and undeveloped land (Figure 2). The source area of the perchlorate contamination is in the northwest portion of the Site.

The investigation area is bounded to the north by Poplar Street, to the south and west by the Mojave River, and to the east by residential properties, undeveloped parcels, and Soap Mine Road. The investigation area consists mostly of undeveloped land or former agricultural fields (Figure 2).

## 2.3 SITE HISTORY

The Site was the personal property of the owner of the former Mojave River Pyrotechnics Corporation. In the mid-1980s, the former Mojave River Pyrotechnics Corporation, located at 36131 Yucca Avenue in Barstow, California, was contracted by the U.S. Army to manufacture various fireworks devices to simulate battlefield explosions. Perchlorate ($ClO_4^-$) is a strong oxidizing agent that was used to manufacture these fireworks.

Suspected illegal disposal of perchlorate waste may have impacted soil at the Site, and soil sampling conducted at the property confirmed that the soil is impacted with perchlorate.

Water samples collected from two private and one public water supply well located downgradient of the Site reported concentrations of perchlorate exceeding the MCL. Since perchlorate is soluble in water, the LRWQCB and U.S. Environmental Protection Agency (EPA) suspected that perchlorate concentrations in groundwater may have resulted from unauthorized storage and disposal activities.

Since there are known groundwater impacts of perchlorate from the Site, the LRWQCB requested a groundwater investigation to delineate perchlorate in the area that extends from the source area to the east-southeast towards, and beyond the Golden State Water Company's Soap Mine Road water production well.

## 2.4 GEOLOGY AND HYDROGEOLOGY

The investigation area is located in the Mojave Groundwater Basin between the Mojave River to the southwest and the Mitchel mountains to the northeast and east. The Site and investigation areas are relatively flat lying with elevations above mean sea level ranging from 2,080 feet on the north side to 2,055 feet on the south side. The groundwater at the Site is mainly influenced by the sub-flow of the alluvial channel of the Mojave River, and an adjoining drainage channel extending from the Mojave River channel to south end of the Mitchel range. The distance from the north to south sides of the investigation area is approximately 1.5 miles.

Depth to groundwater is approximately 16 to 25 feet below grade surface (bgs), and the direction of groundwater flow is assumed to be sub-parallel to the Mojave River.

The Site is situated on alluvial fan deposits of the far-travelled Quaternary age alluvium of the Mojave River. The alluvium is relatively fine grained and compositionally homogeneous, and consists of sand and minor pebble gravel composed largely of granitic detritus. Most of the detritus probably originated far to the south in the western San Bernardino Mountains, where the headwaters of the Mojave River are located.

The river deposits are subdivided into deposits of low stream terraces with moderate plant cover and unvegetated deposits on the floor of the active river channel. The unvegetated sandy alluvium is periodically eroded and re-deposited by southwesterly winds, resulting in a nearly continuous narrow belt of sand dunes along the north side of the active river channel.

# 3.0 PRE-FIELD ACTIVITIES

Pre-field activities for this project included initial coordination meetings, preparation of a work plan technical memorandum, preparation of a health and safety plan, utility clearances, and property access agreements. These activities are summarized in the following sections.

## 3.1 INITIAL COORDINATION MEETING

A project kickoff conference call was held on November 8, 2011. Activities associated with pre-field work included the following: proposing a technical approach and investigation strategy, determining site-specific data quality objectives, determining the requirements for handling and transportation of samples and investigation-derived waste (IDW), defining project quality assurance/quality control (QA/QC) requirements, establishing health and safety requirements to prepare a health and safety plan, and performing a Site walk to discuss access issues.

## 3.2 WORK PLAN TECHNICAL MEMORANDUM

A work plan technical memorandum was submitted to the LRWQCB on November 17, 2011 describing the installation of 22 discrete groundwater sampling locations designated TW-1 through TW-22, describing site-specific data quality objectives, determining the requirements for handling and transportation of samples, handling of IDW, and defining project QA/QC requirements. Adjustments to the work plan were made based on access agreements, access limitations of the drilling equipment, conflicts with utility alignments including a high pressure gas pipeline within the investigation area, and rush analytical results obtained from the first sampling locations. The sampling locations, the property boundaries, and known utility alignments are illustrated in Figure 2.

## 3.3 HEALTH AND SAFETY PLAN

The site-specific Health and Safety Plan (HASP) was prepared based on physical and chemical hazards associated with the field tasks described in the work plan; described requirements for personal protective equipment; directions and route to the nearest occupational clinic and hospital; job safety analyses and safety management standards. The HASP was prepared in accordance with federal and state regulations, and URS' health and safety policies and procedures (which include a description of daily tailgate meetings). Copies of the HASP were available with the driller and with the Site Health and Safety Officer (generally a URS staff member) during on-site activities. The HASP for this project was distributed to the LRWQCB and subcontractors on November 29, 2011.

## 3.4 QUALITY ASSURANCE AND QUALITY CONTROL

All samples were collected with decontaminated and non-disposable sampling equipment between all sampling locations. For QA/QC purposes, duplicate samples and equipment blanks were collected and analyzed using EPA Methods 314.0 and 331.0. All Samples were transported under chain-of-custody to the laboratory. For additional information on QA/QC procedures see Section 4.4.

## 3.5 UTILITY CLEARANCE PROCEDURES

A geophysical survey was conducted by Pacific Coast Locators on December 1, 2011, to clear sampling locations TW-1 through TW-19 of utilities and other hazardous underground obstacles prior to initiating subsurface investigation activities. The geophysical survey was conducted to identify the possible presence of subsurface utility lines. The sampling locations at the Site were marked with white paint and stakes as required by Underground Service Alert (USA).

USA was contacted on December 6, 2011 (Ticket A13400502), more than 48 hours prior to commencing groundwater investigation field activities. USA contacted utility owners within the investigation area. Three of the utility owners requested a meeting on-site prior to commencing drilling activities on December 12, 2011. URS met with representatives from El Paso Gas, PG&E, and the Mojave Water Agency. The three utilities have large transmission lines that transect the investigation area. Sampling locations TW-3, TW-4, TW-10, TW-13, TW-17, TW-20, TW-21, and TW-22 were closest to the transmission pipelines and each representative visited these locations. Each utility was clearly marked adjacent to these sampling locations with either paint or flagging. As a final precaution, a hand auger was be used to clear the boring locations to a depth seven feet bgs to verify the presence or absence of buried underground utilities.

## 3.6 PERMITS AND ACCESS AGREEMENTS

The LRWQCB contacted the County of San Bernardino Department of Environmental Health (the County) to determine if groundwater well installation permits were required for the project. Staff at the County indicated to the LRWQCB that groundwater well installation permits were not required for this project based on a detailed description of the groundwater sampling activities. Instead of constructing permanent groundwater monitoring wells, exploration holes (uncased temporary excavations for the immediate determination of hydrologic conditions) were used; therefore, well permits were not required.

The LRWQCB obtained written access agreements from the various property owners prior to entering private property within the investigation area.

# 4.0 GROUNDWATER INVESTIGATON

Groundwater sampling activities were conducted from December 9 through December 21, 2011. Field activities were concluded January 18, 2012, when the drums containing IDW were collected and transported off-site for disposal (see Section 4.6 for specifics concerning waste characterization and disposal location). This section summarizes the groundwater sampling locations, depth to groundwater, and field drilling and sampling activities.

## 4.1 GROUNDWATER SAMPLING LOCATIONS

Groundwater sampling locations were selected based on an array of transects cutting across the assumed trend of the groundwater plume, extending approximately 1.25 miles south-southeast from the Site. Sample location density was highest in the parcels to the area immediately southeast of the Site. Sampling locations were generally lined up in rows (transects) perpendicular to the trend of the groundwater flow direction. The location of these transects was based on assumed groundwater flow direction, available groundwater quality analytical results from private residential wells, and access constraints.

The alignment of the sampling location transects was generally in a northeast-southwest trend as illustrated on Figure 2. Sampling locations TW-1 through TW-3, and TW-20 were in the first transect southeast of the source area; the second transect included sampling locations TW-4 through TW-7, and TW-10; the third transect included sampling locations TW-11 through TW-15; in the fourth transect included TW-8 through TW-9; and TW-16 through TW-19 in the fifth transect.

Sampling locations TW-21 and TW-22 were not located within a transect. Rather, they were located based on initial groundwater analytical data associated with sampling locations TW-1 through TW-20

Global Positioning System (GPS) coordinates of each sampling location are noted in the following table:

**Table 1 – Groundwater Sampling Locations**

| Sample Location | Latitude | Longitude |
|---|---|---|
| TW-1 | N34º 54.763’ | W116º 59.796’ |
| TW-2 | N34º 54.729’ | W116º 59.807’ |
| TW-3 | N34º 54.693’ | W116º 59.852’ |
| TW-4 | N34º 54.610’ | W116º 59.740’ |
| TW-5 | N34º 54.630’ | W116º 59.700’ |
| TW-6* | N34º 54.679’ | W116º 59.694’ |
| TW-7 | N34º 54.707’ | W116º 59.655’ |
| TW-8* | N34º 54.678’ | W116º 59.567’ |
| TW-9 | N34º 54.584’ | W116º 59.616’ |
| TW-10 | N34º 54.544’ | W116º 59.651’ |
| TW-11 | N34º 54.295’ | W116º 59.678’ |
| TW-12 | N34º 54.350’ | W116º 59.610’ |
| TW-13 | N34º 54.390’ | W116º 59.553’ |

| Sample Location | Latitude | Longitude |
|---|---|---|
| TW-14 | N34º 54.432’ | W116º 59.517’ |
| TW-15 | N34º 54.477’ | W116º 59.385’ |
| TW-16* | N34º 54.158’ | W116º 59.343’ |
| TW-17 | N34º 54.075’ | W116º 59.371’ |
| TW-18 | N34º 54.031’ | W116º 59.439’ |
| TW-19 | N34º 54.913’ | W116º 59.489’ |
| TW-20* | N34º 54.658’ | W116º 59.861’ |
| TW-21* | N34º 54.222’ | W116º 59.422’ |
| TW-22* | N34º 53.900’ | W116º 59.164’ |
| MW-25** | N34º 49.989’ | W116º 59.430’ |

Notes:

GPS locations are approximate

* TW-6, TW-8, TW-16, and TW-20 through TW-22 were measured indirectly in the field with compass and tape measure relative to previous GPS locations or fixed points in the field.

** Existing groundwater monitoring well included for reference.

## 4.2 GROUNDWATER SAMPLING DEPTHS

Groundwater samples were collected within the first encountered groundwater, in the upper five feet below the potentiometric surface (water table). The depths to groundwater ranged from approximately 16 to 25 feet bgs across the investigation area. Depths to first encountered groundwater and elevations at the time of sample collection are summarized in Table 3.

## 4.3 DRILLING ACTIVITIES

Groundwater sampling locations were drilled under the supervision of a California Registered Professional Geologist who recorded visual observations of soil and water and performed soil logging in accordance with the Unified Soil Classification System (USCS). BC2 Environmental (BC2) was subcontracted to drill and collect groundwater samples at the 22 sampling locations. BC2 initially mobilized a hollow-stem auger and later mobilized a Geoprobe® rig due to difficult terrain conditions caused by very loose sandy soils and hummocky terrain.

The following is a description of drilling activities performed within the investigation area:

- Soil Borings – The borings were drilled using a combination of hollow-stem auger and direct push methods to a maximum depth of 30 feet bgs. These borings were advanced to depths below water table ranging from 2.19 to 8.58 feet. The upper seven feet of each boring location was drilled using a hand auger to safely clear unidentified subsurface utilities, followed by either a truck-mounted 8- inch hollow-stem auger or direct push drill rig. Sampling locations TW-1 through TW-8, and TW-10 through TW-19 were drilled using a CME-85 rig with and 8 inch hollow stem augers. Sampling locations TW-9 and TW-20 through TW-22 were drilled using a Geoprobe® 7820DT track-mounted limited access drill rig.

- Soil Characterization – Eight groundwater sampling locations, TW-3, TW-4, TW-7, TW-10, TW-13, TW-19, TW-20, and TW-22, were logged for soil characterization purposes using the USCS. A cross-section with the Site lithology is shown in Figure 3. Boring logs

with lithologic descriptions and observations encountered during drilling activities are included in Appendix A.

- PVC Casing and Screens – Once the water table was encountered, the borehole was advanced approximately five feet below the static water table. A temporary casing consisting of 2 inch PVC riser pipe with a five foot screen at the bottom, was lowered down the auger flights. The five-foot screen was factory slotted PVC (2 inch diameter casing with 0.020 inch-wide slots). The casing was covered with a 250 micron filter sock. Once the temporary riser and screen were set in the borehole, the augers were lifted up to facilitate the flow of groundwater in to the temporary well screen.

- Groundwater Level Measurement – The groundwater level was allowed to equilibrate for at least 15 minutes after the casing was lowered into the boring. This also allowed the suspended solids in the water to settle. Depths to groundwater were measured using a Solinst® 101 P2 water level meter. Groundwater depths varied from 24 to 25 feet bgs in the northwest portion of the investigation area, and 16 to 18 feet bgs in the southeast portion of the investigation area.

- Borehole Abandonment – Boreholes drilled within the investigation area as part of this project were abandoned shortly after groundwater samples were collected and before the drill rig moved off the drilling location. Sampling locations TW-1 through TW-8, and TW-10 through TW-19 were each abandoned using two sacks of cement/bentonite slurry seal for the entire length of the borehole. Wells TW-8, TW-20, TW-21, and TW-22 were abandoned using hydrated No. 3 bentonite chips.

- Investigation-Derived Waste – Soil cuttings and decontamination water were collected as IDW, placed into Department of Transportation (DOT) approved 55 gallon drums, and stored within a designated drum staging area.

A photo log of field activities is included in Appendix B, and the field notes are included in Appendix C.

## 4.4 GROUNDWATER SAMPLING AND ANALYSIS

The following is a description of the groundwater sampling activities conducted within the investigation area:

- Groundwater Sample Collection – Disposable bailers were used to collect groundwater from within the PVC screen. Discrete groundwater samples (i.e., no purge) were transferred from the bailers to either a 125 milliliter (mL) or 100 mL high-density polyethylene bottle depending on the volumes required by the analysis specified (EPA Methods 314.0 or 331.0, respectively). Sample containers were appropriately labeled and preserved in accordance with the QA/QC Plan.

- Sample Preservation and Transportation – Samples were placed on ice in a cooler and transported under chain-of-custody to Calscience Environmental Laboratories (Calscience) in Garden Grove, California. The samples collected during the first days of

sampling were analyzed using a same day or one day rush turnaround time to help guide future sample location decisions.

- Sample Analysis – Samples were analyzed for perchlorate utilizing EPA Method 314.0 (a chromatographic method), which has a detection limit of 2.0 µg/L. For quality control and confirmation of perchlorate detections, samples TW-5, TW-13, and TW-17 were analyzed for perchlorate using EPA Method 331.0 (a mass spectrometer method), which has a detection limit less than 0.1 µg/L.

- Equipment Blanks – Non-disposable field sampling equipment was decontaminated prior to mobilization to the next sampling location. Equipment blank water samples were collected at the end of each sampling day after equipment decontamination. Deionized laboratory grade water provided by the analytical laboratory was poured over equipment that had been used down-hole and collected for analysis. Equipment blank water samples were analyzed for perchlorate using EPA Method 331.0. Equipment blanks were labeled as "EB-" and the date of collection.

Laboratory reports and a data validation report are included in Appendix D.

## 4.5 WASTE STORAGE

A total of 27 drums of soil and one drum of decontamination water were generated as IDW during the groundwater investigation. The drums were labeled "Non-Hazardous" with the generator's information, and staged in the drum staging area located at the southernmost end of Shady Lane prior.

Decontamination water was collected from the 55 gallon drum following decontamination from the sampling locations with highest impact. The contents of each drum were documented in the field notes (Appendix C).

## 4.6 WASTE PROFILING AND DISPOSAL

Representative samples of IDW soil and decontamination water were collected and submitted to Calscience for waste profile analysis. The soil sample was collected in an eight ounce glass jar and three 5 gram Encore® samples. The samples were analyzed for total petroleum hydrocarbons (TPH) carbon chain C6 through C44 using EPA Method 8015B (M), volatile organic compounds (VOCs) using EPA Method 8260B/5035, and Title 22 metals by EPA Method 6010B/7471A.

The IDW water was collected within laboratory preserved 40 ml VOA vials, an amber bottle, and a polyethylene bottle. IDW soil was analyzed for TPH carbon chain C6 through C44 using EPA Method 8015B, VOCs using EPA Method 8260B/5035, and Title 22 metals using EPA Method 6010/7471A.

Waste profiling results are summarized in Table 2 and laboratory analytical reports are included in Appendix D.

**Table 2 – Summary of IDW Characterization Analysis**

| Sample ID | Date Collected | Perchlorate Concentration (µg/L)<br><br>EPA Method 314.0 | TPH Carbon Chain (mg/kg- soil) (µg/L - water)<br><br>EPA Method 8015B (M) | VOCs (µg/kg- soil) (µg/L - water)<br><br>EPA Method 8260B/5035 | Title 22 Metals (mg/kg- soil) (mg/L - water)<br><br>EPA Method 6010B/ 7470A |
|---|---|---|---|---|---|
| TW-3 Soil | 12/12/2011 | NA | ND | ND | As = 0.758<br>Ba = 17.6<br>Cr = 2.03<br>Co = 1.40<br>Cu = 1.57<br>Pb = 0.732<br>Ni = 1.25<br>V = 7.20<br>Zn = 7.96 |
| Decon Water | 12/20/2011 | 120 | 100 | 1.3 (ethylbenzene)<br>22 (acetone) | Ba = 0.0131<br>Cr = 0.0166<br>Mo = 0.0197<br>V = 0.0482<br>Zn = 0.0173 |

Notes: TPH = total petroleum hydrocarbons
VOCs = volatile organic compounds
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
mg/L = milligrams per liter
NA = not analyzed
ND = not detected above laboratory reporting limits
Ar, Ba, Cr, Co, Cu, Mo, Pb, Ni, V, Zn = atomic symbols for the elements arsenic, barium, chromium, cobalt, copper, molybdenum, lead, nickel, vanadium, and zinc, respectively.

Transportation and disposal of the IDW to a treatment and disposal facility occurred on January 18, 2012. One drum of wastewater and 27 drums of waste soil were transported and disposed as non-hazardous waste at Crosby & Overton located at 1630 West 16th Street, Long Beach, California. Waste manifests are included in Appendix E.

# 5.0 GROUNDWATER DATA

This section describes the site-specific hydrogeology, the perchlorate concentrations in groundwater, and summarizes the groundwater monitoring data collected during the Site investigation.

## 5.1 SITE-SPECIFIC HYDROGEOLOGY

Groundwater was encountered within Quaternary-age (recent) alluvium at the investigation area at depths ranging from approximately 16.42 to 25.50 feet bgs. The alluvial materials are composed of poorly-graded, fine to coarse-grained mixtures of clays, silts, and sands,

The deepest groundwater was located at the northern portion of the investigation area, and gradually decreased towards the southeast. Assumed groundwater gradient direction at the Site is approximately south-southeast (Figure 4); however, the groundwater flow direction was estimated based on limited gauging data collected as part of this project and was not estimated using data from permanent groundwater monitoring wells.

Groundwater velocities in the Mojave River channel deposits have been documented in previous studies at a rate of 1.0 to 1.5 feet per day (United States Geological Survey [USGS], 1975). These rates are validated by the apparent evolution of the perchlorate-impacted groundwater with respect to the distance from the source property to the furthest extent of the known perchlorate-impacted groundwater, the time in which perchlorate was allegedly released into the environment, and the fact that dissolved perchlorate travels at the same rate as groundwater velocity (Department of Defense [DOD], 2007).Depths to groundwater measurements were converted to elevations with the use of the USGS Nebo Quadrangle Topographic Map (USGS, 1953). The groundwater elevation contour map with the gradient and groundwater flow direction are included in Figure 4.

## 5.2 PERCHLORATE CONCENTRATIONS IN GROUNDWATER

Perchlorate was detected in 12 of the 22 groundwater samples collected within the investigation area. Detectable concentrations of perchlorate ranged from 4.5 to 13,000µg/L. The perchlorate-impacted groundwater appears to be highest near the Site and gradually decrease toward the southeast. The perchlorate in groundwater forms a narrow plume with an approximate width ranging from 1,300 feet on the north portion of the investigation area to approximately 700 feet on the south portion. The perchlorate iso-concentration contour maps showing the sampling locations and perchlorate concentrations is included in Figure 5 and Figure 6.

## 5.3 SUMMARY OF GROUNDWATER MONITORING DATA

The results of the laboratory analytical report with regards to dissolved perchlorate concentrations in the groundwater are summarized in Table 3.

**Table 3 –Groundwater Elevations and Perchlorate Concentrations**

| Sample ID | Date Collected | Depth to Groundwater (feet) | Approximate Ground Surface Elevation 1 (feet +/- msl) | Approximate Groundwater Elevation (ft +/- msl) | Perchlorate Concentration (µg/L) EPA Method 314.0 | Perchlorate Concentration (µg/L) EPA Method 331.0 |
|---|---|---|---|---|---|---|
| TW-1 | 12/13/2011 | 24.30 | 2078.4 | 2054.1 | **61** | NA |
| TW-2 | 12/15/2011 | 24.30 | 2078.7 | 2054.4 | **13,000** | NA |
| TW-3 | 12/12/2011 | 25.50 | 2079.0 | 2053.5 | **1,000** | NA |
| TW-4 | 12/13/2011 | 22.10 | 2077.3 | 2055.2 | **51** | NA |
| TW-5 | 12/13/2011 | 23.80 | 2075.7 | 2051.9 | **35** | **30** |
| TW-6 | 12/15/2011 | 23.60 | 2076.2 | 2052.6 | **9,700** | NA |
| TW-7 | 12/15/2011 | 22.45 | 2076.7 | 2054.3 | **36** | NA |
| TW-8 | 12/15/2011 | 22.15 | 2073.0 | 2050.9 | ND (< 2.0) | NA |
| TW-9 | 12/21/2011 | 24.55 | 2072.6 | 2048.1 | **5,600** | NA |
| TW-10 | 12/14/2011 | 21.85 | 2074.4 | 2052.6 | ND (< 2.0) | NA |
| TW-11 | 12/14/2011 | 21.97 | 2071.0 | 2049.0 | ND (< 2.0) | NA |
| TW-12 | 12/14/2011 | 20.95 | 2071.0 | 2050.1 | ND (< 2.0) | NA |
| TW-13 | 12/14/2011 | 22.40 | 2072.0 | 2049.6 | **13** | NA |
| TW-14 | 12/14/2011 | 21.85 | 2070.0 | 2048.2 | ND (< 2.0) | NA |
| TW-15 | 12/16/2011 | 22.81 | 2080.0 | 2057.2 | ND (< 2.0) | NA |
| TW-16 | 12/16/2011 | 16.42 | 2062.1 | 2045.7 | ND (< 2.0) | NA |
| TW-17 | 12/15/2011 | 18.05 | 2061.0 | 2043.0 | **4.5** | **7.4** |
| TW-18 | 12/16/2011 | 16.75 | 2062.5 | 2045.8 | ND (< 2.0) | NA |
| TW-19 | 12/16/2011 | 18.40 | 2063.0 | 2044.6 | ND (< 2.0) | NA |
| TW-20 | 12/21/2011 | 24.05 | 2078.5 | 2054.5 | ND (< 2.0) | NA |
| TW-21 | 12/21/2011 | 18.10 | 2064.7 | 2046.6 | **13** | NA |
| TW-22 | 12/21/2011 | 16.52 | 2054.6 | 2038.1 | **8.0** | NA |

Notes: [1] = from Nebo Quadrangle, California-San Bernardino Co., 7.5 minute series (topographic), USGS, 1953
MSL = mean sea level
EPA Methods 314.0 and 331.0 both analyze water for dissolved perchlorate concentrations and have reporting limits of 2.0 and 0.1 µg/l, respectively.
µg/L = micrograms per liter
NA = not analyzed by Method 331.0
ND = not detected above laboratory reporting limits

Results of the analysis of IDW are summarized in Table 2.

# 6.0 PERCHLORATE ABATEMENT OPTIONS

Currently, there are no widely used in-situ technologies for the remediation of perchlorate-impacted groundwater. Pilot testing of in-situ remediation technologies includes groundwater extraction, treatment to remove perchlorate, amendment with acetate (or other designated "electron-donors") plus nutrients, and reinjection into the subsurface. Most in-situ technologies are designed to reduce perchlorate through a biochemical reduction process which is designed to occur in the groundwater. Other alternative amendments used in pilot tests include ethanol, citrate, and vegetable oil. Other pilot test designs include barriers of molasses, cotton seed, and other carbon sources. The effectiveness of in-situ remediation of perchlorate will largely depend on site-specific conditions, and pilot testing is normally recommended prior to full-scale implementation.

Remediation of the Site at this time may be limited to pump and treat alternatives. Groundwater extraction systems will require an arrangement and a design based on existing groundwater conditions. The remediation system's groundwater extraction wells and configuration should be designed to hydraulically contain perchlorate. Once perchlorate-impacted groundwater is extracted from the subsurface, a groundwater treatment system will be required to remove perchlorate prior to disposal or reuse.

Based on URS' experience, ion exchange systems and anoxic filters are considered proven technologies that are cost effective in the treatment of water impacted with perchlorate. Other technologies such as reverse osmosis systems are not discussed, as these are separation technologies that generate high concentration waste streams which require further treatment and disposal.

## 6.1 ION EXCHANGE SYSTEMS

Ion exchange is a process in which ions of a species are displaced from an insoluble exchange material (ion exchange resin) by ions of a different species in water (target ions). The removal of target ions is achieved through commercially available ion exchange resins. Anion exchange resins exchange target anions for chloride ($Cl^-$) or hydroxide ($OH^-$), and cation exchange resins exchange cations for sodium ($Na^+$) or hydrogen ($H^+$) ions depending on the functional groups. The functional group used for removal of perchlorate is the quaternary amine functional group (-$N(R)_3^+$)

$$\text{Resin}\text{–}N(R)_3\ \text{Cl} + ClO_4^- \leftrightarrow \text{Resin}\text{–}N(R)_3\ ClO_4\ + Cl^-$$

Ion exchange resins are comprised of small polymer beads with a large surface area per unit of volume (units in $ft^2/ft^3$) where ion exchange takes place. The resin is placed in vessels, and water is pumped through the resin until the resin's ion exchange capacity is exhausted. To remove solids and restore the resin ion exchange capacity, the resin may be either replaced or backwashed with a prepared solution of salt, acid, or sodium hydroxide solution. If a backwash system is used, a backwash solution is prepared based on the resin specifications.

Commercially available anion exchange resins designed to remove perchlorate include the following strong base anion resins: DOWEX$^{TM}$1, and DOWEX$^{TM}$ PSR-2 which exchange chloride ions ($Cl^-$) for perchlorate. Other anions removed by these resins include nitrates, hexavalent chromium, and uranium.

- Disadvantages – When ion exchange systems are equipped with backwash systems a waste brine containing the target ions is generated. The brine generally requires additional treatment prior to discharge or transportation to a disposal facility. Ion exchange systems which are not equipped with regeneration systems are simple to install and operate; however, since the resin is not regenerated it requires replacement and the process may generate large amounts of spent ion exchange resin which requires off-site disposal as solid waste. According to the equipment suppliers, an ion exchange regeneration system is not recommended while using DOWEX™1, and DOWEX™ PSR-2, and solid waste disposal or incineration of the resin is recommended.
- Advantages – Ion exchange systems are proven technology in the removal of many inorganic substances, and have a proven their effectiveness in the removal of perchlorate from water to very low target concentrations (drinking water levels). Several ion exchange resins have been permitted for use in drinking water applications. Ion exchange vessels can be quickly installed at a site and serviced, which make them suitable for emergency remediation operations. If adequately designed, ion exchange systems may perform under varying process conditions including variations in water chemistry and flows.

Ion exchange system selection, design, and specification will depend on water chemistry, flows, initial concentrations, and target concentrations. An initial assessment is required to determine if ion exchange is economically feasible based on water chemistry and treatment requirements.

Ion exchange systems may be most cost-effective in remediation of perchlorate-impacted groundwater when remediation projects are expected to be short term, and where low capital costs are required. Ion exchange systems available from several ion exchange system suppliers.

The above mentioned ion exchange resins are California Department of Public Health (CDPH) approved for drinking water applications.

## 6.2 ANOXIC FILTERS

Biological treatment is used in a wide range of water and wastewater treatment applications for the removal of biodegradable constituents. The biological treatment process has been demonstrated to chemically reduce perchlorate, nitrates, hexavalent chromium in water through the use of anoxic filters which have been implemented as fluidized bed, packed bed, and membrane anoxic digesters.

Perchlorate can be reduced biologically through microorganisms that use an electron donor (such as methanol, acetic acid, ammonia, or hydrogen) and a compound such as perchlorate as an electron acceptor. The electron donor and the electron acceptor are metabolized by the microorganisms to generate energy for growth and reproduction. The microbial metabolism will generate byproducts, of which the most common are carbon dioxide and water. In the biological reduction process used for the treatment of nitrate and perchlorate, the nitrates are reduced to nitrogen gas $N_2$, and perchlorates are reduced to a chloride ion ($Cl^-$).

Nitrate reduction is catalyzed by microorganisms (denitrification) through the following equation:

$$5CH_3\ COOH + 8NO_3^- \xrightarrow{Microorganisms} 4N_2\ + 10CO_2\ + 6H_2O + 8OH^-$$

Perchlorate reduction catalyzed by microorganisms through the following equation:

$$5CH_3\ COOH + 8ClO_4^- \xrightarrow{Microorganisms} 8Cl^-\ + 14CO_2\ + 10H_2O + 8OH^-$$

The effective operation of the anoxic filter process requires adequate control of treatment system conditions (e.g., dissolved oxygen concentration, temperature, and nutrient availability). The adequate treatment conditions allow the reactor to select for microorganisms that perform the required reactions.

- Disadvantages – Anoxic filters require the construction of biodigesters that control groundwater treatment conditions. The capital costs associated with the construction of biodigesters may be higher than other treatment systems. The treatment system may require longer startup periods to establish the presence of perchlorate reducing microorganisms. The technology is subject to biological water treatment limitations, and its performance may be affected after extended system shutdowns or sudden increases in contaminants.
- Advantages – Anoxic filters do not generate brine and are a proven technology used in the removal of many inorganic substances. They have a proven effectiveness in water applications for the reduction of perchlorate to very low target concentrations. Perchlorate system selection, design, and specification will depend on the water chemistry, flows, initial concentrations, and target concentrations. Anoxic filters may offer lower lifecycle costs (capital plus operation costs) in long-term water treatment applications because there are fewer wastes generated and requiring disposal.

Anoxic filters are available from two manufacturers which include Envirogen, and APT Water. Envirogen supplies anoxic filters using a fluidized bed reactor and methanol or acetate as an electron donor. APT Water's design uses hollow-membranes and hydrogen gas as an electron donor. Both vendors provide technologies that are CDPH approved, or are close to receiving CDPH approval for drinking water applications.

## 6.3 FEASIBILITY STUDY

To select the most cost effective solution for the treatment of perchlorate-impacted groundwater at the Site, a feasibility study should be conducted to evaluate the following:

- Hydraulic Containment – The groundwater extraction flow rates required to hydraulically contain the perchlorate plume and prevent lateral dispersion.
- Remediation Timeframes – The estimated timeframe required for groundwater extraction systems to abate and cleanup the perchlorate plume at the Site.
- Process Reliability and Uptime – The potential for operation interruptions caused by equipment malfunction, media replacement or regeneration, etc. and performance of the remediation processes under these conditions.
- Treated Water Disposal – Identify water disposal options including sewer, storm water, or drinking water systems (requires compliance with drinking water standards).

- Identify Permitting Requirements – Based on the water disposal options, identify permitting requirements associated with preferred disposal options (e.g., NPDES permitting, or sewer regulations), and permitting costs.

# 7.0 CONCLUSIONS

Based on groundwater sampling activities conducted at the Site and investigation areas, the following is concluded:

- Groundwater sampling performed within the investigation area confirmed the presence of perchlorate. Perchlorate was detected within the upper five feet of the saturated zone at 12 of the 22 sampling locations.
- Perchlorate concentrations ranged from non-detectable to 13,000µg/L at TW-2, located approximately 300 feet east of the source area. The lowest detectable concentration was 4.5µg/L at TW-17, located approximately one mile southeast of the Site.
- The remaining 10 samples did not contain concentrations greater than the laboratory reporting limit of 2.0 µg/L.
- The perchlorate-impacted groundwater plume tapers from a maximum width of approximately 1,300 feet on the north end to approximately 400 feet on the south end, and extends at least 1.25 miles southeast of the Site. The axis of the plume follows the same general direction of groundwater flow (south-southeast) which is roughly parallel to the Mojave River Channel. The perchlorate-impacted groundwater plume encompasses an estimated area of 98 acres.
- Lateral delineation of the perchlorate-impacted groundwater plume has been defined to non-detectable concentrations, with the exception of the area south-southeast of sampling location TW-22.
- The data collected during this groundwater investigation did not include groundwater sampling at varying depths below the water table. Therefore, a vertical delineation of the perchlorate plume was not assessed.

# 8.0 RECOMMENDATIONS

Based on the data and conclusions presented in this report, the following actions are recommended and arranged based on priority: (1) remove perchlorate-impacted soil and groundwater from the source; (2) finalize lateral delineation at the south southeast end of the plume, and vertically delineate the perchlorate plume at the Site near the source; (3) install permanent groundwater monitoring wells and initiate a groundwater monitoring program; (4) assess hydraulic capture requirements for the plume; and (5) conduct a feasibility study to select a technology for Site remediation by comparing technical and functional requirements, and estimating preliminary remediation costs.

## 8.1 SOURCE REMOVAL

High concentrations of perchlorate in the soil at the source will continue to impact groundwater with perchlorate. Source removal and control recommendations include the following:

- Excavation and Disposal – The most effective method to remediate a Site is through source removal in soil. Since source removal has not yet been implemented, the perchlorate in soil may continue to leach into the groundwater and disperse. Excavation and treatment (i.e., composting) or disposal of perchlorate-impacted soil, should be conducted as soon as possible to reduce the lifecycle remediation costs of groundwater remediation.

- Groundwater Pump and Treat at the Source –To reduce lifecycle remediation costs, groundwater removal at the source should be conducted as soon as possible to remove the perchlorate mass in groundwater prior its dispersion. Groundwater removal at the source could include extraction and off-site disposal for water with high concentrations of perchlorate, and extraction ion exchange treatment for lower concentrations.

Additional discussion of remediation efforts associated with pump-and-treat systems are described below.

## 8.2 PERCHLORATE PLUME DELINATION

Groundwater sampling activities were conducted to confirm the presence of perchlorate in groundwater. Based on the methods described in this report, the samples were collected approximately five feet below first encountered groundwater; therefore, vertical delineation of the perchlorate plume was not performed. Based on the groundwater characterization reports, the following is recommended:

- Lateral Delineation – The area south-southeast of TW-22 has not been fully characterized. Lateral delineation can be performed using a combination of sampling locations using a Geoprobe rig, installing groundwater monitoring wells, and using existing monitoring well and groundwater extraction well data from nearby wells.

- Vertical Delineation – Deeper groundwater monitoring wells in the vicinity of the Site (and source) are recommended to evaluate the vertical distribution of the perchlorate plume which includes the installation of paired wells.
- Lithological Investigation – During vertical delineation of perchlorate, soil lithology should be logged to determine if there are confining layers below the Site that may limit the vertical dispersion of the perchlorate plume.

The perchlorate plume delineation data should be used to design the groundwater monitoring program described below.

## 8.3 GROUNDWATER MONITORING

A groundwater monitoring program is recommended to evaluate plume dispersion and collect the groundwater monitoring data required to design a remediation system. A Sampling and Analysis Plan (SAP) is recommended and groundwater monitoring wells should be installed at the Site based on the following:

- Location of Wells – Groundwater monitoring wells should be installed to delineate the vertical and lateral extent of perchlorate concentrations in groundwater. The location of the wells should be selected to monitor the changes of perchlorate concentrations over time and accurately estimate groundwater gradient, flow velocity, and direction.
- Groundwater Sampling Schedule – A groundwater monitoring program should be developed to monitor water quality conditions and the effectiveness of remediation efforts conducted at the Site. The sampling schedule should be scheduled on a quarterly basis during the first year and semi-annually, thereafter, at a minimum.

## 8.4 HYDRAULIC CAPTURE OF PERCHLORATE-IMPACTED GROUNDWATER

The design of a hydraulic capture system requires adequate understanding of local hydrogeology and perchlorate dispersion through groundwater monitoring and hydrogeological parameter data (such as hydraulic conductivity, well efficiency, etc.). This information will be used to design the groundwater extraction well network to capture the perchlorate plume.

Prior to the design of a groundwater extraction system, groundwater monitoring and characterization data are used to establish the groundwater flows, and estimate the groundwater extraction requirements (e.g., number of wells, flow directions, and optimum locations of extraction/injection wells) to hydraulically contain the perchlorate at the Site.

## 8.5 FEASIBILITY STUDY

Once the hydraulic containment requirements are identified, a feasibility study is recommended to identify the most cost-effective groundwater treatment solution for Site remediation. A feasibility study should identify the following aspects:

- Technologies – Technologies suitable for the control of perchlorate in groundwater should be identified.
- Capital Costs – Capital costs include the design and construction of groundwater extraction wells, water conveying infrastructure including pumps and pipes, and startup of water treatment systems. Capital costs often include permitting costs.

- Annual Operation Costs – Annual operations costs include replacement costs, power, chemicals, operator and on-going permitting costs.
- Project Lifecycle Costs – Project lifecycle costs are estimated by adding the capital and the operation costs over the period of operation estimated to complete the project. A net present value analysis should be conducted to account for the benefit of deferring costs into the future.
- Required Footprint – The required footprint for each technology is identified to determine if there is a need to purchase real estate for system installation and operation.
- Utility Requirements – The utility requirements for each option is identified such as water, electricity, sewage, or gas.
- Technical Advantages – Technical advantages and drawbacks for each technology are identified in the feasibility study, including required uptime, and operation

Pilot testing costs are identified for technologies that are not considered proven.

# 9.0 LIMITATIONS AND EXCEPTIONS

The conclusions presented in this report are professional opinions based solely on indicated data described in this report, and our interpretation of the available information and documents reviewed as described in this report. The conclusions are intended exclusively for the purpose outlined herein and the Site location and project indicated.

It should be recognized that this study was not intended to be a definitive investigation of contamination at the Site. Given that the scope for this investigation was limited, it is possible that currently unrecognized contamination exists at the Site and surrounding areas.

Opinions and recommendations presented herein apply to the Site conditions existing during conduct of our work and cannot necessarily apply to Site changes of which URS is unaware and has not had the opportunity to evaluate. Changes in the conditions of this property may occur over time because of natural processes or the works of man on the Site or adjacent properties. Changes in applicable standards may also occur as a result of legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or in part, by changes beyond our control or other information becoming available.

# 10.0 REFERENCES

Department of Defense Environmental Data Quality Workgroup (DOD), 2007. *DOD Perchlorate Handbook*. August.

Hughes, Jerry L., 1975. *Evaluation of Ground-water Degradation Resulting from Waste Disposal to Alluvium Near Barstow, California*. USGS.

United States Department of the Interior Geologic Survey (USGS), 1953. Nebo Quadrangle, California- San Bernardino Co., NW/4 Daggett 15' Quadrangle, 7.5 minute series (topographic).

URS, 2011. *Work Plan to Perform Perchlorate Groundwater Investigation Near 30433 Poplar Street, Barstow, California*. November 29, 2011.

# FIGURES


SOURCE: Google Maps, 2011

N

0.0 0.5 1.0 miles

Approximate Scale

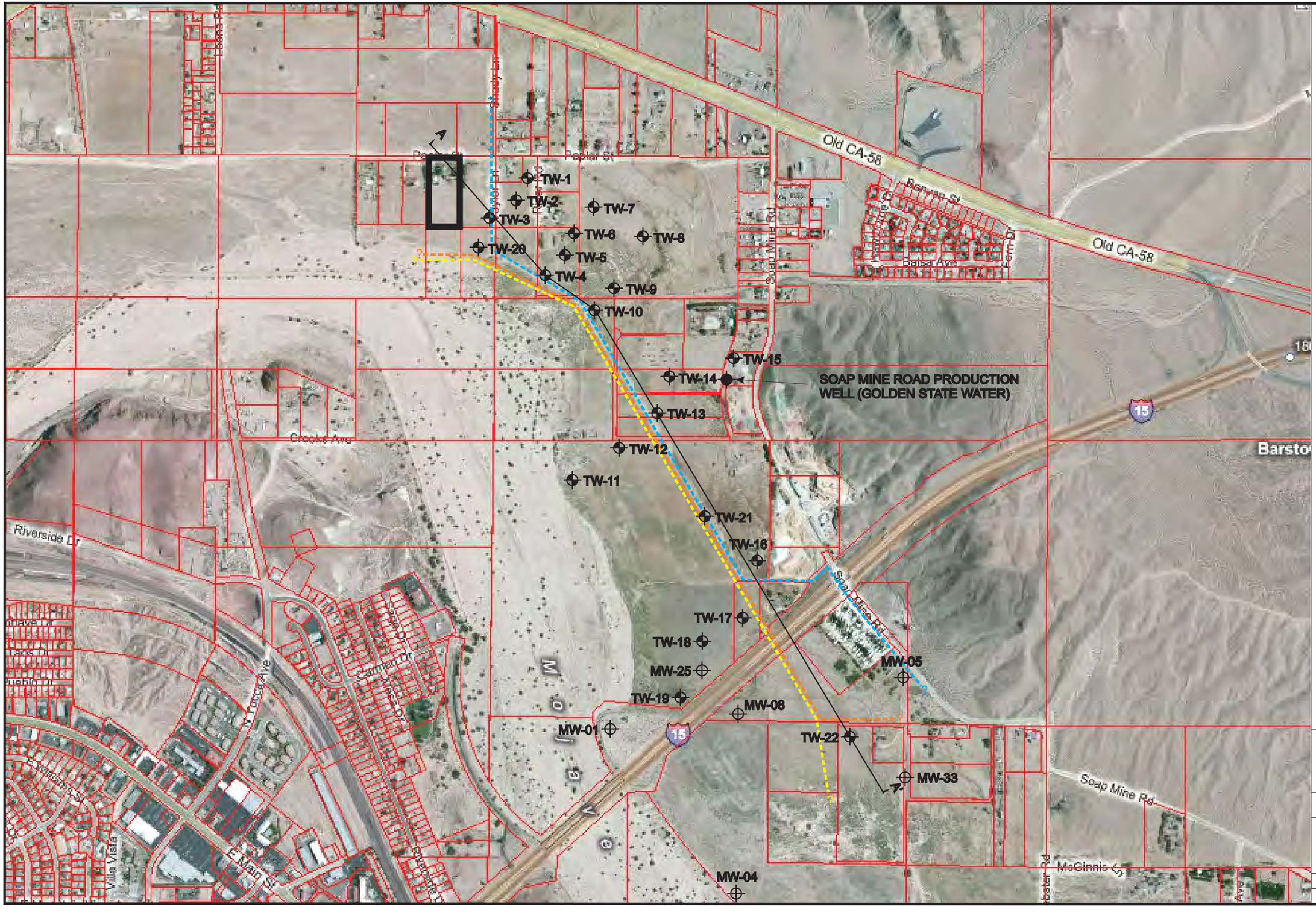
# SITE LOCATION MAP

December, 2011
Barstow, California

URS

URS Job No.: 29403643

**FIGURE 1**




## Legend

- Groundwater sample location and designation
- Existing groundwater monitoring well location and designation
- Existing municipal groundwater production well
- Cross Section Alignment
- Property boundary- 30433 Poplar Street
- Existing El Paso natural gas transmission pipeline (Mojave alignment)*
- Existing PG&E natural gas transmission pipeline
- Existing Mojave Water Agency transmission pipeline*

NOTES:

MW-01, MW-08, MW-04 MW-05, and MW-33 sampled quarterly beginning in 2011 by LARWQCB, with no Perchlorate detections.

* = Approximately Located

North

0 225 450 900

SCALE: 1"=900'

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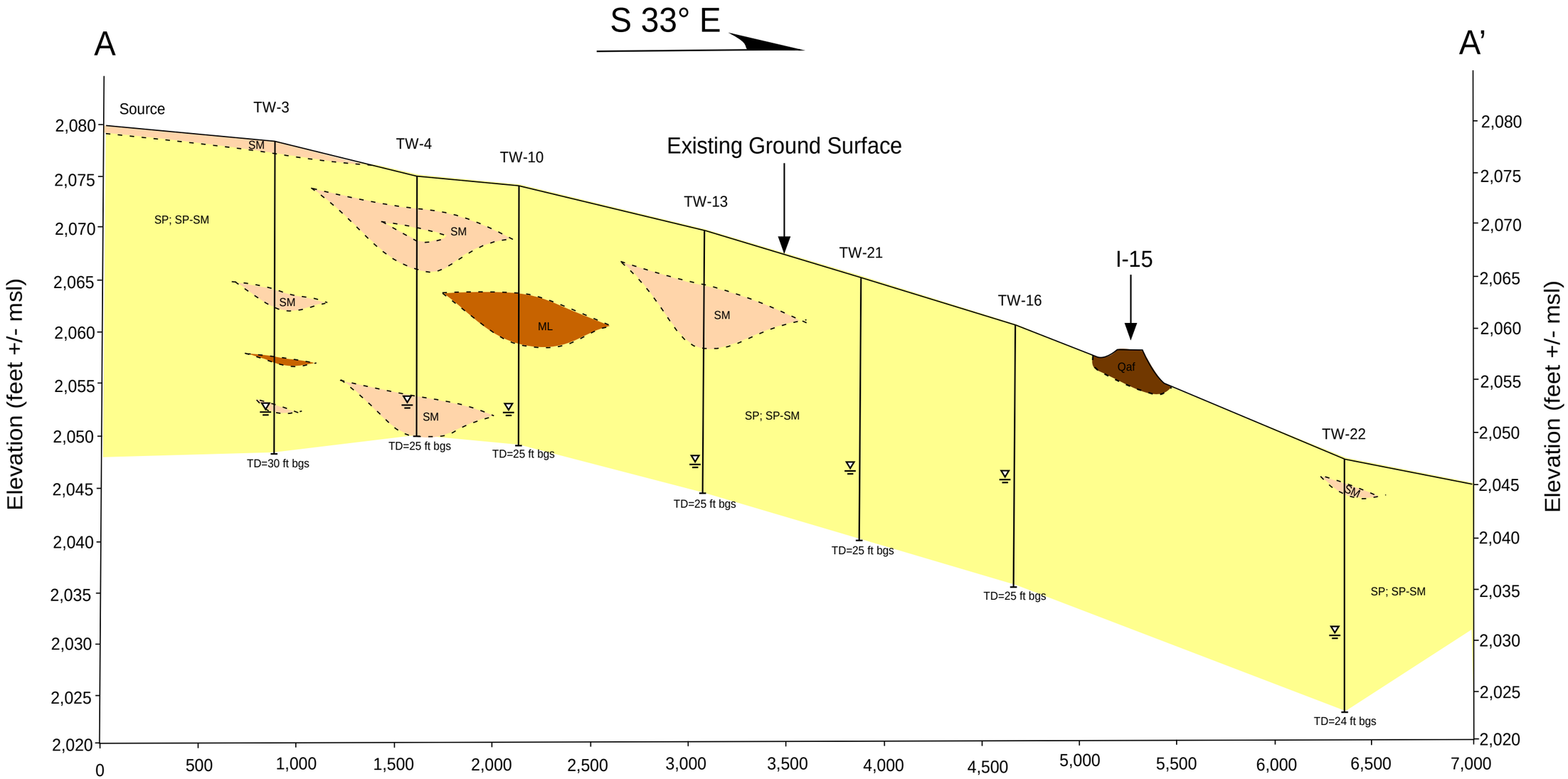
FIGURE 2

SITE MAP
WITH GROUNDWATER
SAMPLE LOCATIONS

| | |
|---|---|
| Project No.: 29403643 | Date: MAR 2012 |
| Project: Barstow Perchlorate | |




Vertically Exagerated 50x

Explanation:

Qaf — Quaternary artificial fill

ML — Sandy SILT with oxidization zones.

SM — Silty fine to coarse SAND

SP; SP-SM — Poorly graded fine to coarse grained SAND and Poorly graded fine SAND with silt. Some gravels and cobbles with trace boulders.

Geologic contact

TW-21 - Sample Location and Designation

TD - Total Depth (feet below ground surface)

- Groundwater Depth

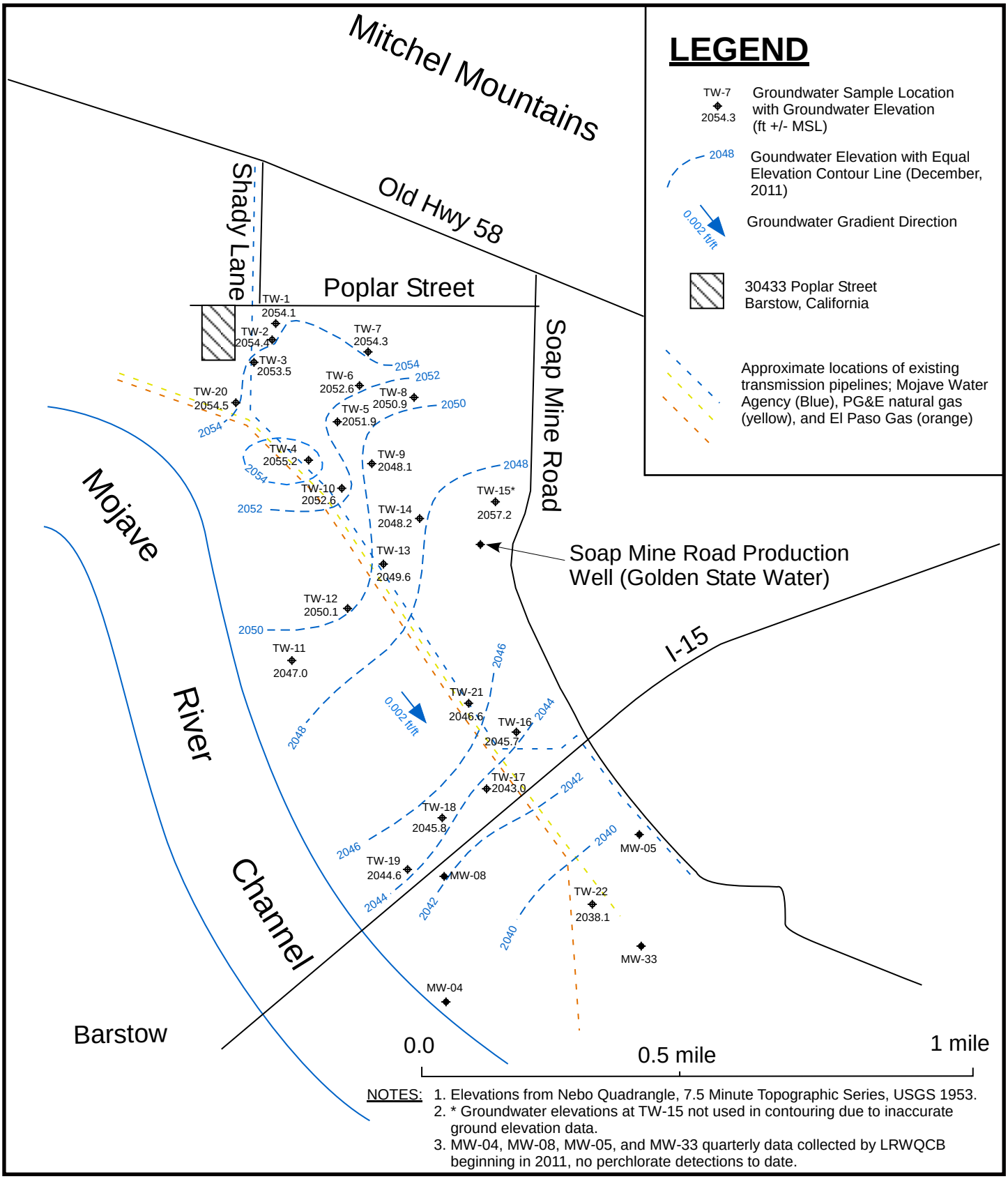
MSL - Mean Sea Level

# GEOLOGIC CROSS SECTION

**December, 2011**
**Barstow, California**

URS

**FIGURE 3**



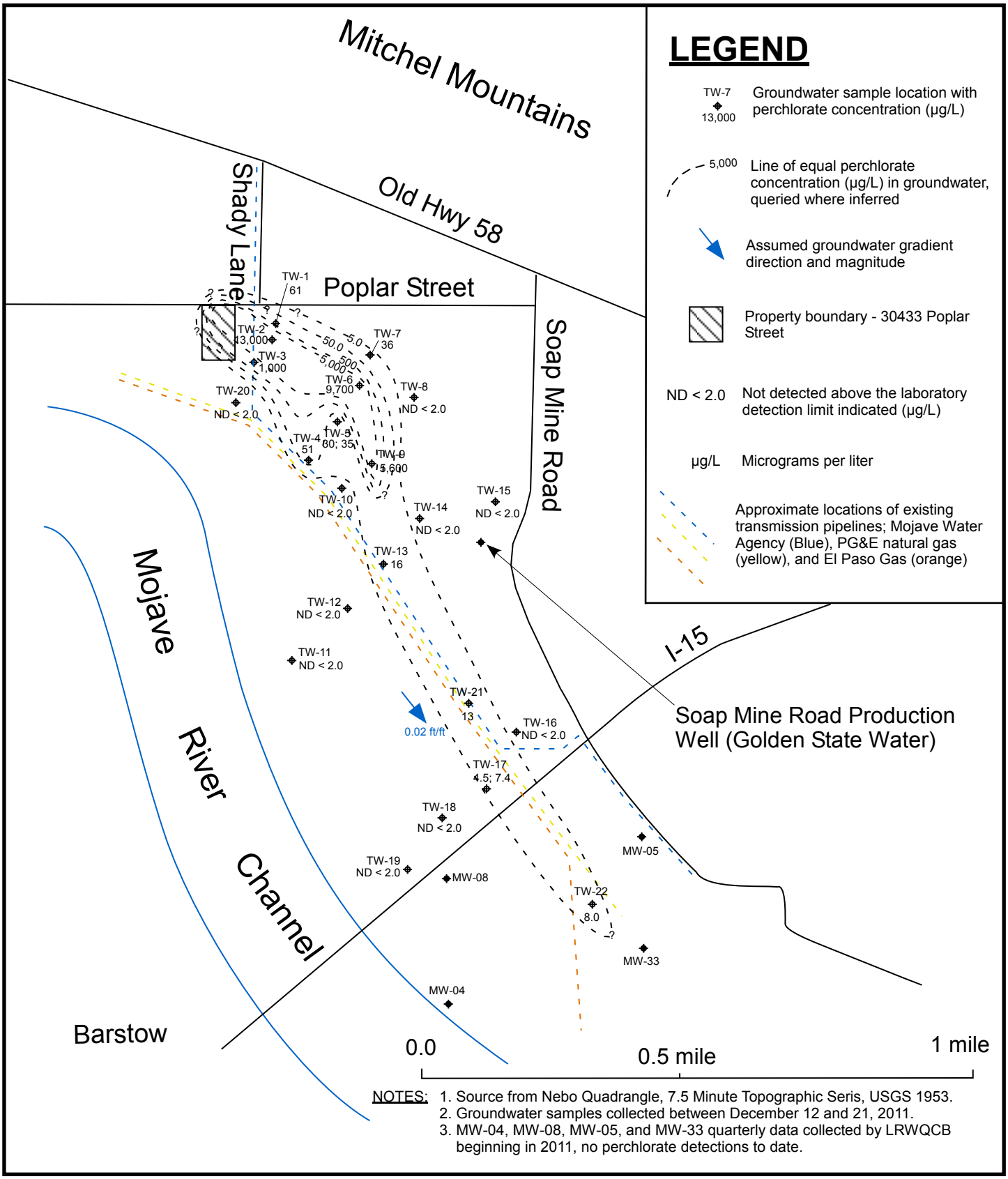

NOTES:
1. Elevations from Nebo Quadrangle, 7.5 Minute Topographic Series, USGS 1953.
2. * Groundwater elevations at TW-15 not used in contouring due to inaccurate ground elevation data.
3. MW-04, MW-08, MW-05, and MW-33 quarterly data collected by LRWQCB beginning in 2011, no perchlorate detections to date.

N

# GROUNDWATER ELEVATION CONTOUR MAP
# December, 2011
# Barstow, California

URS

FIGURE 4

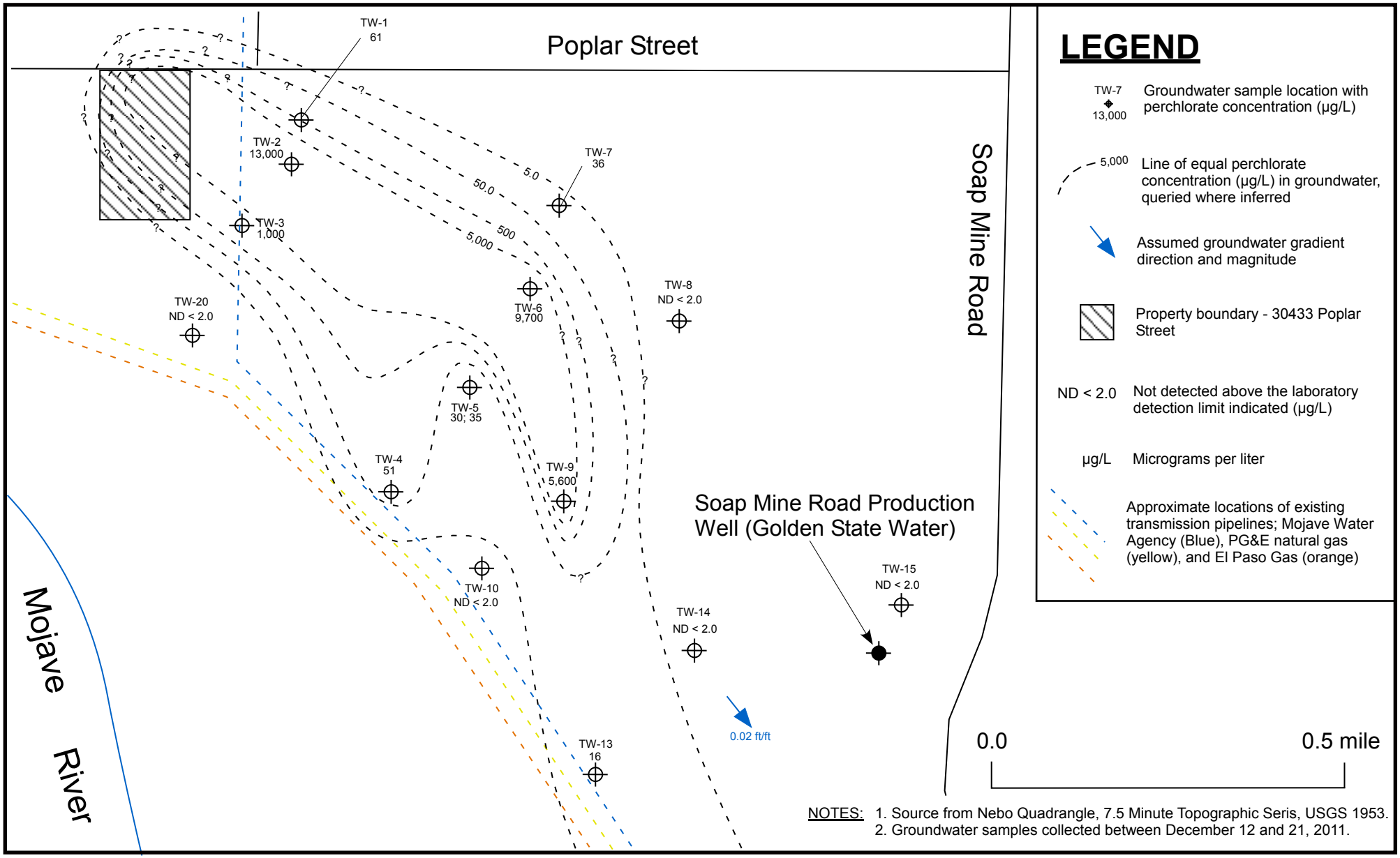



N

# PERCHLORATE ISOCONCENTRATIONS IN GROUNDWATER
## December, 2011
## Barstow, California

URS

FIGURE 5




# PERCHLORATE ISOCONCENTRATIONS IN GROUNDWATER NEAR THE SITE
## December, 2011
## Barstow, California

N

URS

FIGURE 6

# APPENDIX A – BORING LOGS

**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-3

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/12/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hollow Stem Auger** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **30.0 feet bgs** |
| Drill Rig Type | **CME 85** | Drill Bit Size/Type | **8 inch HSA** | Surface Elevation (ft-msl) | **2079.00** |
| Groundwater Level (feet bgs) | **25.50** | Sampling Method(s) | **Cal. Mod. Split Spoon** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **8** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Bentonite grout, 0 to 30 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | Silty coarse SAND (SM): Brown (10 YR 5/3), dry | | | | |
| | 2 | | | | | | Poorly graded coarse SAND (SP): Brown (10 YR 5/3), dry | | | | |
| 2075 | 4 | | | | | | | | | | |
| | 6 | | | | | | | | | | |
| | 8 | | | | | | | | | | |
| 2070 | | | | | | | Becomes brown (10 YR 4/3), damp | | | | |
| | 10 | | | 11 27 50 for 3" | | | Becomes light yellowish brown (10 YR 6/4), to very pale brown (10 YR 7/4), dense, dry | N/A | N/A | N/A | |
| | 12 | | | | | | | | | | |
| 2065 | 14 | | | | | | Silty coarse SAND (SM): Brown (10 YR 4/3), moist, dense | | | | |
| | 16 | | | 13 27 50 for 1" | | | | N/A | N/A | N/A | |
| | 18 | | | | | | Poorly graded coarse SAND with gravel (SP): Pale brown (10 YR 6/3), dense, dry | | | | |
| 2060 | | | | | | | Becomes brown (10 YR 5/3) | | | | |
| | 20 | | | 16 29 50 for 2" | | | | N/A | N/A | N/A | |
| | 22 | | | | | | Sandy SILT (ML): Yellowish brown (10 YR 5/4), hard, moist, oxidation zones present<br>Poorly graded coarse SAND (SP): Brown (10 YR 5/3), very dense, moist | | | | |
| 2055 | 24 | | | | | | | | | | |
| | 26 | | | 19 29 50 for 1" | | | Silty fine SAND (SM): Yellowish brown (10 YR 5/4), very dense, moist<br>Poorly graded coarse SAND (SP): Brown (10 YR 5/3), very dense, wet | N/A | N/A | N/A | |
| | 28 | | | | | | | | | | |
| 2050 | | | | | | | | | | | |
| | 30 | | | | | | Boring terminated at 30' bgs. Groundwater encountered at 26.5' bgs during drilling and measured at 25.50' bgs in 2 inch temporary, slotted PVC after drilling. | | | | |
| | 32 | | | | | | | | | | |
| 2045 | 34 | | | | | | | | | | |

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**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-4

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/13/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hollow Stem Auger** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **25.0 feet bgs** |
| Drill Rig Type | **CME 85** | Drill Bit Size/Type | **8 inch HSA** | Surface Elevation (ft-msl) | **2077.00** |
| Groundwater Level (feet bgs) | **22.10** | Sampling Method(s) | **Cal. Mod. Split Spoon** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **8** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Bentonite grout, 0 to 25 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | Poorly graded medium SAND (SP): Yellowish brown (10 YR 5/4), dry | | | | |
| 2075 | 2 | | | | | | | | | | |
| | 4 | | | | | | Silty fine SAND (SM): Brown (10 YR 4/3), moist | | | | |
| | 6 | | | | | | Poorly graded fine SAND (SP): Pale brown (10 YR 6/3) | | | | |
| 2070 | 8 | | | | | | Silty fine to medium SAND (SM): Brown (10 YR 5/3), moist | | | | |
| | 10 | | | 11<br>22<br>45 | | | Poorly graded coarse SAND (SP): Very pale brown (10 YR 7/3), dense, dry, gravel present | N/A | N/A | N/A | |
| 2065 | 12 | | | | | | | | | | |
| | 14 | | | | | | | | | | |
| | 16 | | | 11<br>17<br>29 | | | Poorly graded coarse SAND with silt (SP-SM): Brown (10 YR 4/3), medium dense, moist, gravel present | N/A | N/A | N/A | |
| 2060 | 18 | | | | | | | | | | |
| | 20 | | | 16<br>24<br>49 | | | Becomes light yellowish brown (10 YR 6/4) | N/A | N/A | N/A | |
| 2055 | 22 | | | | | | Silty coarse SAND (SM): Brown (10 YR 5/3), dense, wet | | | | |
| | 24 | | | | | | | | | | |
| | 26 | | | | | | Boring terminated at 25' bgs. Groundwater encountered at 21' bgs during drilling and measured at 22.10' bgs in 2 inch temporary slotted PVC after drilling. | | | | |
| 2050 | 28 | | | | | | | | | | |
| | 30 | | | | | | | | | | |

URS

**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-7

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/15/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hollow Stem Auger** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **30.0 feet bgs** |
| Drill Rig Type | **CME 85** | Drill Bit Size/Type | **8 inch HSA** | Surface Elevation (ft-msl) | **2076.00** |
| Groundwater Level (feet bgs) | **22.45** | Sampling Method(s) | **Cal. Mod. Split Spoon** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **8** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Bentonite grout, 0 to 30 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2075 | 0 | | | | | | Poorly graded fine SAND with silt (SP): Brown (10 YR 5/3), moist | | | | |
| | 2 | | | | | | Poorly graded fine SAND (SP): Pale brown (10 YR 6/3), moist, micaceous | | | | |
| 2070 | 4 | | | | | | | | | | |
| | 6 | | | | | | | | | | |
| | 8 | | | | | | Becomes brown (10 YR 5/3), dry | | | | |
| 2065 | 10 | | | 12<br>15<br>22 | | | Becomes poorly graded coarse sand with coarse gravel; medium dense, oxidation zones | N/A | N/A | N/A | |
| | 12 | | | | | | | | | | |
| | 14 | | | | | | | | | | |
| 2060 | 16 | | | 19<br>21<br>50<br>for 3" | | | Silty fine SAND with gravel (SM): Yellowish brown (10 YR 5/4), dense, dry; lenses of sandy SILT and poorly graded coarse sand | N/A | N/A | N/A | |
| | 18 | | | | | | | | | | |
| 2055 | 20 | | | 18<br>22<br>50<br>for 5" | | | Clayey coarse SAND (SC): Yellowish brown (10 YR 5/4), dense, moist | N/A | N/A | N/A | |
| | 22 | | | | | | ▼ | | | | |
| | 24 | | | | | | | | | | |
| 2050 | 26 | | | 17<br>24<br>50<br>for 2" | | | Poorly graded fine SAND (SP): Yellowish brown (10 YR 5/4), dense, moist | N/A | N/A | N/A | |
| | 28 | | | | | | Becomes coarse, wet | | | | |
| | 30 | | | | | | | | | | |
| 2045 | 32 | | | | | | Boring terminated at 30' bgs. Groundwater encountered at 28.5' bgs during drilling and measured at 22.45' bgs in 2 inch temporary slotted PVC casing after drilling. | | | | |
| | 34 | | | | | | | | | | |

URS

**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-10

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/14/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hollow Stem Auger** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **25.0 feet bgs** |
| Drill Rig Type | **CME 85** | Drill Bit Size/Type | **8 inch HSA** | Surface Elevation (ft-msl) | **2074.00** |
| Groundwater Level (feet bgs) | **21.85** | Sampling Method(s) | **Cal. Mod. Split Spoon** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **8** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Bentonite Grout, 0 to 25 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | Poorly graded fine SAND with silt (SP-SM): moist, micaceous | | | | |
| | 2 | | | | | | Poorly graded fine SAND (SP): Brown (10 RY 4/3), dry | | | | |
| 2070 | 4 | | | | | | | | | | |
| | 6 | | | | | | | | | | |
| | 8 | | | | | | Becomes yellowish brown (10 YR 5/4), poorly graded coarse sand | | | | |
| 2065 | 10 | | | 12<br>20<br>25 | | | Sandy SILT (ML): Brown (10 YR 5/3), very stiff, dry, micaceous | N/A | N/A | N/A | |
| | 12 | | | | | | | | | | |
| 2060 | 14 | | | | | | | | | | |
| | 16 | | | 27<br>50<br>for 4" | | | Poorly graded coarse SAND with gravel (SP): Brownish yellow (10 YR 6/6), very dense, moist, lens of brown (10 YR 4/3) sandy SILT | N/A | N/A | N/A | |
| | 18 | | | | | | | | | | |
| 2055 | 20 | | | 17<br>29<br>36 | | | Becomes brown (10 YR 5/3), dense, wet | N/A | N/A | N/A | |
| | 22 | | | | | | | | | | |
| 2050 | 24 | | | | | | | | | | |
| | 26 | | | | | | Boring terminated at 25' bgs. Groundwater encountered at 20' bgs during drilling and measured at 21.85' bgs in temporary 2 inch slotted PVC casing after drilling. | | | | |
| | 28 | | | | | | | | | | |
| 2045 | 30 | | | | | | | | | | |

URS

**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-13

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/14/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hollow Stem Auger** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **25.0 feet bgs** |
| Drill Rig Type | **CME 85** | Drill Bit Size/Type | **8 inch HSA** | Surface Elevation (ft-msl) | **2072.00** |
| Groundwater Level (feet bgs) | **22.40** | Sampling Method(s) | **Cal. Mod. Split Spoon** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **8** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Bentonite grout, 0 to 25 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | Poorly graded coarse SAND (SP): Yellowish brown (10 YR 5/4), moist | | | | |
| 2070 | 2 | | | | | | Becomes pale brown (10 YR 6/3), poorly graded fine sand, dry | | | | |
| | 4 | | | | | | Poorly graded fine SAND with silt (SP-SM): Pale brown (10 YR 6/3), moist, micaceous | | | | |
| | 6 | | | | | | Silty fine SAND (SM): Brown (10 YR 4/3), moist | | | | |
| 2065 | 8 | | | | | | | | | | |
| | 10 | | | 13<br>19<br>24 | | | | N/A | N/A | N/A | |
| 2060 | 12 | | | | | | Poorly graded coarse SAND with silt (SP-SM): Pale brown (10 YR 6/3), dense, dry | | | | |
| | 14 | | | | | | Poorly graded coarse SAND (SP): Light brown (7.5 YR 6/4), dense, moist, gravel present | | | | |
| | 16 | | | 17<br>29<br>36 | | | | N/A | N/A | N/A | |
| 2055 | 18 | | | | | | | | | | |
| | 20 | | | 12<br>24<br>50<br>for 3" | | | lenses of yellowish brown (10 YR 5/4) sandy CLAY and sandy SILT, very dense, moist | N/A | N/A | N/A | |
| 2050 | 22 | | | | | ▼ | | | | | |
| | 24 | | | | | | | | | | |
| | 26 | | | | | | Boring terminated at 25' bgs. Groundwater measured at 22.40' bgs in temporary 2 inch slotted PVC after drilling. | | | | |
| 2045 | 28 | | | | | | | | | | |
| | 30 | | | | | | | | | | |

URS

**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-19

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/16/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hollow Stem Auger** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **20.0 feet bgs** |
| Drill Rig Type | **CME 85** | Drill Bit Size/Type | **8 inch HSA** | Surface Elevation (ft-msl) | **2063.00** |
| Groundwater Level (feet bgs) | **18.40** | Sampling Method(s) | **Cal. Mod. Split Spoon** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **8** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Bentonite grout, 0 to 20 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | Poorly graded fine SAND (SP): Brown (10 YR 5/3), dry | | | | |
| | 2 | | | | | | | | | | |
| 2060 | | | | | | | | | | | |
| | 4 | | | | | | | | | | |
| | 6 | | | | | | | | | | |
| 2055 | 8 | | | | | | | | | | |
| | 10 | | | 19<br>24<br>50<br>for 2" | | | Becomes light yellowish brown (10 YR 6/4), poorly graded coarse sand with gravel, very dense, moist | N/A | N/A | N/A | |
| | 12 | | | | | | | | | | |
| 2050 | | | | | | | | | | | |
| | 14 | | | | | | Silty fine SAND (SM): Brown (10 YR 5/3), very dense, dry | | | | |
| | | | | 50<br>for 4" | | | | N/A | N/A | N/A | |
| | 16 | | | | | | Poorly graded coarse SAND (SP) with gravel: Light yellowish brown (10 YR 6/4), very dense, wet | | | | |
| | | | | | | | Silty fine SAND (SM): Brown (10 YR 4/3), very dense, wet | | | | |
| 2045 | 18 | | | | | | | | | | |
| | 20 | | | | | | Boring terminated at 20' bgs. Groundwater encountered at 15.5' bgs during drilling and measured at 18.40' bgs in temporary 2 inch slotted PVC casing after drilling. | | | | |
| | 22 | | | | | | | | | | |
| 2040 | | | | | | | | | | | |
| | 24 | | | | | | | | | | |

URS

**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-20

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/20/11 & 12/21/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hand Auger/Direct Push** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **28.0 feet bgs** |
| Drill Rig Type | **Geoprobe 7822DT** | Drill Bit Size/Type | **Macrocore** | Surface Elevation (ft-msl) | **2078.00** |
| Groundwater Level (feet bgs) | **24.05** | Sampling Method(s) | **Dual Tube with acetate sleeve** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **2.5** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Hydrated bentonite chips, 0 to 28 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | Silty medium SAND (SM): Brown (10 YR 5/3), dry | | | | |
| | 2 | | | | | | Poorly graded medium SAND (SP): Yellowish brown (10 YR 5/4), dry | | | | |
| 2075 | | | | | | | | | | | |
| | 4 | | | | | | Becomes pale brown (10 YR 6/3), poorly graded fine sand, moist | | | | |
| | 6 | | | | | | Silty fine SAND (SM): Brown (10 YR 4/3), moist | | | | |
| | 8 | | | | 36 | | Poorly graded coarse SAND (SP): Light yellowish brown (10 YR 6/4), dry | | | | |
| 2070 | | | | | | | | | | | |
| | 10 | | | | | | Silty fine SAND (SM): Brown (10 YR 5/3), dry | | | | |
| | | | | | | | Poorly graded coarse SAND with gravel (SP): Brownish yellow (10 YR 6/6), dry | | | | |
| | 12 | | | | 36 | | Poorly graded fine SAND with gravel (SP-SM): Very pale brown (10 YR 8/3), dry | | | | |
| 2065 | | | | | | | | | | | |
| | 14 | | | | | | Becomes pale brown (10 YR 6/3), poorly graded coarse sand with increasing gravel content | | | | |
| | 16 | | | | 40 | | | | | | |
| | | | | | | | Sandy SILT (ML): Yellowish brown (10 YR 5/4), moist | | | | |
| 2060 | 18 | | | | | | | | | | |
| | 20 | | | | 48 | | Poorly graded coarse SAND with gravel (SP): Brown (10 YR 5/3) | | | | Slow to advance drill due to rocks. |
| | 22 | | | | | | | | | | |
| 2055 | | | | | | | | | | | |
| | 24 | | | | 48 | | | | | | Refusal encountered 12/20/11. Stepout completed on 12/21/12 |
| | 26 | | | | | | | | | | |
| 2050 | 28 | | | | | | Boring terminated at 28' bgs. Groundwater measured at 24.05' bgs in 1 inch temporary slotted PVC casing after drilling. | | | | |
| | 30 | | | | | | | | | | |

URS

**Project: Barstow LRWQCB**
**Project Location: Barstow, California**
**Project Number: 29403643**

# Log of TW-22

Sheet 1 of 1

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **12/21/11** | Logged By | **A. Vigna** | Checked By | **B. Jacobs** |
| Drilling Method | **Hand Auger/Direct Push** | Drilling Contractor | **BC2 Environmental** | Total Depth of Borehole | **24.0 feet bgs** |
| Drill Rig Type | **Geoprobe 7822DT** | Drill Bit Size/Type | **Macrocore** | Surface Elevation (ft-msl) | **2054.00** |
| Groundwater Level (feet bgs) | **16.52** | Sampling Method(s) | **Dual Tube with acetate sleeve** | Top of PVC Elevation | **N/A** |
| Diameter of Hole (inches) | **2.5** Diameter of Well (inches) **-** | Type of Well Casing | **N/A** | Screen Perforation | **N/A** |
| Type of Sand Pack | **N/A** | Type/Thickness of Seal(s) | **Hydrated bentonite chips, 0 to 24 feet bgs** | | |
| Comments | **Hand Augered to 7'** | | | | |

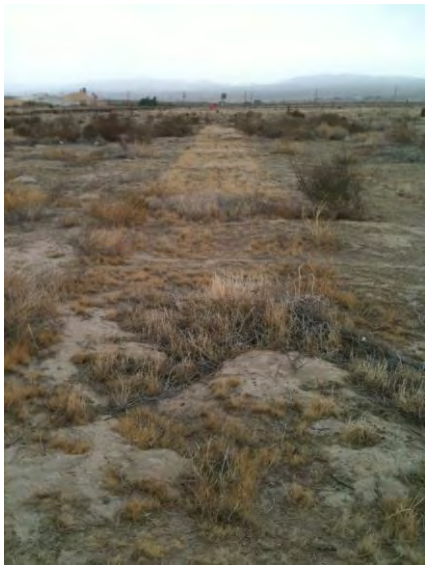
| Elevation, feet | Depth, feet | SAMPLES Type | SAMPLES Number | Blows/6 in. | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | PID Headspace (ppm) | PID Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | Poorly graded fine SAND with silt (SP-SM): Pale brown (10 YR 6/3), dry, micaceous | | | | Push with point from 0 to 20' bgs. |
| | 2 | | | | | | Silty fine SAND (SM): Brown (10 YR 5/3), moist | | | | |
| 2050 | 4 | | | | | | Poorly graded fine SAND (SP): Yellowish brown to light yellowish brown (10 YR 5.5/4), moist | | | | |
| | 6 | | | | | | Silty fine SAND (SM): Very dark grayish brown (10 YR 3/2), moist | | | | |
| | 8 | | | | | | Poorly graded medium SAND with silt (SP-SM): Brown to pale brown (10 YR 5.5/3), micaceous | | | | |
| 2045 | 10 | | | | | | | | | | |
| | 12 | | | | | | | | | | |
| 2040 | 14 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 18 | | | | | | | | | | |
| 2035 | 20 | | | | 42 | | Poorly graded coarse SAND (SP): Brown (10 YR 5/3), wet, lenses of silt | | | | |
| | 22 | | | | | | | | | | |
| 2030 | 24 | | | | | | Boring terminated at 24' bgs. Groundwater encountered at 20' bgs during drilling, measured at 16.52' bgs in 1 inch temporary slotted PVC after drilling. | | | | |
| | 26 | | | | | | | | | | |
| | 28 | | | | | | | | | | |
| 2025 | 30 | | | | | | | | | | |

URS

# APPENDIX B – PHOTO LOG

PHOTOGRAPH 1.

View of typical ground penetrating radar survey in the vicinity of temporary wells prior to drilling activities.



PHOTOGRAPH 2.

View of grass sod patch extending along the transmission pipeline trench backfill, in the vicinity of temporary well TW-13; facing southeast.

PHOTOGRAPH 3.

Representative view of the HSA drill rig at sampling location TW-16.

PHOTOGRAPH 4.

Representative view of drilling activities on private, residential property at sampling location TW-1.

PHOTOGRAPH 5.

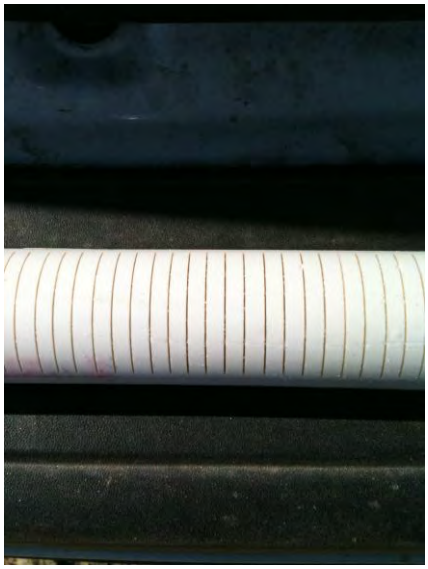
Representative view of undeveloped land at the site with direct push, limited access drill rig and driller in the background.

PHOTOGRAPH 6.

Representative view of screened 2 inch PVC with filter fabric used to collect groundwater sample.

PHOTOGRAPH 7.

Representative view of screened 1 inch PVC temporary well casing used with the direct push drill rig for collecting groundwater samples.



PHOTOGRAPH 8.

Representative view (close-up) of 1 inch screened PVC.

PHOTOGRAPH 9.

View of existing groundwater monitoring well at the site (one of many installed by others).

# APPENDIX C – FIELD NOTES

# URS

## DAILY FIELD REPORT

915 Wilshire Boulevard, Suite 700
Los Angeles, California 90017
213-996-2200 Phone
213-996-2456 Fax



DATE OF FIELD WORK 12/12/11
PROJECT Barstow Perchlorate
LOCATION Poplar Ave & Shady Lane CHARGEABLE MILEAGE
FIELD PERSONNEL A. Vigna

**TYPE OF WORK PERFORMED:** (Check all that apply)
☒ Sampling (soil/water/vapor/other) ☐ Excavation ☒ Site Observation/Oversight
☐ Well Construction/Destruction ☐ Geophysical ☐ Other

**EQUIPMENT USED:** (Indicate quantity)

| | | | | | |
|---|---|---|---|---|---|
| ☐ Auger | | ☐ Baggies | | ☐ Bailers | |
| ☐ Bucket | | ☐ Digital Camera | | ☐ Drill (battery/electric) | |
| ☐ Dust Mask | | ☒ EnCore Sampler | | ☒ Gloves (rubber/leather/surgical) | |
| ☐ Hammer | | ☒ Ice Chest/Cooler | | ☐ Interface Probe | |
| ☐ Marking Paint | | ☒ Paper Towels | | ☐ pH/Conductivity Meter | |
| ☐ PID | | ☐ Rope | | ☐ Soil Sampling Rings & Caps | |
| ☒ Sampling Jar/VOAs | | ☐ Socket Wrench Set | | ☐ Teflon Squares | |
| ☐ Trash Bags | | ☐ Field Truck | | ☐ Tyvek Suit | |
| ☐ Water Level Meter | | | | | |
| ☐ Other | | | | | |

| SUBCONTRACTORS IN THE FIELD | TIME OF ARRIVAL | NAME OF PERSONNEL |
|---|---|---|
| BC2 | 0930 | Cameron, Ty, Geoff |
| | | |
| | | |

☐ HEALTH & SAFETY MEETING CONDUCTED (Time) 0945

**FIELD NOTES**

0530 - Leave URS LA office after load up.
0745 - Arrive at Barstow site. Eric (PG&E) and Donn (El Paso Gas) on site to spot our boring locations near their transmission lines. No conflicts after site walk through.
0800 - Tim Post (LRWQCB) on-site.
0930 - BC2 on site
0945 - Dan Wyatt (Mojave) on-site to spot our boring locations along their transmission line. He suggests moving TW-13 off a bit.
1015 - Mob to TW-3 & set up
1030 - Begin hand augering
1145 - Reach water at 30 ft, equilibrates to ~25 ft.
1215 - Grout borehole
1230 - Mob to TW-2, get stuck
1330 - Set up at TW-2.
1400 - Encounter water when drilled to 30 ft, water equilibrates to 24.3 ft bgs.
1430 - Sample groundwater at TW-2
1445 - Collect equipment blank QA/QC.
1510 - Leave site for UPS shipping store

URS

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Los Angeles, California 90017
213-996-2200 Phone
213-996-2456 Fax

DAILY FIELD REPORT



1545 - Ship samples via UPS, last pickup for overnight was at 1, last pickup for next day is at 4

AT

TOTAL CHARGABLE FIELD HOURS

URS

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Los Angeles, California 90017
213-996-2200 Phone
213-996-2456 Fax

# DAILY FIELD REPORT



DATE OF FIELD WORK 12/13/11
PROJECT Barstow LRWQCB
LOCATION Barstow, CA CHARGEABLE MILEAGE
FIELD PERSONNEL A. Vigna

**TYPE OF WORK PERFORMED:** (Check all that apply)
☒ Sampling (soil/water/vapor/other) ☐ Excavation ☐ Site Observation/Oversight
☐ Well Construction/Destruction ☐ Geophysical ☐ Other_____

**EQUIPMENT USED:** (Indicate quantity)

| | | | | | |
|---|---|---|---|---|---|
| ☐ Auger | | ☐ Baggies | | ☐ Bailers | |
| ☐ Bucket | | ☐ Digital Camera | | ☐ Drill (battery/electric) | |
| ☐ Dust Mask | | ☐ EnCore Sampler | | ☒ Gloves (rubber/leather/surgical) | |
| ☐ Hammer | | ☒ Ice Chest/Cooler | | ☐ Interface Probe | |
| ☐ Marking Paint | | ☐ Paper Towels | | ☐ pH/Conductivity Meter | |
| ☐ PID | | ☐ Rope | | ☐ Soil Sampling Rings & Caps | |
| ☒ Sampling Jar/VOAs | | ☐ Socket Wrench Set | | ☐ Teflon Squares | |
| ☐ Trash Bags | | ☐ Field Truck | | ☐ Tyvek Suit | |
| ☐ Water Level Meter | | | | | |
| ☐ Other_____ | | | | | |

| SUBCONTRACTORS IN THE FIELD | TIME OF ARRIVAL | NAME OF PERSONNEL |
|---|---|---|
| BC2 | 0720 | Ty, Cameron, Geoff |
| | | |
| | | |

☒ HEALTH & SAFETY MEETING CONDUCTED (Time) 0715

**FIELD NOTES**

0655 - Arrive on site, label drums from previous days work (3 drums total)
0715 - Conduct daily H&S tailgate safety meeting.
0730 - Arrive at TW-1 sampling location.
0800 - Begin handaugering
0820 - Begin drilling TW-1
0830 - Encounter groundwater & sample.
0900 - Collect gw level data. 24.3 ft bgs
0910 - Additional drums arrive on site.
0925 - Decon equipment
1030 - Walk alignment w/ driller prior to mob. rig. He said TW-4, TW-5, & Maybe TW-7 are accessible, TW-6 is not.
1046 - Set up at TW-4
1200 - Collect water sample (314.0)
1215 - Mob to TW-5, get stuck. Hand auger TW-5 while working to free the vehicles.
1420 - 2 of 3 vehicles unstuck
1425 - Begin drilling TW-5.
1500 - Encountered groundwater, drill to 30 ft bgs.
1505 - Sample TW-5 (1-100ml for 314.0 & 1-125 ml for 331.0)

915 Wilshire Boulevard, Suite 700
Los Angeles, California 90017
213-996-2200 Phone
213-996-2456 Fax

**DAILY FIELD REPORT**



1515 - Trip out of hole, decon the drill bit and collect an equipment blank.
1525 - Drive to Office Works (UPS) to ship samples. Packed samples w/ blue ice, wet ice, and paper towels along with fragile sticker.
1555 - Returned to site. Drill rig & 1-ton support truck out of sand. Flatbed support truck still stuck.
1700 - Flatbed still stuck, dark. Leave site. Drums in sand next to TW-5 (4 drums).

N

TOTAL CHARGABLE FIELD HOURS

# URS

DAILY FIELD REPORT

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Los Angeles, California 90017
213-996-2200 Phone
213-996-2456 Fax



DATE OF FIELD WORK 12/14/11
PROJECT Barstow Perchlorate
LOCATION Barstow CA
CHARGEABLE MILEAGE
FIELD PERSONNEL A. Vigna

TYPE OF WORK PERFORMED: (Check all that apply)
☒ Sampling (soil/water/vapor/other) ☐ Excavation ☒ Site Observation/Oversight
☐ Well Construction/Destruction ☐ Geophysical ☐ Other

EQUIPMENT USED: (Indicate quantity)

| | | | | | |
|---|---|---|---|---|---|
| ☐ Auger | | ☐ Baggies | | ☐ Bailers | |
| ☐ Bucket | | ☐ Digital Camera | | ☐ Drill (battery/electric) | |
| ☐ Dust Mask | | ☐ EnCore Sampler | | ☐ Gloves (rubber/leather/surgical) | |
| ☐ Hammer | | ☐ Ice Chest/Cooler | | ☐ Interface Probe | |
| ☐ Marking Paint | | ☐ Paper Towels | | ☐ pH/Conductivity Meter | |
| ☐ PID | | ☐ Rope | | ☐ Soil Sampling Rings & Caps | |
| ☐ Sampling Jar/VOAs | | ☐ Socket Wrench Set | | ☐ Teflon Squares | |
| ☐ Trash Bags | | ☐ Field Truck | | ☐ Tyvek Suit | |
| ☐ Water Level Meter | | | | | |
| ☐ Other | | | | | |

| SUBCONTRACTORS IN THE FIELD | TIME OF ARRIVAL | NAME OF PERSONNEL |
|---|---|---|
| BC2 | 0715 | Cameron, Ty, ~~Jeff~~ Geoff |
| | | |
| | | |

☒ HEALTH & SAFETY MEETING CONDUCTED (Time) 0720

FIELD NOTES

0700 - Arrive on site.
0715 - BC2 on site.
0720 - Conduct daily H&S meeting
0725 - Refill water tanks via Mojave Pipeline.
0730 - Scout sampling locations with driller.
0745 - Forklift arrival on site
0815 - Pull support truck out of sand.
0825 - Finish filling water tanks.
0840 - Mob to TW-10
0850 - Begin handaugering
0915 - Begin drilling
0945 - Encounter groundwater, sample (314.0). GW @ 21.85 ft.
005 - Augers out of hole, begin mixing grout.
1030 - Mob to TW-12
1040 - Begin handaugering TW-12
1100 - Begin drilling
1110 - Encounter GW, sample (314.0). GW @ 20.95 ft (N65°E)
1200 - Mob to TW-11. Measure distance from TW-11 to abandoned residential well 142 ft W. of

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DAILY FIELD REPORT



TW-11
1216 - Begin handaugering TW-11
1225 - Begin drilling
1235 - Encounter gw @ 21.97 ft bgs, sample (314.0)
1320 - Refill water
1340 - Mob to TW-13
1350 - Begin handaugering.
1410 - Begin drilling
1445 - Sample TW-13 (331.0). GW at 22.40 ft bgs
1455 - Demob from TW-13.
1510 - Mob to TW-14, get stuck.
1520 - Arrive at TW-14, begin handaugering.
1550 - GW encountered at 21.85 ft bgs, sample water (314.0)
1600 - Collect EBquipment blank sample.
1620 - Arrive at Barstow Office Works to ship samples, missed driver.
1655 - Arrive at Victorville UPS Store, ship samples.
1735 - Arrive back at site, BC2 working to fill up water tanks on vehicles.
1750 - Leave site, end of day

TOTAL CHARGABLE FIELD HOURS -

# URS

DAILY FIELD REPORT

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DATE OF FIELD WORK Thursday, December 15, 2011
PROJECT Barstow Perchlorate
LOCATION Barstow, CA CHARGEABLE MILEAGE
FIELD PERSONNEL A. Vigna

TYPE OF WORK PERFORMED: (Check all that apply)
☒ Sampling (soil/water/vapor/other) ☐ Excavation ☐ Site Observation/Oversight
☐ Well Construction/Destruction ☐ Geophysical ☐ Other

EQUIPMENT USED: (Indicate quantity)

| | | | | | |
|---|---|---|---|---|---|
| ☐ Auger | | ☐ Baggies | | ☐ Bailers | |
| ☐ Bucket | | ☐ Digital Camera | | ☐ Drill (battery/electric) | |
| ☐ Dust Mask | | ☐ EnCore Sampler | | ☐ Gloves (rubber/leather/surgical) | |
| ☐ Hammer | | ☒ Ice Chest/Cooler | | ☐ Interface Probe | |
| ☐ Marking Paint | | ☒ Paper Towels | | ☐ pH/Conductivity Meter | |
| ☐ PID | | ☐ Rope | | ☐ Soil Sampling Rings & Caps | |
| ☒ Sampling Jar/VOAs | | ☐ Socket Wrench Set | | ☐ Teflon Squares | |
| ☒ Trash Bags | | ☐ Field Truck | | ☐ Tyvek Suit | |
| ☒ Water Level Meter | | | | | |
| ☐ Other | | | | | |

| SUBCONTRACTORS IN THE FIELD | TIME OF ARRIVAL | NAME OF PERSONNEL |
|---|---|---|
| BC2 | | Cameron, Ty, Jeff Geoff |
| | | |
| | | |

☒ HEALTH & SAFETY MEETING CONDUCTED (Time) 0820

FIELD NOTES

0705 - Arrive at site.
0725 - BC2 on site, less Cameron who is getting more cement.
0745 - Cameron on site
0750 - Walk to locations TW-6 & TW-7
0915 - Mob to TW-6.
0820 - Conduct daily tailgate H&S meeting
0825 - Begin handaugering TW-6 (N50°W of GPS location).
0840 - Begin drilling, drilled to 30 ft bgs. 105 ft.
0855 - Encounter gw, depth to water is 23.60 ft bgs.
0900 - Sample gw
0905 - Grout hole
0930 - Mob to TW-7.
0945 - Begin handaugering
1010 - Begin drilling, drill to 30 ft bgs.
1050 - Encounter gw at 22.45 ft bgs
1110 - Collect sample TW-7.
1130 - Grout boring.
1159 - Mob to TW-8, begin handaugering. TW-8 inaccesible, new/alt. spot is 110 ft @ N2°E.

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DAILY FIELD REPORT



1200 - Begin handaugering TW-8, drill to 30 ft bgs
1250 - Encounter GW sample (314.0).
1330 - Demob from TW-8, get stuck.
1400 - Mob to TW-2 again for re-sample.
1415 - Begin drilling
1455 - Sample TW-2 (314.0)
1515 - Leave site for local UPS drop off.
1545 - Leave local UPS drop off for site, mob to TW-17
1605 - Begin handaugering TW-17. Cameron, Tim, and I walk to old wells in the area. One is open to the surface and located approx ~~300 to 400 yds~~ 400 ft. NE of TW-17. Another one is approx. 400 ft. N of TW-17.
1615 - Begin boring location TW-17.
1635 - Drill to 25 ft bgs, encounter gw.
1645 - Sample well TW-17. GW @ 18.05 ft bgs
1655 - Collect equipment blank sample
1710 - Leave TW-17 location for drum drop off at drum staging area.
1735 - Label drums and leave site.

AJ

TOTAL CHARGABLE FIELD HOURS

# URS

DAILY FIELD REPORT

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DATE OF FIELD WORK 12/16/11
PROJECT Barstow Perchlorate
LOCATION Barstow, CA CHARGEABLE MILEAGE
FIELD PERSONNEL A. Vigna

TYPE OF WORK PERFORMED: (Check all that apply)
☒ Sampling (soil/water/vapor/other) ☐ Excavation ☐ Site Observation/Oversight
☐ Well Construction/Destruction ☐ Geophysical ☐ Other

EQUIPMENT USED: (Indicate quantity)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ☐ Auger | | ☒ Baggies | | ☒ Bailers | |
| ☐ Bucket | | ☐ Digital Camera | | ☐ Drill (battery/electric) | |
| ☐ Dust Mask | | ☐ EnCore Sampler | | ☒ Gloves (rubber/leather/surgical) | |
| ☐ Hammer | | ☒ Ice Chest/Cooler | | ☐ Interface Probe | |
| ☐ Marking Paint | | ☒ Paper Towels | | ☐ pH/Conductivity Meter | |
| ☐ PID | | ☐ Rope | | ☐ Soil Sampling Rings & Caps | |
| ☐ Sampling Jar/VOAs | | ☐ Socket Wrench Set | | ☐ Teflon Squares | |
| ☐ Trash Bags | | ☐ Field Truck | | ☐ Tyvek Suit | |
| ☒ Water Level Meter | | | | | |
| ☐ Other | | | | | |

| SUBCONTRACTORS IN THE FIELD | TIME OF ARRIVAL | NAME OF PERSONNEL |
|---|---|---|
| BC2 | | Cameron, Ty, ~~Jeff~~ Geoff |
| | | |
| | | |

☒ HEALTH & SAFETY MEETING CONDUCTED (Time) 0750

FIELD NOTES

0655 - Arrive at field site.
0720 - BC2 on site.
0735 - Mob to TW-18.
0745 - Arrive at TW-18
0750 - Conduct daily tailgate H&S meeting.
0755 - Begin handangering.
0820 - Begin drilling.
0835 - Encounter GW, drill to 25 ft bgs.
0845 - GW equilibrates to 16.75 ft bgs, collect sample TW-18
0900 - Grout hole then mob to TW-19.
0915 - Set up at TW-19, begin handangering.
0930 - Begin handangering.
0945 - Encounter GW.
0950 - Water @ 19.40 ft bgs, collect sample
1015 - Grout hole and mob to TW-16.
1030 - Arrive at TW-16. New location approx. 450 to 500 ft W-SW of previous location.
1035 - Begin handangering. A local newspaper correspondant on site & Tim escorts her around.
1045 - Encounter GW. Local paper correspondent off site

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**DAILY FIELD REPORT**



1100 - Sample GW at TW-16. GW @ 16.42 ft bgs.
1120 - Grout hole.
1130 - Demob from TW-16
1150 - Mob to TW-15 & set up - TW-15 in Brubaker Mann gravel yard which is excavated approx 5 ft bgs.
1245 - Encounter GW, drilled to 25 ft bgs.
1300 - Collect GW sample, water at 22.81 ft bgs.
1330 - Mix grout and abandon hole. Collect Equipment blank sample off Solinst water level meter after decon by pressure/steam cleaning.
1415 - 26 Soil & 1 Decon Water 55 gal. drums. Backfill holes that had settled w/ ~~decon water~~ surficial loose soil.
1445 - Leave site. Drive to UPS store in Victorville.
1520 - Arrive at UPS store, package & ship samples for 8am next day arrival w/ same day rush TAT.
1545 - Spoke w/ Roberto then Sam (BC2) re: next week schedule. BC2 available for hand augering on Tues & Wednesday.
1615 - Leave Victorville for LA.
1735 - Arrive in LA. End of day.

AJ

**TOTAL CHARGABLE FIELD HOURS**

# URS

DAILY FIELD REPORT

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DATE OF FIELD WORK: Barstow Perchlorate 12/20/11
PROJECT: Barstow Perchlorate
LOCATION: Barstow, CA
CHARGEABLE MILEAGE:
FIELD PERSONNEL: A. Vigna

**TYPE OF WORK PERFORMED:** (Check all that apply)
- [X] Sampling (soil/water/vapor/other)
- [ ] Well Construction/Destruction
- [ ] Excavation
- [ ] Geophysical
- [ ] Site Observation/Oversight
- [ ] Other

**EQUIPMENT USED:** (Indicate quantity)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| [ ] Auger | | [X] Baggies | | [X] Bailers | |
| [ ] Bucket | | [ ] Digital Camera | | [ ] Drill (battery/electric) | |
| [ ] Dust Mask | | [ ] EnCore Sampler | | [X] Gloves (rubber/leather/surgical) | |
| [ ] Hammer | | [X] Ice Chest/Cooler | | [ ] Interface Probe | |
| [ ] Marking Paint | | [X] Paper Towels | | [ ] pH/Conductivity Meter | |
| [ ] PID | | [ ] Rope | | [ ] Soil Sampling Rings & Caps | |
| [ ] Sampling Jar/VOAs | | [ ] Socket Wrench Set | | [ ] Teflon Squares | |
| [ ] Trash Bags | | [X] Field Truck | | [ ] Tyvek Suit | |
| [X] Water Level Meter | | | | | |
| [ ] Other | | | | | |

| SUBCONTRACTORS IN THE FIELD | TIME OF ARRIVAL | NAME OF PERSONNEL |
|---|---|---|
| BC2 | | Joaquin, Eliud |
| | | |
| | | |

[X] HEALTH & SAFETY MEETING CONDUCTED (Time) 0820

**FIELD NOTES**

0755 - Arrive on site for water investigation
0800 - BC2 on site.
0820 - Conduct tailgate H&S meeting.
0830 - Site walk w/ Eliud.
0840 - Forklift off site. LRWQCB rep. (Tim) on site w/ assistant (Randall)
0855 - Set up at TW-20, new location, located ~~180~~ 240 ft S-SW (345° W) of TW-3.
0910 - Begin handdangering TW-20
0925 - Begin drilling, Log soil characteristics.
1015 - Encounter hard object at ~21 ft bgs. Drill rig shuts down and won't re-start.
1030 - Drillers call office, rig won't re-start.
1115 - Tim & Randall off site.
1120 - Sample decon water drum (Sample ID: Dacon).
1200 - Drill rig still down.
1400 - Still broke down.
1700 - Drill rig re-started. By passed transmitter of remote control unit.
1705 - Resume drilling. Very hard object encountered refusal at 20 ft bgs.
1740 - Pack up & demob from sample location TW-20. Try again tomorrow morning.

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DAILY FIELD REPORT

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PAGE OF

TOTAL CHARGABLE FIELD HOURS

# URS

DAILY FIELD REPORT

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DATE OF FIELD WORK 12/21/11
PROJECT Barstow Perchlorate
LOCATION Barstow CA CHARGEABLE MILEAGE
FIELD PERSONNEL A. Vigna

TYPE OF WORK PERFORMED: (Check all that apply)
☒ Sampling (soil/water/vapor/other) ☐ Excavation ☐ Site Observation/Oversight
☐ Well Construction/Destruction ☐ Geophysical ☐ Other

EQUIPMENT USED: (Indicate quantity)

| | | | | | |
|---|---|---|---|---|---|
| ☐ Auger | | ☒ Baggies | | ☐ Bailers | |
| ☐ Bucket | | ☐ Digital Camera | | ☐ Drill (battery/electric) | |
| ☐ Dust Mask | | ☐ EnCore Sampler | | ☒ Gloves (rubber/leather/surgical) | |
| ☐ Hammer | | ☒ Ice Chest/Cooler | | ☐ Interface Probe | |
| ☐ Marking Paint | | ☒ Paper Towels | | ☐ pH/Conductivity Meter | |
| ☐ PID | | ☐ Rope | | ☐ Soil Sampling Rings & Caps | |
| ☐ Sampling Jar/VOAs | | ☐ Socket Wrench Set | | ☐ Teflon Squares | |
| ☐ Trash Bags | | ☒ Field Truck | | ☐ Tyvek Suit | |
| ☒ Water Level Meter | | | | | |
| ☐ Other | | | | | |

| SUBCONTRACTORS IN THE FIELD | TIME OF ARRIVAL | NAME OF PERSONNEL |
|---|---|---|
| BC2 | 0645 | Elind, Joaquin. |
| | | |
| | | |

☒ HEALTH & SAFETY MEETING CONDUCTED (Time) 0700

FIELD NOTES

0645 - Arrive on site. BC2 already here.
0700 - Conduct daily H&S tailgate meeting
0715 - Mob pack to TW-20 for final attempt, step out next to previous attempt
0750 - Encounter GW @ 24.05 ft bgs.
0800 - Collect GW sample TW-20.
0815 - Decon equipment & demob.
0845 - Mob to TW-9.
0900 - Arrive at TW-9. Begin handaugering.
0915 - Begin drilling.
0930 - Encounter GW at 24.55 ft bgs.
0940 - Sample TW-9 (314.0).
1000 - Decon equipment & demob.
1010 - Mob to new location, TW-21, ~½ way b/t TW-17 & TW-13. Location ~½ way b/t Mojave & PG&E pipelines.
1030 - Begin handaugering TW-21
1046 - Begin drilling TW-21
1100 - Encounter GW at 18.10 ft bgs. Sample TW-21 (314.0).
1115 - Demob from TW-21

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**DAILY FIELD REPORT**



1120 Mob to TW-22, south of I-15. Approx 75 575E of property corner.
1145 - Begin handaugering.
1215 - Encounter GW @ 16.52 ft bgs, collect sample (314.0).
1230 - Collect equipment blank off the temporary well (1 inch by 1.5 ft. long PVC w/ 0.020 in factory perforations).
1315 - Dump soil & water IDW at drum staging area. 2 soil & 1 water.
1330 - Sign paperwork and leave site.

TOTAL CHARGABLE FIELD HOURS

**Project:** Barstow LRWQCB
**Project Location:** Barstow, CA
**Project Number:** 29403643

# Log of Boring TW-3

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Date(s) Drilled: 12/12/11 | Logged By: A. Vigna | Checked By: | |
| Drilling Method: Hollow Stem Auger | Drilling Contractor: BC2 | Total Depth of Borehole: 30 – | |
| Drill Rig Type: CME 85 | Sampler Type: Cal. Mod. Split Spoon | Surface Elevation: – | |
| Groundwater Level: 25.50 | Drill Bit Size/Type: HSA | Top of PVC Elevation: – | |
| Borehole Diameter (inches): 8 / Diameter of Well (inches): 2 in | Type of Well Casing: 2 in PVC w/ sock | Screen Perforation: 0.020 inch | |
| Type of Sand Pack: – | Type and Depth of Seal(s): Hydrated grout from 0 to ft bgs | | |
| Comments: Hand augered 0 to , blow counts bentonite via downhole hammer | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Blows/Foot | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | SM SP | Brown (10YR 5/3), silty SAND, dry – – – – coarse – – Brown (10YR 5/3), poorly graded coarse SAND, dry. | | | | | |
| | 5 | | | | | | | | | | | |
| | 10 | | 11 27 50/5" 77 | → | | | becomes brown (10YR 4/3), damp. becomes light y/w. brn. (10YR 6/4) to pale brown (10YR 7/4), dry. very | | | | | |
| | 15 | | 13 27 50/1 77 | → | | SM SP | Brn. (10YR 4/3), silty crs. SAND, moist. Pale brn. (10YR 6/3), poorly graded crs. SAND w/ gravel, dry. | | | | | |
| | 20 | | 16 29 50/2 79 | | | ML SP | becomes brn. (10YR 5/3) Y/w. Brn. (10YR 5/4), sandy SILT, moist; oxidization zones present. Brn. (10YR 5/3), poorly graded crs. SAND, moist. | | | | | |
| | 25 | | 19 29 50/1 79 | | | SM SP | Y/w. brn. (10YR 5/4), silty fine SAND Brn. (10YR 5/3), poorly graded coarse SAND, wet. | ▽ | | | | Drilled to 30 ft |
| | 30 | | | | | | | | | | | |

URS

**Project:** Barstow LRWQCB
**Project Location:** Barstow, CA
**Project Number:** 29403643

# Log of Boring TW-4

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled: 12/13/11 | Logged By: A. Vigna | Checked By: |
| Drilling Method: HSA | Drilling Contractor: BC2 | Total Depth of Borehole: 25 |
| Drill Rig Type: CME 85 | Sampler Type: Cal. Mod. Split Spoon | Surface Elevation: – |
| Groundwater Level: 22.1 ft bgs | Drill Bit Size/Type: 8 inch HSA | Top of PVC Elevation: – |
| Borehole Diameter (inches): 8 / Diameter of Well (inches): – | Type of Well Casing: 2 inch PVC (Temp) | Screen Perforation: 0.020 |
| Type of Sand Pack: – | Type and Depth of Seal(s): Bentonite grout 0 to 30 ft bgs | |
| Comments: Hand auger 0 to 7 ft bgs. | | |

| Elevation, feet / Depth, feet | SAMPLES: Type / Number / Blows/Foot / Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 0 | | SP | Yellowish brn. (10YR 5/4), poorly graded med. SAND, dry | | | | | |
| | | SM | ~~Dk. ylw.~~ brn. (10YR 4/3), silty fine SAND, moist. | | | | | |
| 5 | | SP | Pale brn. (10YR 6/3), poorly graded fine SAND. | | | | | |
| | | SM | Brn. (10YR 5/3), silty fine to med. SAND, moist. | | | | | |
| 10 | 11, 22, 45 (67) | SP | V. pale brn. (10YR 7/3), poorly graded crs. SAND, dry; gravel present. | | | | | |
| 15 | 11, 17, 29 (46) | SP-SM | Brn. (10YR 4/3), ~~silty~~ poorly graded crs. SAND w/ silt, moist; gravel present. | | | | | |
| | | | becomes lt. ylw. brn. (10YR 6/4). | | | | | |
| 20 | 16, 24, 49 (73) | ▽ | Brn. (10YR 5/3), silty crs. SAND, wet | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |

URS

Report: ENV_23AW_TEMP; File: URS_TE-1.GPJ; 7/24/2002 2

**Project:** Barstow Perchlorate
**Project Location:** Barstow
**Project Number:** 29403643

# Log of Boring TW-10

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled: 12/14/11 | Logged By: A. Vigna | Checked By: |
| Drilling Method: HSA | Drilling Contractor: BC2 | Total Depth of Borehole: 25.00 |
| Drill Rig Type: CME 85 | Sampler Type: Cal. Mod. Split Spoon | Surface Elevation: |
| Groundwater Level: 21.85 ft bgs | Drill Bit Size/Type: 8 inch | Top of PVC Elevation: - |
| Borehole Diameter (inches): 8 inch; Diameter of Well (inches): 2 inch | Type of Well Casing: 2 inch PVC | Screen Perforation: 0.020 |
| Type of Sand Pack: - | Type and Depth of Seal(s): Bentonite grout | |
| Comments: Hand auger 0 to 7 ft bgs | | |

| Elevation, feet / Depth, feet | SAMPLES: Type | Number | Blows/Foot | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | SP-SM / SP | Brn. (10YR 5/3), poorly graded fine - SAND w/ silt, moist; micaceous. Brn. (10YR 5/3), poorly graded fine SAND, dry. | | | | | |
| 5 | | | | | | Becomes yl w. brn. (10YR 5/4), poorly graded coarse SAND. | | | | | |
| 10 | | | 12, 20, 25 (45) | | ML | Brn. (10YR 5/3), sandy SILT, dry; micaceous. | | | | | |
| 15 | | | 27, 50/4 | | SP | Brn. yl w. (10YR 6/6), poorly graded crs SAND w/ gravel, moist; lenses of brn. (10YR 4/3), sandy SILT, moist. | | | | | |
| 20 | | | 17, 21, 36 (65) | | 21.85 ▽ | becomes brn. (10YR 5/3), wet | | | | | |
| 25 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

URS

Report: ENV_23AW_TEMP; File: URS_TE-1.GPJ; 7/24/2002 2

**Project:** Barstow Perchlorate
**Project Location:** Barstow, CA
**Project Number:** 29403643

# Log of Boring TW-13

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Date(s) Drilled: 12/14/11 | Logged By: A. Vigna | | Checked By: |
| Drilling Method: HSA | Drilling Contractor: BC2 | | Total Depth of Borehole: 25 ft bgs |
| Drill Rig Type: CME 85 | Sampler Type: Cal. Mod. Split Spoon | | Surface Elevation: - |
| Groundwater Level: 22.40 | Drill Bit Size/Type: 8 inch HSA | | Top of PVC Elevation: - |
| Borehole Diameter (inches): 8 | Diameter of Well (inches): 2 | Type of Well Casing: 2 inch PVC | Screen Perforation: 0.020 |
| Type of Sand Pack: | | Type and Depth of Seal(s): Bentonite grout 0 to 25 ft bgs | |
| Comments: Hand auger 0 to 7 ft bgs | | | |

| Elevation, feet / Depth, feet | SAMPLES: Type | Number | Blows/Foot | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | SP | Yl w. brn. (10YR 5/4), poorly graded crs. SAND, moist; becomes pale brn. (10YR 6/3), poorly graded fine SAND, dry. | | | | | Contains carbonate |
| 5 | | | | | SP-SM / SM | Pale brn. (10YR 6/3), poorly graded fine SAND w/ silt, moist; micaceous. Brn. (10YR 4/3), silty fine SAND, moist | | | | | |
| 10 | | | 12, 19, 24, (43) | | SP-SM | Pale brn. (10YR 6/3), poorly graded crs. SAND w/ SILT, dry; laminated w/ SILT | | | | | |
| 15 | | | 17, 29, 36, (65) | | SP | ~~becomes~~ lt. brn. (7.5YR 6/4) moist; gravel present. poorly graded crs. SAND. | | | | | |
| 20 | | | 12, 24, 50/3 | | | Yellowish brn. (10YR 5/4) lenses of sandy CLAY and sandy SILT, moist. | | | | | |
| 25 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

URS

Report: ENV_23AW_TEMP; File: URS_TE-1.GPJ; 7/24/2002 2

**Project:** Barstow LRWQCB
**Project Location:** Barstow
**Project Number:** 29403643

# Log of Boring IW-7

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled: 12/15/11 | Logged By: A. Vigna | Checked By: |
| Drilling Method: HSA | Drilling Contractor: BC2 | Total Depth of Borehole: 30 ft bgs |
| Drill Rig Type: CME 85 | Sampler Type: Cal. Mod. Split Spoon | Surface Elevation: - |
| Groundwater Level: 22.45 ft bgs | Drill Bit Size/Type: 8 inch HSA | Top of PVC Elevation: - |
| Borehole Diameter (inches): 8 / Diameter of Well (inches): 2 | Type of Well Casing: 2 inch PVC | Screen Perforation: 0.020 |
| Type of Sand Pack: - | Type and Depth of Seal(s): Bentonite grout. | |
| Comments: Hand auger 0 to 7 ft bgs | | |

| Elevation, feet / Depth, feet | SAMPLES: Type | Number | Blows/Foot | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | SP-SM | Brn. (10YR 5/3), poorly grade fine SAND w/ silt, moist. | | | | | |
| | | | | | SP | Pale brn. (10YR 6/3), poorly graded fine SAND, moist; micaceous | | | | | Biotite & Magnetite present. |
| 5 | | | | | | becomes brn. (10YR 5/3), dry. | | | | | |
| 10 | | 12, 15, 22 (37) | | | | becomes poorly graded crs. SAND w/ gravel; oxidization zones. crs. | | | | | |
| 15 | | 19, 21, 50/3 (71) | | | SM | Ylw. brn. (10YR 5/4), silty fine SAND w/ gravel, dry; lenses of sandy SILT and poorly graded crs. SAND. | | | | | |
| 20 | | 18, 22, 50/5 (72) | | | SC | Ylw. brn. (10YR 5/4), clayey SAND, moist. crs | | | | | |
| 25 | | 17, 24, 50/2 (74) | | | SP | Ylw. brn. (10YR 5/4), ~~silt~~ poorly graded fine SAND, moist! becomes crs, wet. | | | | | |
| 30 | | | | | | | | | | | |

URS

Report: ENV_23AW_TEMP; File: URS_TE-1.GPJ; 7/24/2002 2

**Project:** Barstow Perchlorate
**Project Location:** Barstow, CA
**Project Number:** 29403643

# Log of Boring TW-19

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Date(s) Drilled: 12/16/11 | Logged By: A. Vigna | | Checked By: |
| Drilling Method: HSA | Drilling Contractor: BC2 | | Total Depth of Borehole: 20.0 |
| Drill Rig Type: CME 85 | Sampler Type: Cal. Mod. Split Spoon | | Surface Elevation: -- |
| Groundwater Level: 18.40 | Drill Bit Size/Type: 8 inch HSA | | Top of PVC Elevation: -- |
| Borehole Diameter (inches): 8 | Diameter of Well (inches): 2 | Type of Well Casing: 2 inch PVC (Temporary) | Screen Perforation: 0.020 |
| Type of Sand Pack: N/A | | Type and Depth of Seal(s): Bentonite grout. | |
| Comments: Handauger 0 to 7 ft bgs | | | |

| Elevation, feet / Depth, feet | SAMPLES: Type | Number | Blows/Foot | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | SP | Brn. (10YR 5/3), poorly graded fine SAND, dry. | | | | | |
| 5 | | | | | | | | | | | |
| 10 | | | 19<br>24<br>50/2" | | | becomes lt. y/w. brn. (10YR 6/4) poorly graded crs. SAND w/ gravel; moist. | | | | | |
| 15 | | | 50/4 | | SM | Brn. (10YR 5/3), silty fine SAND, dry | | | | | |
| | | | | | SP-SM | Lt. y/w; brn. (10YR 6/4), poorly graded crs. SAND w/ gravel, ~~moist~~ wet. | | | | | |
| | | | | | ▽ | Brn. (10YR 4/3), silty fine SAND, wet. | | | | | |
| 20 | | | | | | | | | | | |
| 25 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

URS

Report: ENV_23AW_TEMP; File: URS_TE-1.GPJ; 7/24/2002 2

**Project:** Barstow Perchlorate
**Project Location:** Barstow, CA
**Project Number:** 29403643

# Log of Boring TW-20

Sheet 1 of 1

| | | | |
|---|---|---|---|
| Date(s) Drilled: 12/20/11 & 12/21/11 | Logged By: A. Vigna | | Checked By: |
| Drilling Method: Hand auger & Direct Push | Drilling Contractor: BC2 | | Total Depth of Borehole: 28 |
| Drill Rig Type: Geoprobe 7822DT | Sampler Type: Dual tube w/ acetate sleeve | | Surface Elevation: - |
| Groundwater Level: 24.05 | Drill Bit Size/Type: Macrocore | | Top of PVC Elevation: - |
| Borehole Diameter (inches): 2.5 / Diameter of Well (inches): 2.5 | Type of Well Casing: 1 inch PVC | | Screen Perforation |
| Type of Sand Pack: - | Type and Depth of Seal(s): Hydrated bentonite chips. | | |
| Comments: Hand auger 0 to 7 ft bgs | | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Blows/Foot | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | SM | Brn. (10YR 5/3), silty med. SAND, dry | | | | | |
| | | | | | | SP | Ylw. brn. (10YR 5/4), poorly graded med. SAND, dry. | | | | | |
| | 5 | | | | | SM | @ 3.5 ft becomes pale brn. (10YR 6/3), poorly graded fine SAND, moist. | | | | | @ 5 ft... 4 ft Drive sampler 5 ft b/c of soft soil |
| | | | | | 36 | SP | Brn. (10YR 4/3), silty fine SAND, moist. | | | | | |
| | 10 | | | | | SM SP | Lt. ylw. brn. (10YR 6/4), poorly graded crs. SAND, dry. | | | | | |
| | | | | | | SP-SM | Brn. (10YR 5/3), silty fine SAND, dry. | | | | | |
| | | | | | 36 | | Brn. ylw. (10YR 6/6), poorly graded crs. SAND w/ gravel; dry. | | | | | |
| | 15 | | | | | | V. pale brn. (10YR 8/3), poorly graded fine SAND w/ gravel, dry. | | | | | |
| | | | | | 40 | SM ML | @ 14 becomes pale brn. (10YR 6/3), | | | | | |
| | 20 | | | | | SP | poorly graded crs. SAND w/ incr. gravel content. | | | | | Slow to advance drill due to rocks |
| | | | | | 48 | | Ylw. brn. (10YR 5/4), silty fine sandy SILT, moist. | | | | | Refusal encountered 12/20/11. |
| | | | | | | | Brn. (10YR 5/3), poorly graded crs. SAND w/ gravel | | | | | Stepout 12/21/11 |
| | 25 | | | | 48 | | | | | | | |
| | 30 | | | | | | | | | | | |

URS

Report: ENV_23AW_TEMP; File: URS_TE-1.GPJ; 7/24/2002 2

**Project:** Barstow Perchlorate
**Project Location:** Barstow, CA
**Project Number:** 29403643

# Log of Boring TW-22

Sheet 1 of 1

| | | |
|---|---|---|
| Date(s) Drilled: 12/21/11 | Logged By: A. Vigna | Checked By: |
| Drilling Method: Direct Push | Drilling Contractor: BC2 | Total Depth of Borehole: 24 ft bgs |
| Drill Rig Type: Geoprobe 7822 DT | Sampler Type: Dual tube w/ acetate sleeves | Surface Elevation: |
| Groundwater Level: 16.52 | Drill Bit Size/Type: | Top of PVC Elevation: |
| Borehole Diameter (inches): 2.5 / Diameter of Well (inches): 1 | Type of Well Casing: 1 in PVC (temporary) | Screen Perforation: 0.020 |
| Type of Sand Pack: — | Type and Depth of Seal(s): Hydrated bentonite crumbles (No. 8) | |
| Comments: Hand auger 0 to 7 ft bgs | | |

| Elevation, feet | Depth, feet | SAMPLES Type | Number | Blows/Foot | Inches Recovered | Graphic Log | MATERIAL DESCRIPTION | Well Completion Log | OVA Headspace (ppm) | OVA Background (ppm) | Sample Time | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | SP-SM | Pale brn. (10YR 6/3), poorly graded fine SAND w/ silt, dry, micaceous. | | | | | |
| | | | | | | SM | Brn. (10YR 5/3), silty fine SAND, moist. | | | | | |
| | | | | | | SP | Ylw. brn. to lt. ylw. brn. (10YR 5.5/4) poorly graded fine SAND, moist. | | | | | |
| | 5 | | | | | SM | V. dk. gry. brn. (10YR 3/2), silty fine SAND, moist. | | | | | Push w/ Point from 16 ft bgs to 20 ft bgs. |
| | | | | | | SP-SM | Brn to pale brn. (10YR 5.5/3), poorly graded med. SAND w/ silt, micaceous. | | | | | |
| | 10 | | | | | | | | | | | |
| | 15 | | | | | ▽ | | | | | | |
| | 20 | | | | 42 | SP | Brn. (10YR 5/3), poorly graded crs. SAND; lenses of SILT, wet. | | | | | |
| | 25 | | | | | | | | | | | |
| | 30 | | | | | | | | | | | |

URS

Report: ENV_23AW_TEMP; File: URS_TE-1.GPJ; 7/24/2002 2

# APPENDIX D – LABORATORY REPORTS

URS

# Data Validation Memorandum

3500 Porsche Way, Suite 300
Ontario, CA 91764
Telephone – (909) 980-4000
Fax – (909) 980-1399

**TO:** Roberto Pinon **FILE:** 2940364.40000

**FROM:** Lily Bayati, Ontario QA/QC Group **SITE:** Barstow Poplar Street

**DATE:** January 30, 2012

**SUBJECT:** Summary of Limited Data Validation for Calscience Reports: 11-12-0927, 11-12-1002, 11-12-1131, 11-12-1227, 11-12-1370, and 11-12-1644

**Introduction**

This report summarizes the findings of the limited data validation (completeness check) of 24 water samples, one soil sample, and six equipment blanks. These samples were collected December 12-21, 2011 as part of the groundwater investigation activities conducted at 30433 Poplar Street, in Barstow, California. Calscience Environmental Laboratories, Inc. in Garden Grove, California analyzed 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 2008), and *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA 2010).

**Executive Summary**

All samples were analyzed as requested and all holding times were met. No data were qualified. Overall, based on this limited validation covering the QC parameters listed below, the data are useable for their intended purpose.

**1.0 Data Review Narratives**

Twenty- four water samples and six equipment blanks were collectively analyzed for perchlorate by EPA methods 314.0 and 331.0. In addition, one water sample and one soil sample were analyzed for TPH-carbon range (EPA 8015B modified), volatile organic compounds (VOCs; EPA method 8260B) and total metals (EPA 6010B/7471A/7470). The laboratory data were reviewed to evaluate compliance with these methods and the quality of the data reported. This data review process did not include result recalculation or transcription error checking from the raw data. 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
- ✓ Method Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples (LCS/ LCSD)
- ✓ Matrix Spike/Matrix Spike Duplicate Samples (MS/MSD)

✓ Compound Identification and Quantitation

1.1 Overall Assessment

The data reported in this package, 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.

1.2 Data Completeness

All analyses were performed as requested on the chain-of-custody (COC) forms with one exception. Sample TW-2 (sampled on 12/13/11) was not analyzed due to broken sample container. This sample was re-collected on 12/15/11 and analyzed as requested.

1.3 Holding Times and Preservation

All analyses were performed within the method-specified holding times. In addition, all samples were collected and preserved appropriately.

1.4 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.

1.5 System Monitoring Compounds (Surrogates)

Appropriate numbers of surrogate compounds were spiked into each sample for the EPA 8015B and 8260B analyses. All surrogate compound recoveries were within the laboratory's statistically determined acceptance ranges.

1.6 Laboratory Control Samples (LCS/ LCSD)

LCSs were prepared in duplicate (LCSD) and analyzed at the proper frequency for each analysis. The LCS and LCSD recoveries of all spiked analytes and the relative percent differences (RPDs) between the LCS/LCSD results were within laboratory's statistically determined acceptance ranges.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample **TW-3, TW-8, TW-11, TW-18, TW-20** (EPA 314.0), **TW-5, TW-13** (EPA 331.0) were utilized for MS/MSD analyses. All average MS/MSD recoveries reported and RPD between the results were within the laboratory's statistically determined acceptance ranges. For all other analyses, MS/MSDs for project samples were not provided. Consequently matrix effects cannot be determined.

1.8 Compound Identification and Quantitation

All compounds reported and the detection limits obtained comply with project specifications. All dilutions were appropriate.

Table I
Calscience Environmental Laboratories, Inc.

| Client Sample | Matrix | SDG | Laboratory Number | Date Sampled | Analyses Performed |
|---|---|---|---|---|---|
| **TW-3** | Water | 11-12-0927 | 11-12-0927-1 | 12/12/11 | EPA 314.0 |
| **TW-3 SOIL** | Soil | 11-12-0927 | 11-12-0927-2 | 12/12/11 | EPA 8260B, 6010B, 7471A, 8015B |
| **TW-2** | Water | 11-12-0927 | 11-12-0927-3 | 12/12/11 | NA |
| **EB-121211** (Equipment Blank) | Water | 11-12-0927 | 11-12-0927-4 | 12/12/11 | EPA 314.0 |
| **TW-1** | Water | 11-12-1002 | 11-12-1002-1 | 12/13/11 | EPA 314.0 |
| **TW-4** | Water | 11-12-1002 | 11-12-1002-2 | 12/13/11 | EPA 314.0 |
| **TW-5** | Water | 11-12-1002 | 11-12-1002-3 | 12/13/11 | EPA 331.0 |
| **TW-5** | Water | 11-12-1002 | 11-12-1002-4 | 12/13/11 | EPA 314.0 |
| **EB-121311** (Equipment Blank) | Water | 11-12-1002 | 11-12-1002-5 | 12/13/11 | EPA 314.0 |
| **TW-10** | Water | 11-12-1131 | 11-12-1131-1 | 12/14/11 | EPA 314.0 |
| **TW-12** | Water | 11-12-1131 | 11-12-1131-2 | 12/14/11 | EPA 314.0 |
| **TW-11** | Water | 11-12-1131 | 11-12-1131-3 | 12/14/11 | EPA 314.0 |
| **TW-13** | Water | 11-12-1131 | 11-12-1131-4 | 12/14/11 | EPA 331.0 |
| **TW-14** | Water | 11-12-1131 | 11-12-1131-5 | 12/14/11 | EPA 314.0 |
| **EB-121411** (Equipment Blank) | Water | 11-12-1131 | 11-12-1131-6 | 12/14/11 | EPA 314.0 |
| **TW-6** | Water | 11-12-1227 | 11-12-1227-1 | 12/15/11 | EPA 314.0 |
| **TW-7** | Water | 11-12-1227 | 11-12-1227-2 | 12/15/11 | EPA 314.0 |
| **TW-8** | Water | 11-12-1227 | 11-12-1227-3 | 12/15/11 | EPA 314.0 |
| **TW-2** | Water | 11-12-1227 | 11-12-1227-4 | 12/15/11 | EPA 314.0 |
| **TW-17** | Water | 11-12-1370 | 11-12-1370-1 | 12/15/11 | EPA 314.0, 331.0 |
| **EB-121511** (Equipment Blank) | Water | 11-12-1370 | 11-12-1370-2 | 12/15/11 | EPA 314.0 |
| **TW-18** | Water | 11-12-1370 | 11-12-1370-3 | 12/16/11 | EPA 314.0 |
| **TW-19** | Water | 11-12-1370 | 11-12-1370-4 | 12/16/11 | EPA 314.0 |
| **TW-16** | Water | 11-12-1370 | 11-12-1370-5 | 12/16/11 | EPA 314.0 |
| **TW-15** | Water | 11-12-1370 | 11-12-1370-6 | 12/16/11 | EPA 314.0 |
| **EB-121611** (Equipment Blank) | Water | 11-12-1370 | 11-12-1370-7 | 12/16/11 | EPA 314.0 |
| **Decon** | Water | 11-12-1644 | 11-12-1644-1 | 12/20/11 | EPA 8260B, 6010B, 7470A, 8015B, 314.0 |
| **TW-20** | Water | 11-12-1644 | 11-12-1644-2 | 12/21/11 | EPA 314.0 |
| **TW-9** | Water | 11-12-1644 | 11-12-1644-3 | 12/21/11 | EPA 314.0 |
| **TW-21** | Water | 11-12-1644 | 11-12-1644-4 | 12/21/11 | EPA 314.0 |
| **TW-22** | Water | 11-12-1644 | 11-12-1644-5 | 12/21/11 | EPA 314.0 |
| **EB-122111** (Equipment Blank) | Water | 11-12-1644 | 11-12-1644-6 | 12/21/11 | EPA 314.0 |

Notes: SDG: Sample Delivery Group NA: Not Analyzed
EPA 314.0: Perchlorate
EPA 331.0: Perchlorate
EPA 8260B: Volatile Organic Compounds (VOCs)
EPA 8015B: Extractable Fuel Hydrocarbons (CADHS); Diesel Range Organics (DRO), Oil Range Organics (ORO)
EPA 6010B: Total Metals
EPA 7470: Mercury
EPA 7471A: Mercury

**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.
h holding time violation.
i Internal standard failure.
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 Equipment 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.

Calscience Environmental Laboratories, Inc.

# CALSCIENCE

## WORK ORDER NUMBER: 11-12-0927

*The difference is service*

AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** URS Corporation

**Client Project Name:** Barstow Perchlorate / 29403643

**Attention:** Roberto Pinon
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Vikas Patel

Approved for release on 12/14/2011 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

# Contents

Client Project Name: Barstow Perchlorate / 29403643
Work Order Number: 11-12-0927

Calscience Environmental Laboratories, Inc.

| | | | |
|---|---|---|---|
| Client: | URS Corporation<br>915 Wilshire Blvd., Suite 700<br>Los Angeles, CA 90017-3437 | Work Order: | 11-12-0927 |
| | | Project name: | Barstow Perchlorate / 29403643 |
| | | Received: | 12/13/11 11:30 |
| Attn: | Roberto Pinon | | |

## DETECTIONS SUMMARY

| Client Sample ID<br>Analyte | Result | Qualifiers | Reporting Limit | Units | Method | Extraction |
|---|---|---|---|---|---|---|
| **TW-3** | | | | | | |
| Perchlorate | **1000** | | 40 | ug/L | EPA 314.0 | N/A |
| **TW-3 Soil** | | | | | | |
| Arsenic | **0.758** | | 0.750 | mg/kg | EPA 6010B | EPA 3050B |
| Barium | **17.6** | | 0.500 | mg/kg | EPA 6010B | EPA 3050B |
| Chromium | **2.03** | | 0.250 | mg/kg | EPA 6010B | EPA 3050B |
| Cobalt | **1.40** | | 0.250 | mg/kg | EPA 6010B | EPA 3050B |
| Copper | **1.57** | | 0.500 | mg/kg | EPA 6010B | EPA 3050B |
| Lead | **0.732** | | 0.500 | mg/kg | EPA 6010B | EPA 3050B |
| Nickel | **1.25** | | 0.250 | mg/kg | EPA 6010B | EPA 3050B |
| Vanadium | **7.20** | | 0.250 | mg/kg | EPA 6010B | EPA 3050B |
| Zinc | **7.96** | | 1.00 | mg/kg | EPA 6010B | EPA 3050B |

Subcontracted analyses, if any, are not included in this summary.

Return to Contents

*MDL is shown.

Calscience Environmental Laboratories, Inc.

# Analytical Report

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | 12/13/11 |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-0927 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow Perchlorate / 29403643 Page 1 of 1

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-3** | **11-12-0927-1-A** | **12/12/11 12:00** | **Aqueous** | **IC 8** | **N/A** | **12/13/11 15:16** | **111213L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 1000 | 40 | 20 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-121211** | **11-12-0927-4-A** | **12/12/11 15:00** | **Aqueous** | **IC 8** | **N/A** | **12/13/11 16:02** | **111213L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-05-203-1,379** | **N/A** | **Aqueous** | **IC 8** | **N/A** | **12/13/11 11:55** | **111213L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

# Analytical Report

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | 12/13/11 |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-0927 |
| Los Angeles, CA 90017-3437 | | Preparation: | EPA 3550B |
| | | Method: | EPA 8015B (M) |
| | | Units: | mg/kg |

Project: Barstow Perchlorate / 29403643 

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-3 Soil** | **11-12-0927-2-A** | **12/12/11 11:55** | **Solid** | **GC 46** | **12/13/11** | **12/14/11 00:40** | **111213B11A** |

Comment(s): -The Total concentration includes individual carbon range concentrations (estimated), if any, below the RL reported as ND.

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| C6 | ND | 5.0 | 1 | | C21-C22 | ND | 5.0 | 1 | |
| C7 | ND | 5.0 | 1 | | C23-C24 | ND | 5.0 | 1 | |
| C8 | ND | 5.0 | 1 | | C25-C28 | ND | 5.0 | 1 | |
| C9-C10 | ND | 5.0 | 1 | | C29-C32 | ND | 5.0 | 1 | |
| C11-C12 | ND | 5.0 | 1 | | C33-C36 | ND | 5.0 | 1 | |
| C13-C14 | ND | 5.0 | 1 | | C37-C40 | ND | 5.0 | 1 | |
| C15-C16 | ND | 5.0 | 1 | | C41-C44 | ND | 5.0 | 1 | |
| C17-C18 | ND | 5.0 | 1 | | C6-C44 Total | ND | 5.0 | 1 | |
| C19-C20 | ND | 5.0 | 1 | | | | | | |

| Surrogates: | REC (%) | Control Limits | Qual |
|---|---|---|---|
| Decachlorobiphenyl | 116 | 61-145 | |

| Method Blank | 099-14-085-512 | N/A | Solid | GC 46 | 12/13/11 | 12/13/11 21:53 | 111213B11A |
|---|---|---|---|---|---|---|---|

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| C6 | ND | 5.0 | 1 | | C21-C22 | ND | 5.0 | 1 | |
| C7 | ND | 5.0 | 1 | | C23-C24 | ND | 5.0 | 1 | |
| C8 | ND | 5.0 | 1 | | C25-C28 | ND | 5.0 | 1 | |
| C9-C10 | ND | 5.0 | 1 | | C29-C32 | ND | 5.0 | 1 | |
| C11-C12 | ND | 5.0 | 1 | | C33-C36 | ND | 5.0 | 1 | |
| C13-C14 | ND | 5.0 | 1 | | C37-C40 | ND | 5.0 | 1 | |
| C15-C16 | ND | 5.0 | 1 | | C41-C44 | ND | 5.0 | 1 | |
| C17-C18 | ND | 5.0 | 1 | | C6-C44 Total | ND | 5.0 | 1 | |
| C19-C20 | ND | 5.0 | 1 | | | | | | |

| Surrogates: | REC (%) | Control Limits | Qual |
|---|---|---|---|
| Decachlorobiphenyl | 102 | 61-145 | |

Return to Contents



7440 Lincoln Way, Garden Grove, CA 92841-1427 · TEL:(714) 895-5494 · FAX: (714) 894-7501

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/13/11
Work Order No: 11-12-0927
Preparation: EPA 5035
Method: EPA 8260B
Units: ug/kg

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-3 Soil** | **11-12-0927-2-C** | **12/12/11 11:55** | **Solid** | **GC/MS PP** | **12/13/11** | **12/13/11 13:51** | **111213L01** |

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | ND | 48 | 0.954 | | 1,3-Dichloropropane | ND | 0.95 | 0.954 | |
| Benzene | ND | 0.95 | 0.954 | | 2,2-Dichloropropane | ND | 4.8 | 0.954 | |
| Bromobenzene | ND | 0.95 | 0.954 | | 1,1-Dichloropropene | ND | 1.9 | 0.954 | |
| Bromochloromethane | ND | 1.9 | 0.954 | | c-1,3-Dichloropropene | ND | 0.95 | 0.954 | |
| Bromodichloromethane | ND | 0.95 | 0.954 | | t-1,3-Dichloropropene | ND | 1.9 | 0.954 | |
| Bromoform | ND | 4.8 | 0.954 | | Ethylbenzene | ND | 0.95 | 0.954 | |
| Bromomethane | ND | 19 | 0.954 | | 2-Hexanone | ND | 19 | 0.954 | |
| 2-Butanone | ND | 19 | 0.954 | | Isopropylbenzene | ND | 0.95 | 0.954 | |
| n-Butylbenzene | ND | 0.95 | 0.954 | | p-Isopropyltoluene | ND | 0.95 | 0.954 | |
| sec-Butylbenzene | ND | 0.95 | 0.954 | | Methylene Chloride | ND | 9.5 | 0.954 | |
| tert-Butylbenzene | ND | 0.95 | 0.954 | | 4-Methyl-2-Pentanone | ND | 19 | 0.954 | |
| Carbon Disulfide | ND | 9.5 | 0.954 | | Naphthalene | ND | 9.5 | 0.954 | |
| Carbon Tetrachloride | ND | 0.95 | 0.954 | | n-Propylbenzene | ND | 1.9 | 0.954 | |
| Chlorobenzene | ND | 0.95 | 0.954 | | Styrene | ND | 0.95 | 0.954 | |
| Chloroethane | ND | 1.9 | 0.954 | | 1,1,1,2-Tetrachloroethane | ND | 0.95 | 0.954 | |
| Chloroform | ND | 0.95 | 0.954 | | 1,1,2,2-Tetrachloroethane | ND | 1.9 | 0.954 | |
| Chloromethane | ND | 19 | 0.954 | | Tetrachloroethene | ND | 0.95 | 0.954 | |
| 2-Chlorotoluene | ND | 0.95 | 0.954 | | Toluene | ND | 0.95 | 0.954 | |
| 4-Chlorotoluene | ND | 0.95 | 0.954 | | 1,2,3-Trichlorobenzene | ND | 1.9 | 0.954 | |
| Dibromochloromethane | ND | 1.9 | 0.954 | | 1,2,4-Trichlorobenzene | ND | 1.9 | 0.954 | |
| 1,2-Dibromo-3-Chloropropane | ND | 4.8 | 0.954 | | 1,1,1-Trichloroethane | ND | 0.95 | 0.954 | |
| 1,2-Dibromoethane | ND | 0.95 | 0.954 | | 1,1,2-Trichloroethane | ND | 0.95 | 0.954 | |
| Dibromomethane | ND | 0.95 | 0.954 | | 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 9.5 | 0.954 | |
| 1,2-Dichlorobenzene | ND | 0.95 | 0.954 | | Trichloroethene | ND | 1.9 | 0.954 | |
| 1,3-Dichlorobenzene | ND | 0.95 | 0.954 | | Trichlorofluoromethane | ND | 9.5 | 0.954 | |
| 1,4-Dichlorobenzene | ND | 0.95 | 0.954 | | 1,2,3-Trichloropropane | ND | 1.9 | 0.954 | |
| Dichlorodifluoromethane | ND | 1.9 | 0.954 | | 1,2,4-Trimethylbenzene | ND | 1.9 | 0.954 | |
| 1,1-Dichloroethane | ND | 0.95 | 0.954 | | 1,3,5-Trimethylbenzene | ND | 1.9 | 0.954 | |
| 1,2-Dichloroethane | ND | 0.95 | 0.954 | | Vinyl Acetate | ND | 9.5 | 0.954 | |
| 1,1-Dichloroethene | ND | 0.95 | 0.954 | | Vinyl Chloride | ND | 0.95 | 0.954 | |
| c-1,2-Dichloroethene | ND | 0.95 | 0.954 | | p/m-Xylene | ND | 1.9 | 0.954 | |
| t-1,2-Dichloroethene | ND | 0.95 | 0.954 | | o-Xylene | ND | 0.95 | 0.954 | |
| 1,2-Dichloropropane | ND | 0.95 | 0.954 | | Methyl-t-Butyl Ether (MTBE) | ND | 1.9 | 0.954 | |
| Surrogates: | REC (%) | Control Limits | Qual | | Surrogates: | REC (%) | Control Limits | Qual | |
| 1,4-Bromofluorobenzene | 94 | 80-120 | | | Dibromofluoromethane | 99 | 79-133 | | |
| 1,2-Dichloroethane-d4 | 107 | 71-155 | | | Toluene-d8 | 98 | 80-120 | | |

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Return to Contents

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/13/11
Work Order No: 11-12-0927
Preparation: EPA 5035
Method: EPA 8260B
Units: ug/kg

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **095-01-025-22,397** | **N/A** | **Solid** | **GC/MS PP** | **12/13/11** | **12/13/11 12:57** | **111213L01** |

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | ND | 50 | 1 | | 1,3-Dichloropropane | ND | 1.0 | 1 | |
| Benzene | ND | 1.0 | 1 | | 2,2-Dichloropropane | ND | 5.0 | 1 | |
| Bromobenzene | ND | 1.0 | 1 | | 1,1-Dichloropropene | ND | 2.0 | 1 | |
| Bromochloromethane | ND | 2.0 | 1 | | c-1,3-Dichloropropene | ND | 1.0 | 1 | |
| Bromodichloromethane | ND | 1.0 | 1 | | t-1,3-Dichloropropene | ND | 2.0 | 1 | |
| Bromoform | ND | 5.0 | 1 | | Ethylbenzene | ND | 1.0 | 1 | |
| Bromomethane | ND | 20 | 1 | | 2-Hexanone | ND | 20 | 1 | |
| 2-Butanone | ND | 20 | 1 | | Isopropylbenzene | ND | 1.0 | 1 | |
| n-Butylbenzene | ND | 1.0 | 1 | | p-Isopropyltoluene | ND | 1.0 | 1 | |
| sec-Butylbenzene | ND | 1.0 | 1 | | Methylene Chloride | ND | 10 | 1 | |
| tert-Butylbenzene | ND | 1.0 | 1 | | 4-Methyl-2-Pentanone | ND | 20 | 1 | |
| Carbon Disulfide | ND | 10 | 1 | | Naphthalene | ND | 10 | 1 | |
| Carbon Tetrachloride | ND | 1.0 | 1 | | n-Propylbenzene | ND | 2.0 | 1 | |
| Chlorobenzene | ND | 1.0 | 1 | | Styrene | ND | 1.0 | 1 | |
| Chloroethane | ND | 2.0 | 1 | | 1,1,1,2-Tetrachloroethane | ND | 1.0 | 1 | |
| Chloroform | ND | 1.0 | 1 | | 1,1,2,2-Tetrachloroethane | ND | 2.0 | 1 | |
| Chloromethane | ND | 20 | 1 | | Tetrachloroethene | ND | 1.0 | 1 | |
| 2-Chlorotoluene | ND | 1.0 | 1 | | Toluene | ND | 1.0 | 1 | |
| 4-Chlorotoluene | ND | 1.0 | 1 | | 1,2,3-Trichlorobenzene | ND | 2.0 | 1 | |
| Dibromochloromethane | ND | 2.0 | 1 | | 1,2,4-Trichlorobenzene | ND | 2.0 | 1 | |
| 1,2-Dibromo-3-Chloropropane | ND | 5.0 | 1 | | 1,1,1-Trichloroethane | ND | 1.0 | 1 | |
| 1,2-Dibromoethane | ND | 1.0 | 1 | | 1,1,2-Trichloroethane | ND | 1.0 | 1 | |
| Dibromomethane | ND | 1.0 | 1 | | 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 10 | 1 | |
| 1,2-Dichlorobenzene | ND | 1.0 | 1 | | Trichloroethene | ND | 2.0 | 1 | |
| 1,3-Dichlorobenzene | ND | 1.0 | 1 | | Trichlorofluoromethane | ND | 10 | 1 | |
| 1,4-Dichlorobenzene | ND | 1.0 | 1 | | 1,2,3-Trichloropropane | ND | 2.0 | 1 | |
| Dichlorodifluoromethane | ND | 2.0 | 1 | | 1,2,4-Trimethylbenzene | ND | 2.0 | 1 | |
| 1,1-Dichloroethane | ND | 1.0 | 1 | | 1,3,5-Trimethylbenzene | ND | 2.0 | 1 | |
| 1,2-Dichloroethane | ND | 1.0 | 1 | | Vinyl Acetate | ND | 10 | 1 | |
| 1,1-Dichloroethene | ND | 1.0 | 1 | | Vinyl Chloride | ND | 1.0 | 1 | |
| c-1,2-Dichloroethene | ND | 1.0 | 1 | | p/m-Xylene | ND | 2.0 | 1 | |
| t-1,2-Dichloroethene | ND | 1.0 | 1 | | o-Xylene | ND | 1.0 | 1 | |
| 1,2-Dichloropropane | ND | 1.0 | 1 | | Methyl-t-Butyl Ether (MTBE) | ND | 2.0 | 1 | |
| Surrogates: | REC (%) | Control Limits | | Qual | Surrogates: | REC (%) | Control Limits | | Qual |
| 1,4-Bromofluorobenzene | 95 | 80-120 | | | Dibromofluoromethane | 96 | 79-133 | | |
| 1,2-Dichloroethane-d4 | 103 | 71-155 | | | Toluene-d8 | 99 | 80-120 | | |

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Return to Contents

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/13/11
Work Order No: 11-12-0927
Preparation: EPA 3050B / EPA 7471A Total
Method: EPA 6010B / EPA 7471A
Units: mg/kg

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date /Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-3 Soil** | **11-12-0927-2-A** | **12/12/11 11:55** | **Solid** | **ICP 5300** | **12/13/11** | **12/13/11 19:10** | **111213L01** |

Comment(s): -Mercury analysis was performed on 12/13/11 16:57 with batch 111213L01.

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | 0.750 | 1 | | Mercury | ND | 0.0835 | 1 | |
| Arsenic | 0.758 | 0.750 | 1 | | Molybdenum | ND | 0.250 | 1 | |
| Barium | 17.6 | 0.500 | 1 | | Nickel | 1.25 | 0.250 | 1 | |
| Beryllium | ND | 0.250 | 1 | | Selenium | ND | 0.750 | 1 | |
| Cadmium | ND | 0.500 | 1 | | Silver | ND | 0.250 | 1 | |
| Chromium | 2.03 | 0.250 | 1 | | Thallium | ND | 0.750 | 1 | |
| Cobalt | 1.40 | 0.250 | 1 | | Vanadium | 7.20 | 0.250 | 1 | |
| Copper | 1.57 | 0.500 | 1 | | Zinc | 7.96 | 1.00 | 1 | |
| Lead | 0.732 | 0.500 | 1 | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-04-007-8,402** | **N/A** | **Solid** | **Mercury** | **12/13/11** | **12/13/11 12:04** | **111213L01** |

Comment(s): -Preparation/analysis for Mercury was performed by EPA 7471A.

| Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|
| Mercury | ND | 0.0835 | 1 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **097-01-002-15,505** | **N/A** | **Solid** | **ICP 5300** | **12/13/11** | **12/13/11 19:06** | **111213L01** |

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | 0.750 | 1 | | Lead | ND | 0.500 | 1 | |
| Arsenic | ND | 0.750 | 1 | | Molybdenum | ND | 0.250 | 1 | |
| Barium | ND | 0.500 | 1 | | Nickel | ND | 0.250 | 1 | |
| Beryllium | ND | 0.250 | 1 | | Selenium | ND | 0.750 | 1 | |
| Cadmium | ND | 0.500 | 1 | | Silver | ND | 0.250 | 1 | |
| Chromium | ND | 0.250 | 1 | | Thallium | ND | 0.750 | 1 | |
| Cobalt | ND | 0.250 | 1 | | Vanadium | ND | 0.250 | 1 | |
| Copper | ND | 0.500 | 1 | | Zinc | ND | 1.00 | 1 | |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

# Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/13/11
Work Order No: 11-12-0927
Preparation: N/A
Method: EPA 314.0

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-3** | **Aqueous** | **IC 8** | **N/A** | **12/13/11** | **111213S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 2500 | 95 | 93 | 80-120 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

# Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/13/11
Work Order No: 11-12-0927
Preparation: EPA 3550B
Method: EPA 8015B (M)

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **11-12-0791-3** | **Solid** | **GC 46** | **12/13/11** | **12/13/11** | **111213S11** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| TPH as Diesel | 400.0 | 100 | 99 | 64-130 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

# Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/13/11
Work Order No: 11-12-0927
Preparation: EPA 7471A Total
Method: EPA 7471A

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **11-12-0777-1** | **Solid** | **Mercury** | **12/13/11** | **12/13/11** | **111213S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Mercury | 0.8350 | 108 | 111 | 71-137 | 3 | 0-14 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

# Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: N/A
Work Order No: 11-12-0927
Preparation: EPA 3050B
Method: EPA 6010B

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **097-01-002-15,505** | **Solid** | **ICP 5300** | **12/13/11** | **12/13/11** | **111213L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | ME_CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|---|
| Antimony | 25.00 | 99 | 99 | 80-120 | 73-127 | 1 | 0-20 | |
| Arsenic | 25.00 | 99 | 99 | 80-120 | 73-127 | 0 | 0-20 | |
| Barium | 25.00 | 102 | 102 | 80-120 | 73-127 | 1 | 0-20 | |
| Beryllium | 25.00 | 99 | 98 | 80-120 | 73-127 | 1 | 0-20 | |
| Cadmium | 25.00 | 101 | 100 | 80-120 | 73-127 | 1 | 0-20 | |
| Chromium | 25.00 | 99 | 98 | 80-120 | 73-127 | 1 | 0-20 | |
| Cobalt | 25.00 | 107 | 106 | 80-120 | 73-127 | 1 | 0-20 | |
| Copper | 25.00 | 100 | 99 | 80-120 | 73-127 | 1 | 0-20 | |
| Lead | 25.00 | 104 | 103 | 80-120 | 73-127 | 1 | 0-20 | |
| Molybdenum | 25.00 | 102 | 101 | 80-120 | 73-127 | 1 | 0-20 | |
| Nickel | 25.00 | 104 | 103 | 80-120 | 73-127 | 1 | 0-20 | |
| Selenium | 25.00 | 99 | 99 | 80-120 | 73-127 | 1 | 0-20 | |
| Silver | 12.50 | 94 | 94 | 80-120 | 73-127 | 1 | 0-20 | |
| Thallium | 25.00 | 100 | 100 | 80-120 | 73-127 | 0 | 0-20 | |
| Vanadium | 25.00 | 96 | 96 | 80-120 | 73-127 | 1 | 0-20 | |
| Zinc | 25.00 | 107 | 106 | 80-120 | 73-127 | 1 | 0-20 | |

Total number of LCS compounds : 16
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-0927 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-05-203-1,379** | **Aqueous** | **IC 8** | **N/A** | **12/13/11** | **111213L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 25 | 97 | 98 | 85-115 | 0 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-0927 |
| Los Angeles, CA 90017-3437 | | Preparation: | EPA 3550B |
| | | Method: | EPA 8015B (M) |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-14-085-512** | **Solid** | **GC 46** | **12/13/11** | **12/13/11** | **111213B11A** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| TPH as Diesel | 400.0 | 100 | 102 | 75-123 | 2 | 0-12 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-0927 |
| Los Angeles, CA 90017-3437 | | Preparation: | EPA 7471A Total |
| | | Method: | EPA 7471A |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-04-007-8,402** | **Solid** | **Mercury** | **12/13/11** | **12/13/11** | **111213L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Mercury | 0.8350 | 96 | 96 | 85-121 | 1 | 0-10 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

# Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: N/A
Work Order No: 11-12-0927
Preparation: EPA 5035
Method: EPA 8260B

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **095-01-025-22,397** | **Solid** | **GC/MS PP** | **12/13/11** | **12/13/11** | **111213L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | ME_CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|---|
| Benzene | 50.00 | 98 | 101 | 80-120 | 73-127 | 3 | 0-20 | |
| Carbon Tetrachloride | 50.00 | 110 | 113 | 65-137 | 53-149 | 3 | 0-20 | |
| Chlorobenzene | 50.00 | 104 | 107 | 80-120 | 73-127 | 3 | 0-20 | |
| 1,2-Dibromoethane | 50.00 | 106 | 110 | 80-120 | 73-127 | 4 | 0-20 | |
| 1,2-Dichlorobenzene | 50.00 | 101 | 106 | 80-120 | 73-127 | 6 | 0-20 | |
| 1,2-Dichloroethane | 50.00 | 106 | 110 | 80-120 | 73-127 | 4 | 0-20 | |
| 1,1-Dichloroethene | 50.00 | 106 | 108 | 68-128 | 58-138 | 2 | 0-20 | |
| Ethylbenzene | 50.00 | 105 | 106 | 80-120 | 73-127 | 1 | 0-20 | |
| Toluene | 50.00 | 97 | 101 | 80-120 | 73-127 | 4 | 0-20 | |
| Trichloroethene | 50.00 | 102 | 106 | 80-120 | 73-127 | 4 | 0-20 | |
| Vinyl Chloride | 50.00 | 118 | 118 | 67-127 | 57-137 | 0 | 0-20 | |
| Methyl-t-Butyl Ether (MTBE) | 50.00 | 99 | 100 | 70-124 | 61-133 | 1 | 0-20 | |

Total number of LCS compounds : 12
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Glossary of Terms and Qualifiers

ACCREDITED IN ACCORDANCE WITH nelac

Work Order Number: 11-12-0927

| Qualifier | Definition |
|---|---|
| * | See applicable analysis comment. |
| < | Less than the indicated value. |
| > | Greater than the indicated value. |
| 1 | Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification. |
| 2 | Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. |
| 3 | Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification. |
| 4 | The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification. |
| 5 | The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification. |
| 6 | Surrogate recovery below the acceptance limit. |
| 7 | Surrogate recovery above the acceptance limit. |
| B | Analyte was present in the associated method blank. |
| BU | Sample analyzed after holding time expired. |
| E | Concentration exceeds the calibration range. |
| ET | Sample was extracted past end of recommended max. holding time. |
| HD | The chromatographic pattern was inconsistent with the profile of the reference fuel standard. |
| HDH | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected). |
| HDL | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected). |
| J | Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated. |
| ME | LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range. |
| ND | Parameter not detected at the indicated reporting limit. |
| Q | Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. |
| SG | The sample extract was subjected to Silica Gel treatment prior to analysis. |
| X | % Recovery and/or RPD out-of-range. |
| Z | Analyte presence was not confirmed by second column or GC/MS analysis. |
| | Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis. |

Return to Contents

# Calscience Environmental Laboratories, Inc.

## CHAIN OF CUSTODY RECORD

SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WO # / LAB USE ONLY: **11-12-0927**

Date 12/12/11

Page 1 of 1

LABORATORY CLIENT: URS Corporation

ADDRESS: 915 Wilshire Blvd Ste. 700

CITY: LA STATE: CA ZIP: 90017

TEL: 213 996 2200 E-MAIL: Roberto.Pinon@URS.com

CLIENT PROJECT NAME / NUMBER: Barstow Perchlorate 29403643

P.O. NO.:

PROJECT CONTACT: Roberto Piñon

SAMPLER(S): (PRINT) Andrew Vigna

TURNAROUND TIME: ☐ SAME DAY ☒ 24 HR ☐ 48 HR ☐ 72 HR ☐ STANDARD

☐ COELT EDF GLOBAL ID LOG CODE

SPECIAL INSTRUCTIONS:
* Please let aqueous samples settle out and collect aliquot from upper portion.

**REQUESTED ANALYSES**

| LAB USE ONLY | SAMPLE ID | SAMPLING DATE | SAMPLING TIME | MATRIX | NO. OF CONT. | Unpreserved | Preserved | Field Filtered | TPH (g) or GRO | TPH (d) or DRO or (C6-C36) or (C6-C44) | TPH ( ) | BTEX / MTBE (8260) or ( ) | VOCs (8260) | Oxygenates (8260) | En Core / Terra Core Prep (5035) | SVOCs (8270) | Pesticides (8081) | PCBs (8082) | PNAs (8310) or (8270) | T22 Metals (6010/747X) | Cr(VI) [7196 or 7199 or 218.6] | Air - VOCs (TO-14A) or (TO-15) | Air - TPH (g) [TO-3] | USEPA Method 314.0 | USEPA Method 331.0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TW-3 | 12/12/11 | 1200 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 2 | TW-3 Soil | " | 1155 | Soil | 4 | X | | | | X | | | X | | X | | | | | X | | | | | | | |
| 3 | TW-2 | " | 1420 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | | X | |
| 4 | EB-12.12.11 | " | 1500 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |

AV

| | | | |
|---|---|---|---|
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: 12/12/11 | Time: 1540 |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: | Time: |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) Priority A. (UPS) | Date: 12/13/11 | Time: 11:30 |

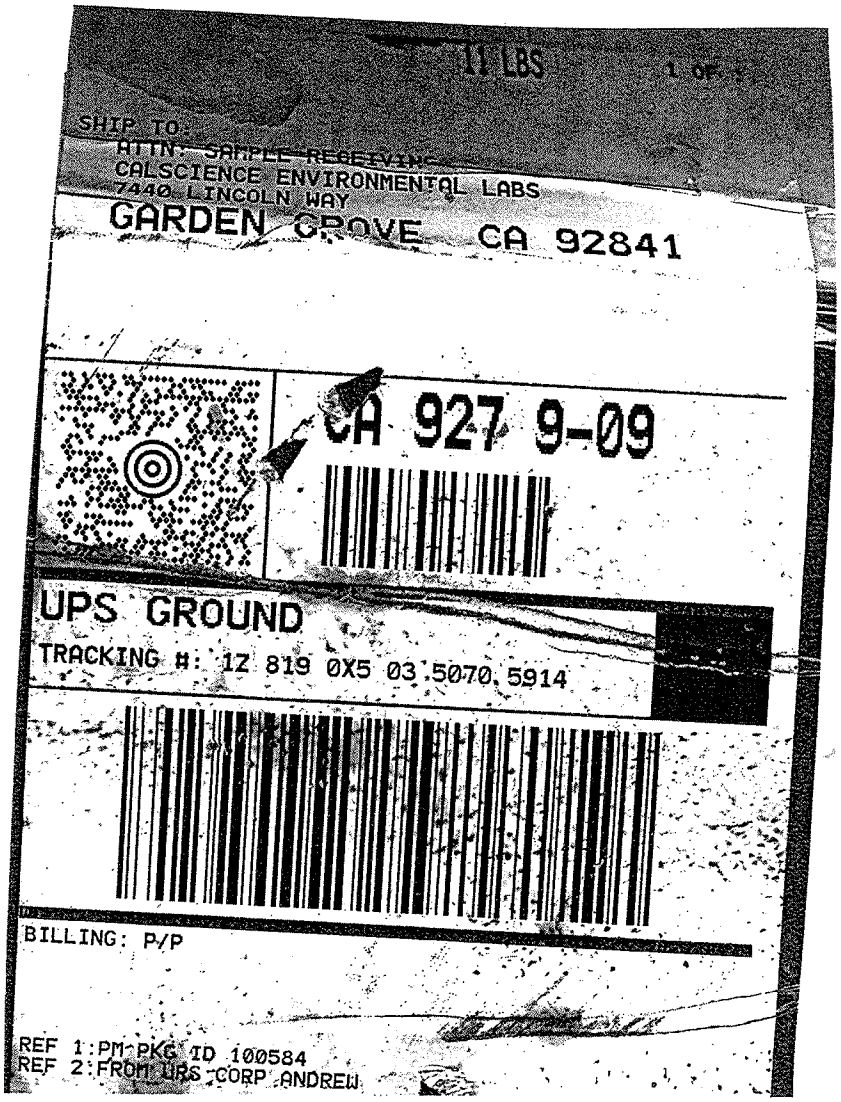
DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision



Return to Contents

0927




Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-0927

# SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: UPS CORP DATE: 12/13/11

**TEMPERATURE:** Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

**Temperature** 1.4 °C - 0.3 °C (CF) = 1.1 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

**Ambient Temperature:** ☐ Air ☐ Filter **Initial:** RT

**CUSTODY SEALS INTACT:**

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Initial:** RT

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Initial:** YL

| **SAMPLE CONDITION:** | Yes | No | N/A |
|---|---|---|---|
| Chain-Of-Custody (COC) document(s) received with samples | ☑ | ☐ | ☐ |
| COC document(s) received complete | ☑ | ☐ | ☐ |
| ☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels. | | | |
| ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished. | | | |
| Sampler's name indicated on COC | ☑ | ☐ | ☐ |
| Sample container label(s) consistent with COC | ☑ | ☐ | ☐ |
| Sample container(s) intact and good condition | ☐ | ☑ | ☐ |
| Proper containers and sufficient volume for analyses requested | ☐ | ☐ | ☐ |
| Analyses received within holding time | ☑ | ☐ | ☐ |
| pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours | ☐ | ☐ | ☑ |
| Proper preservation noted on COC or sample container | ☑ | ☐ | ☐ |
| ☐ Unpreserved vials received for Volatiles analysis | | | |
| Volatile analysis container(s) free of headspace | ☐ | ☐ | ☑ |
| Tedlar bag(s) free of condensation | ☐ | ☐ | ☑ |

**CONTAINER TYPE:**

**Solid:** ☐4ozCGJ ☐8ozCGJ ☑16ozCGJ ☐Sleeve (_____) ☑3EnCores® ☐TerraCores® ☐_____

**Water:** ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☑125PB ☐125PB**znna** ☑(-3)100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

**Air:** ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** YL

**Container:** **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** WL

**Preservative:** **h:** HCL **n:** $HNO_3$ **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** $H_3PO_4$ **s:** $H_2SO_4$ **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** WL

Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-0927

# SAMPLE ANOMALY FORM

## SAMPLES - CONTAINERS & LABELS:

Comments:

- ☐ **Sample(s) NOT RECEIVED but listed on COC**
- ☐ **Sample(s) received but NOT LISTED on COC**
- ☐ **Holding time expired** – list sample ID(s) and test
- ☐ **Insufficient quantities for analysis** – list test
- ☐ **Improper container(s) used** – list test
- ☐ **Improper preservative used** – list test
- ☐ **No preservative noted on COC or label** – list test & notify lab
- ☐ **Sample labels illegible** – note test/container type
- ☐ **Sample label(s) do not match COC** – Note in comments
  - ☐ **Sample ID**
  - ☐ **Date and/or Time Collected**
  - ☐ **Project Information**
  - ☐ **# of Container(s)**
  - ☐ **Analysis**
- ☑ **Sample container(s) compromised** – Note in comments
  - ☐ **Water present in sample container**
  - ☑ **Broken**
- ☐ **Sample container(s) not labeled**
- ☐ **Air sample container(s) compromised** – Note in comments
  - ☐ **Flat**
  - ☐ **Very low in volume**
  - ☐ **Leaking (Not transferred - duplicate bag submitted)**
  - ☐ **Leaking (transferred into Calscience Tedlar® Bag*)**
  - ☐ **Leaking (transferred into Client's Tedlar® Bag*)**
- ☐ **Other:** _____

(3) 1 of 1 100 ml plastic container received broken

## HEADSPACE – Containers with Bubble > 6mm or ¼ inch:

| Sample # | Container ID(s) | # of Vials Received | Sample # | Container ID(s) | # of Vials Received | Sample # | Container ID(s) | # of Cont. received | Analysis |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Comments: _____

*Transferred at Client's request.

Initial / Date: WS 12/13/11



Return to Contents

Calscience Environmental Laboratories, Inc.

# CALSCIENCE

## WORK ORDER NUMBER: 11-12-1002

*The difference is service*

AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** URS Corporation

**Client Project Name:** Barstow LRWQCB / 29403643

**Attention:** Roberto Pinon
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Vikas Patel

Approved for release on 02/1/2012 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

# Contents

Client Project Name: Barstow LRWQCB / 29403643
Work Order Number: 11-12-1002

Calscience Environmental Laboratories, Inc.

| | | | |
|---|---|---|---|
| Client: | URS Corporation<br>915 Wilshire Blvd., Suite 700<br>Los Angeles, CA 90017-3437 | Work Order: | 11-12-1002 |
| | | Project name: | Barstow LRWQCB / 29403643 |
| | | Received: | 12/14/11 10:30 |
| Attn: | Roberto Pinon | | |

## DETECTIONS SUMMARY

| Client Sample ID<br>Analyte | Result | Qualifiers | Reporting Limit | Units | Method | Extraction |
|---|---|---|---|---|---|---|
| TW-1 | | | | | | |
| Perchlorate | **61** | | 2.0 | ug/L | EPA 314.0 | N/A |
| TW-4 | | | | | | |
| Perchlorate | **51** | | 2.0 | ug/L | EPA 314.0 | N/A |
| TW-5 | | | | | | |
| Perchlorate | **30** | | 1.0 | ug/L | EPA 331.0 (M) | N/A |
| TW-5 | | | | | | |
| Perchlorate | **35** | | 2.0 | ug/L | EPA 314.0 | N/A |

Subcontracted analyses, if any, are not included in this summary.

Return to Contents

*MDL is shown.

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/14/11
Work Order No: 11-12-1002
Preparation: N/A
Method: EPA 314.0

Project: Barstow LRWQCB / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-1** | **11-12-1002-1-A** | **12/13/11 08:30** | **Aqueous** | **IC 8** | **N/A** | **12/14/11 15:26** | **111214L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 61 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-4** | **11-12-1002-2-A** | **12/13/11 11:40** | **Aqueous** | **IC 8** | **N/A** | **12/14/11 15:40** | **111214L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 51 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-5** | **11-12-1002-4-A** | **12/13/11 15:10** | **Aqueous** | **IC 8** | **N/A** | **12/14/11 15:55** | **111214L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 35 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-121311** | **11-12-1002-5-A** | **12/13/11 15:20** | **Aqueous** | **IC 8** | **N/A** | **12/14/11 15:11** | **111214L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-05-203-1,380** | **N/A** | **Aqueous** | **IC 8** | **N/A** | **12/14/11 14:28** | **111214L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/14/11
Work Order No: 11-12-1002
Preparation: N/A
Method: EPA 331.0 (M)

Project: Barstow LRWQCB / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-5** | **11-12-1002-3-A** | **12/13/11 15:05** | **Aqueous** | **LC/MS 1** | **12/14/11** | **12/14/11 21:29** | **111214L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 30 | 1.0 | 1 | | ug/L |

| Method Blank | 099-12-420-36 | N/A | Aqueous | LC/MS 1 | 12/14/11 | 12/14/11 21:10 | 111214L01 |
|---|---|---|---|---|---|---|---|

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 1.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/14/11
Work Order No: 11-12-1002
Preparation: N/A
Method: EPA 314.0

Project Barstow LRWQCB / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **11-12-1057-1** | **Aqueous** | **IC 8** | **N/A** | **12/14/11** | **111214S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 50 | 89 | 88 | 80-120 | 2 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/14/11
Work Order No: 11-12-1002
Preparation: N/A
Method: EPA 331.0 (M)

Project Barstow LRWQCB / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-5** | **Aqueous** | **LC/MS 1** | **12/14/11** | **12/14/11** | **111214S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 10 | 90 | 83 | 80-120 | 2 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1002 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow LRWQCB / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-05-203-1,380** | **Aqueous** | **IC 8** | **N/A** | **12/14/11** | **111214L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 25 | 101 | 102 | 85-115 | 2 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: N/A
Work Order No: 11-12-1002
Preparation: N/A
Method: EPA 331.0 (M)

Project: Barstow LRWQCB / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-12-420-36** | **Aqueous** | **LC/MS 1** | **12/14/11** | **12/14/11** | **111214L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 10 | 96 | 100 | 85-115 | 4 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Glossary of Terms and Qualifiers

ACCREDITED IN ACCORDANCE WITH nelac

Work Order Number: 11-12-1002

| Qualifier | Definition |
|---|---|
| * | See applicable analysis comment. |
| < | Less than the indicated value. |
| > | Greater than the indicated value. |
| 1 | Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification. |
| 2 | Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. |
| 3 | Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification. |
| 4 | The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification. |
| 5 | The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification. |
| 6 | Surrogate recovery below the acceptance limit. |
| 7 | Surrogate recovery above the acceptance limit. |
| B | Analyte was present in the associated method blank. |
| BU | Sample analyzed after holding time expired. |
| E | Concentration exceeds the calibration range. |
| ET | Sample was extracted past end of recommended max. holding time. |
| HD | The chromatographic pattern was inconsistent with the profile of the reference fuel standard. |
| HDH | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected). |
| HDL | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected). |
| J | Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated. |
| ME | LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range. |
| ND | Parameter not detected at the indicated reporting limit. |
| Q | Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. |
| SG | The sample extract was subjected to Silica Gel treatment prior to analysis. |
| X | % Recovery and/or RPD out-of-range. |
| Z | Analyte presence was not confirmed by second column or GC/MS analysis. |

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

Return to Contents

# Calscience Environmental Laboratories, Inc.

## CHAIN OF CUSTODY RECORD

SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WO # / LAB USE ONLY: 11-12-1002

Date: 12/13/11

Page 1 of 1

LABORATORY CLIENT: URS Corporation

ADDRESS: 915 Wilshire Blvd. Ste. 700

CITY: LA STATE: CA ZIP: 90017

TEL: 213 996 2200 E-MAIL: Roberto.Piñon@URS.com

CLIENT PROJECT NAME / NUMBER: Barstow LRWQCB / 29403643

P.O. NO.:

PROJECT CONTACT: Roberto Piñon

SAMPLER(S): (PRINT) A. Vigna

TURNAROUND TIME: ☐ SAME DAY ☒ 24 HR ☐ 48 HR ☐ 72 HR ☐ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS: Please let aqueous samples settle before taking aliquot

**REQUESTED ANALYSES**

| LAB USE ONLY | SAMPLE ID | SAMPLING DATE | SAMPLING TIME | MATRIX | NO. OF CONT. | Unpreserved | Preserved | Field Filtered | TPH (g) or GRO | TPH (d) or DRO or (C6-C36) or (C6-C44) | TPH ( ) | BTEX / MTBE (8260) or ( ) | VOCs (8260) | Oxygenates (8260) | En Core / Terra Core Prep (5035) | SVOCs (8270) | Pesticides (8081) | PCBs (8082) | PNAs (8310) or (8270) | T22 Metals (6010/747X) | Cr(VI) [7196 or 7199 or 218.6] | Air - VOCs (TO-14A) or (TO-15) | Air - TPH (g) [TO-3] | USEPA 314.0 | USEPA 331.0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TW-1 | 12/13/11 | 0830 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 2 | TW-4 | ↓ | 1140 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 3 | TW-5 | | 1505 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | (2) | X | X | |
| 4 | TW-5 | | 1510 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 5 | EB-121311 | | 1520 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| | | | | | | | | | | | | | | | | | | | | | | (1) | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: (Signature) Andrew Vig | Received by: (Signature/Affiliation) | Date: 12/13/11 | Time: 1545 |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: | Time: |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: 12/14/11 | Time: 1030 |

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

Return to Contents

1002

OFFICE WORKS
(760) 252-8833
909 ARMORY ROAD
BARSTOW CA 92311

12 LBS

1 OF 1

SHIP TO:
ATTN: SAMPLE RECEIVING
CALSCIENCE ENVIRONMENTAL LABS
7440 LINCOLN WAY
GARDEN GROVE CA 92841

CA 927 9-09

UPS GROUND

TRACKING #: 1Z 819 0X5 03 6123 5607

BILLING: P/P

REF 1:PM PKG ID 100666
REF 2:FROM URS CORP ANDREW

WS 10.0.49 LP2844 21.0A 10/2011

SEE NOTICE ON REVERSE regarding UPS Terms, and notice of limitation of liability. Where allowed by law, shipper authorizes UPS to act as forwarding agent for export control and customs purposes. If exported from the US, shipper certifies that the commodities, technology or software were exported from the US in accordance with the Export Administration Regulations. Diversion contrary to law is prohibited

Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1002

# SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: UPS DATE: 12/14/11

**TEMPERATURE:** Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

**Temperature** 3.1 °C - 0.3 °C (CF) = 2.8 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

**Ambient Temperature:** ☐ Air ☐ Filter Initial: JH

**CUSTODY SEALS INTACT:**

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial: JH

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: JH

| SAMPLE CONDITION: | Yes | No | N/A |
|---|---|---|---|
| Chain-Of-Custody (COC) document(s) received with samples | ☑ | ☐ | ☐ |
| COC document(s) received complete | ☑ | ☐ | ☐ |
| ☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels. | | | |
| ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished. | | | |
| Sampler's name indicated on COC | ☑ | ☐ | ☐ |
| Sample container label(s) consistent with COC | ☑ | ☐ | ☐ |
| Sample container(s) intact and good condition | ☑ | ☐ | ☐ |
| Proper containers and sufficient volume for analyses requested | ☑ | ☐ | ☐ |
| Analyses received within holding time | ☑ | ☐ | ☐ |
| pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours | ☐ | ☐ | ☑ |
| Proper preservation noted on COC or sample container | ☑ | ☐ | ☐ |
| ☐ Unpreserved vials received for Volatiles analysis | | | |
| Volatile analysis container(s) free of headspace | ☐ | ☐ | ☑ |
| Tedlar bag(s) free of condensation | ☐ | ☐ | ☑ |

**CONTAINER TYPE:**

**Solid:** ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

**Water:** ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☑125PB ☐125PB**znna** (-3) ☑100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

**Air:** ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** JS

**Container:** **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** YC

**Preservative:** **h:** HCL **n:** $HNO_3$ **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** $H_3PO_4$ **s:** $H_2SO_4$ **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** JS



Return to Contents

Calscience Environmental Laboratories, Inc.

# CALSCIENCE

## WORK ORDER NUMBER: 11-12-1131

*The difference is service*

AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** URS Corporation

**Client Project Name:** Barstow Perchlorate / 29403643

**Attention:** Roberto Pinon
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Vikas Patel

Approved for release on 12/16/2011 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

# Contents

Client Project Name: Barstow Perchlorate / 29403643
Work Order Number: 11-12-1131

Calscience Environmental Laboratories, Inc.

| | | | |
|---|---|---|---|
| Client: | URS Corporation<br>915 Wilshire Blvd., Suite 700<br>Los Angeles, CA 90017-3437 | Work Order: | 11-12-1131 |
| | | Project name: | Barstow Perchlorate / 29403643 |
| | | Received: | 12/15/11 10:00 |
| Attn: | Roberto Pinon | | |

## DETECTIONS SUMMARY

| Client Sample ID<br>Analyte | Result | Qualifiers | Reporting Limit | Units | Method | Extraction |
|---|---|---|---|---|---|---|
| TW-13 | | | | | | |
| Perchlorate | **16** | | 1.0 | ug/L | EPA 331.0 (M) | N/A |

Subcontracted analyses, if any, are not included in this summary.

Return to Contents

*MDL is shown.

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/15/11
Work Order No: 11-12-1131
Preparation: N/A
Method: EPA 314.0

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-10** | **11-12-1131-1-A** | **12/14/11 09:50** | **Aqueous** | **IC 8** | **N/A** | **12/15/11 12:51** | **111215L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-12** | **11-12-1131-2-A** | **12/14/11 11:10** | **Aqueous** | **IC 8** | **N/A** | **12/15/11 13:06** | **111215L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-11** | **11-12-1131-3-A** | **12/14/11 12:45** | **Aqueous** | **IC 8** | **N/A** | **12/15/11 13:20** | **111215L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-14** | **11-12-1131-5-A** | **12/14/11 15:55** | **Aqueous** | **IC 8** | **N/A** | **12/15/11 13:35** | **111215L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-121411** | **11-12-1131-6-A** | **12/14/11 16:00** | **Aqueous** | **IC 8** | **N/A** | **12/15/11 12:37** | **111215L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-05-203-1,381** | **N/A** | **Aqueous** | **IC 8** | **N/A** | **12/15/11 11:54** | **111215L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/15/11
Work Order No: 11-12-1131
Preparation: N/A
Method: EPA 331.0 (M)

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-13** | **11-12-1131-4-A** | **12/14/11 14:45** | **Aqueous** | **LC/MS 1** | **12/16/11** | **12/16/11 11:06** | **111216L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 16 | 1.0 | 1 | | ug/L |

| Method Blank | 099-12-420-37 | N/A | Aqueous | LC/MS 1 | 12/16/11 | 12/16/11 10:47 | 111216L01 |
|---|---|---|---|---|---|---|---|

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 1.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/15/11
Work Order No: 11-12-1131
Preparation: N/A
Method: EPA 314.0

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-11** | **Aqueous** | **IC 8** | **N/A** | **12/15/11** | **111215S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 50 | 97 | 97 | 80-120 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/15/11
Work Order No: 11-12-1131
Preparation: N/A
Method: EPA 331.0 (M)

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-13** | **Aqueous** | **LC/MS 1** | **12/16/11** | **12/16/11** | **111216S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 10 | 86 | 84 | 80-120 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1131 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-05-203-1,381** | **Aqueous** | **IC 8** | **N/A** | **12/15/11** | **111215L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 25 | 101 | 102 | 85-115 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: N/A
Work Order No: 11-12-1131
Preparation: N/A
Method: EPA 331.0 (M)

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-12-420-37** | **Aqueous** | **LC/MS 1** | **12/16/11** | **12/16/11** | **111216L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 10 | 91 | 86 | 85-115 | 6 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Glossary of Terms and Qualifiers

ACCREDITED IN ACCORDANCE WITH nelac

Work Order Number: 11-12-1131

| Qualifier | Definition |
|---|---|
| * | See applicable analysis comment. |
| < | Less than the indicated value. |
| > | Greater than the indicated value. |
| 1 | Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification. |
| 2 | Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. |
| 3 | Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification. |
| 4 | The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification. |
| 5 | The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification. |
| 6 | Surrogate recovery below the acceptance limit. |
| 7 | Surrogate recovery above the acceptance limit. |
| B | Analyte was present in the associated method blank. |
| BU | Sample analyzed after holding time expired. |
| E | Concentration exceeds the calibration range. |
| ET | Sample was extracted past end of recommended max. holding time. |
| HD | The chromatographic pattern was inconsistent with the profile of the reference fuel standard. |
| HDH | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected). |
| HDL | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected). |
| J | Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated. |
| ME | LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range. |
| ND | Parameter not detected at the indicated reporting limit. |
| Q | Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. |
| SG | The sample extract was subjected to Silica Gel treatment prior to analysis. |
| X | % Recovery and/or RPD out-of-range. |
| Z | Analyte presence was not confirmed by second column or GC/MS analysis. |

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

Return to Contents

# Calscience Environmental Laboratories, Inc.

## CHAIN OF CUSTODY RECORD

Date 12/14/11

Page 1 of 1


☒ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022


WO # / LAB USE ONLY: ☐ 11-12-1131

LABORATORY CLIENT: URS Corporation

ADDRESS: 915 Wilshire Blvd, Ste. 700

CITY: LA STATE: CA ZIP: 90017

TEL: 213 996 2200 E-MAIL: Roberto.Pinon@URS.com

CLIENT PROJECT NAME / NUMBER: Barstow Perchlorate 29403643

P.O. NO.:

PROJECT CONTACT: Roberto Piñon

SAMPLER(S): (PRINT) Andrew Vigna

TURNAROUND TIME: ☐ SAME DAY ☒ 24 HR ☐ 48 HR ☐ 72 HR ☐ STANDARD

☐ COELT EDF GLOBAL ID LOG CODE

SPECIAL INSTRUCTIONS: Please let aqueous samples settle before taking aliquot.

## REQUESTED ANALYSES

| LAB USE ONLY | SAMPLE ID (A) | SAMPLING DATE | SAMPLING TIME | MATRIX | NO. OF CONT. | Unpreserved | Preserved | Field Filtered | TPH (g) or GRO | TPH (d) or DRO or (C6-C36) or (C6-C44) | TPH ( ) | BTEX / MTBE (8260) or ( ) | VOCs (8260) | Oxygenates (8260) | En Core / Terra Core Prep (5035) | SVOCs (8270) | Pesticides (8081) | PCBs (8082) | PNAs (8310) or (8270) | T22 Metals (6010/747X) | Cr(VI) [7196 or 7199 or 218.6] | Air - VOCs (TO-14A) or (TO-15) | Air - TPH (g) [TO-3] | USEPA 314.0 | USEPA 331.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TW-1 ~~80~~ | 12/14/11 | 0950 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | |
| 2 | TW-12 | | 1110 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | |
| 3 | TW-11 | | 1245 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | |
| 4 | TW-13 | | 1445 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | | X |
| 5 | TW-14 | | 1555 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | |
| 6 | EB_121411 | | 1600 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | |
| | | | | | | | | | | | | | | | | | | | | | | | (A) | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: (Signature) Andrew Vigna | Received by: (Signature/Affiliation) | Date: 12/14/11 | Time: 1700 |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: | Time: |
| Relinquished by: (Signature) (UPS) 12/15/11 PS ~~FEDEX~~ | Received by: (Signature/Affiliation) | Date: 12/15/11 | Time: 10:00 |

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Return to Contents nd Yellow copies respectively.

06/01/10 Revision

1131

ANDREW VIGNA
(213) 219-8735
THE UPS STORE #5055
STE A
12127 MALL BLVD
VICTORVILLE CA 92392-7657

14 LBS 1 OF 1
SHP WT: 14 LBS
DATE: 14 DEC 2011
AH

SHIP SOCAL LABRATORY
TO: 7440 LINCOLN WAY

GARDEN GROVE CA 92841-1427

CA 927 9-09

UPS GROUND
TRACKING #: 1Z A69 19A 03 9289 5379

BILLING: P/P
UPS CARBON NEUTRAL SHIPMENT

REF #2: AL1214111

ISH 13.00N E2844 21.5V 10/2011



Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1 1 3 1

# SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: URS CORP DATE: 12/15/11

**TEMPERATURE:** Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 1.9 °C - 0.3 °C (CF) = 1.6 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

**Ambient Temperature:** ☐ Air ☐ Filter Initial: PS

**CUSTODY SEALS INTACT:**

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial: PS

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: YL

| SAMPLE CONDITION: | Yes | No | N/A |
|---|---|---|---|
| Chain-Of-Custody (COC) document(s) received with samples | ☑ | ☐ | ☐ |
| COC document(s) received complete | ☐ | ☑ | ☐ |
| ☑ Collection date/time, matrix, and/or # of containers logged in based on sample labels. | | | |
| ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished. | | | |
| Sampler's name indicated on COC | ☑ | ☐ | ☐ |
| Sample container label(s) consistent with COC | ☑ | ☐ | ☐ |
| Sample container(s) intact and good condition | ☑ | ☐ | ☐ |
| Proper containers and sufficient volume for analyses requested | ☑ | ☐ | ☐ |
| Analyses received within holding time | ☑ | ☐ | ☐ |
| pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours | ☐ | ☐ | ☑ |
| Proper preservation noted on COC or sample container | ☑ | ☐ | ☐ |
| ☐ Unpreserved vials received for Volatiles analysis | | | |
| Volatile analysis container(s) free of headspace | ☐ | ☐ | ☑ |
| Tedlar bag(s) free of condensation | ☐ | ☐ | ☑ |

**CONTAINER TYPE:**

**Solid:** ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

**Water:** ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☑125PB ☐125PB**znna** ☑100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

**Air:** ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** YL

**Container:** **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** PS

**Preservative:** **h:** HCL **n:** $HNO_3$ **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** $H_3PO_4$ **s:** $H_2SO_4$ **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:**_____

Return to Contents

Calscience Environmental Laboratories, Inc.

# CALSCIENCE

## WORK ORDER NUMBER: 11-12-1227

*The difference is service*

AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** URS Corporation

**Client Project Name:** Barstow Perchlorate / 29403643

**Attention:** Roberto Pinon
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Vikas Patel

Approved for release on 12/16/2011 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

# Contents

Client Project Name: Barstow Perchlorate / 29403643
Work Order Number: 11-12-1227

Calscience Environmental Laboratories, Inc.

| | | | |
|---|---|---|---|
| Client: | URS Corporation<br>915 Wilshire Blvd., Suite 700<br>Los Angeles, CA 90017-3437 | Work Order: | 11-12-1227 |
| | | Project name: | Barstow Perchlorate / 29403643 |
| | | Received: | 12/16/11 07:50 |
| Attn: | Roberto Pinon | | |

## DETECTIONS SUMMARY

| Client Sample ID<br>Analyte | Result | Qualifiers | Reporting Limit | Units | Method | Extraction |
|---|---|---|---|---|---|---|
| TW-6 | | | | | | |
| Perchlorate | **9700** | | 1600 | ug/L | EPA 314.0 | N/A |
| TW-7 | | | | | | |
| Perchlorate | **36** | | 2.0 | ug/L | EPA 314.0 | N/A |
| TW-2 | | | | | | |
| Perchlorate | **13000** | | 800 | ug/L | EPA 314.0 | N/A |

Subcontracted analyses, if any, are not included in this summary.

Return to Contents

*MDL is shown.

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/16/11
Work Order No: 11-12-1227
Preparation: N/A
Method: EPA 314.0

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-6** | **11-12-1227-1-A** | **12/15/11 09:00** | **Aqueous** | **IC 8** | **N/A** | **12/16/11 12:21** | **111216L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 9700 | 1600 | 800 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-7** | **11-12-1227-2-A** | **12/15/11 11:10** | **Aqueous** | **IC 8** | **N/A** | **12/16/11 11:13** | **111216L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 36 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-8** | **11-12-1227-3-A** | **12/15/11 12:50** | **Aqueous** | **IC 8** | **N/A** | **12/16/11 11:27** | **111216L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-2** | **11-12-1227-4-A** | **12/15/11 14:55** | **Aqueous** | **IC 8** | **N/A** | **12/16/11 12:50** | **111216L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 13000 | 800 | 400 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-05-203-1,382** | **N/A** | **Aqueous** | **IC 8** | **N/A** | **12/16/11 10:15** | **111216L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/16/11
Work Order No: 11-12-1227
Preparation: N/A
Method: EPA 314.0

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-8** | **Aqueous** | **IC 8** | **N/A** | **12/16/11** | **111216S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 50 | 100 | 97 | 80-120 | 3 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1227 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-05-203-1,382** | **Aqueous** | **IC 8** | **N/A** | **12/16/11** | **111216L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 25 | 99 | 100 | 85-115 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Glossary of Terms and Qualifiers

ACCREDITED IN ACCORDANCE WITH nelac

Work Order Number: 11-12-1227

| Qualifier | Definition |
|---|---|
| * | See applicable analysis comment. |
| < | Less than the indicated value. |
| > | Greater than the indicated value. |
| 1 | Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification. |
| 2 | Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. |
| 3 | Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification. |
| 4 | The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification. |
| 5 | The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification. |
| 6 | Surrogate recovery below the acceptance limit. |
| 7 | Surrogate recovery above the acceptance limit. |
| B | Analyte was present in the associated method blank. |
| BU | Sample analyzed after holding time expired. |
| E | Concentration exceeds the calibration range. |
| ET | Sample was extracted past end of recommended max. holding time. |
| HD | The chromatographic pattern was inconsistent with the profile of the reference fuel standard. |
| HDH | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected). |
| HDL | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected). |
| J | Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated. |
| ME | LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range. |
| ND | Parameter not detected at the indicated reporting limit. |
| Q | Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. |
| SG | The sample extract was subjected to Silica Gel treatment prior to analysis. |
| X | % Recovery and/or RPD out-of-range. |
| Z | Analyte presence was not confirmed by second column or GC/MS analysis. |

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

Return to Contents

# Calscience Environmental Laboratories, Inc.

**CHAIN OF CUSTODY RECORD**

SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WORK ORDER NUMBER: **11-12-1227**

Date 12/15/11

Page 1 of 1

| | |
|---|---|
| LABORATORY CLIENT: URS Corporation | CLIENT PROJECT NAME / NUMBER: Barstow Perchlorate 29403643 |
| ADDRESS: 915 Wilshire Blvd Ste. 700 | P.O. NO.: |
| CITY: LA STATE: CA ZIP: 90017 | PROJECT CONTACT: Roberto Pinon |
| TEL: 213 996 2200 E-MAIL: Roberto.Piñon@URS.com | SAMPLER(S): (PRINT) Andrew Vigna |

TURNAROUND TIME: ☒ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ STANDARD

☐ COELT EDF | GLOBAL ID | LOG CODE

SPECIAL INSTRUCTIONS:
*Please allow aqueous samples to settle before taking aliquot.

**REQUESTED ANALYSES**

| LAB USE ONLY | SAMPLE ID | SAMPLING DATE | SAMPLING TIME | MATRIX | NO. OF CONT. | Unpreserved | Preserved | Field Filtered | TPH (g) or GRO | TPH (d) or DRO or (C6-C36) or (C6-C44) | TPH ( ) | BTEX / MTBE (8260) or ( ) | VOCs (8260) | Oxygenates (8260) | En Core / Terra Core Prep (5035) | SVOCs (8270) | Pesticides (8081) | PCBs (8082) | PNAs (8310) or (8270) | T22 Metals (6010/747X) | Cr(VI) [7196 or 7199 or 218.6] | Air - VOCs (TO-14A) or (TO-15) | Air - TPH (g) [TO-3] | USEPA 314.0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TW-6 | 12/15/11 | 0900 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 2 | TW-7 | ↓ | 1110 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 3 | TW-8 | ↓ | 1250 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 4 | TW-2 | ↓ | 1455 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| | | | | | | | | | | | | | | | | | | | | | | | (N) | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | |
|---|---|---|---|
| Relinquished by: (Signature) UPS | Received by: (Signature/Affiliation) | Date: 12/15/11 | Time: 1540 |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) CET | Date: 12/16/11 | Time: 0750 |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: | Time: |

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

Return to Contents

OFFICE WORKS
(760) 252-8833
909 ARMORY ROAD
BARSTOW CA 92311

7 LBS

1 OF 1

1227

SHIP TO:
SOCAL LABORATORY
(714) 895-5494
CALSCIENCE ENVIRONMENTAL LABS
7440 LINCOLN WAY
GARDEN GROVE CA 92841


REF 1:PM PKG ID 100776
REF 2:FROM URS CORP ANDREW

WS 10.0.49

LP2844 21.0A 10/2011

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Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1227

# SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: URS DATE: 12/16/11

**TEMPERATURE:** Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

**Temperature** 2.3 °C - 0.3 °C (CF) = 2.0 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

**Ambient Temperature:** ☐ Air ☐ Filter **Initial:** WB

**CUSTODY SEALS INTACT:**

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Initial:** WB

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present **Initial:** WB

| **SAMPLE CONDITION:** | Yes | No | N/A |
|---|---|---|---|
| Chain-Of-Custody (COC) document(s) received with samples | ☑ | ☐ | ☐ |
| COC document(s) received complete | ☑ | ☐ | ☐ |
| ☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels. | | | |
| ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished. | | | |
| Sampler's name indicated on COC | ☑ | ☐ | ☐ |
| Sample container label(s) consistent with COC | ☐ | ☑ | ☐ |
| Sample container(s) intact and good condition | ☑ | ☐ | ☐ |
| Proper containers and sufficient volume for analyses requested | ☑ | ☐ | ☐ |
| Analyses received within holding time | ☑ | ☐ | ☐ |
| pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours | ☐ | ☐ | ☑ |
| Proper preservation noted on COC or sample container | ☑ | ☐ | ☐ |
| ☐ Unpreserved vials received for Volatiles analysis | | | |
| Volatile analysis container(s) free of headspace | ☐ | ☐ | ☑ |
| Tedlar bag(s) free of condensation | ☐ | ☐ | ☑ |

**CONTAINER TYPE:**

**Solid:** ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

**Water:** ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s** ☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB ☐250PB ☐250PB**n** ☑125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

**Air:** ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** WB

**Container:** **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** _____

**Preservative:** **h:** HCL **n:** $HNO_3$ **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** $H_3PO_4$ **s:** $H_2SO_4$ **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** _____

Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1227

# SAMPLE ANOMALY FORM

## SAMPLES - CONTAINERS & LABELS:

- ☐ **Sample(s) NOT RECEIVED but listed on COC**
- ☐ **Sample(s) received but NOT LISTED on COC**
- ☐ **Holding time expired** – list sample ID(s) and test
- ☐ **Insufficient quantities for analysis** – list test
- ☐ **Improper container(s) used** – list test
- ☐ **Improper preservative used** – list test
- ☐ **No preservative noted on COC or label** – list test & notify lab
- ☐ **Sample labels illegible** – note test/container type
- ☑ **Sample label(s) do not match COC** – Note in comments
  - ☐ **Sample ID**
  - ☑ **Date and/or Time Collected**
  - ☐ **Project Information**
  - ☐ **# of Container(s)**
  - ☐ **Analysis**
- ☐ **Sample container(s) compromised** – Note in comments
  - ☐ **Water present in sample container**
  - ☐ **Broken**
- ☐ **Sample container(s) not labeled**
- ☐ **Air sample container(s) compromised** – Note in comments
  - ☐ **Flat**
  - ☐ **Very low in volume**
  - ☐ **Leaking (Not transferred - duplicate bag submitted)**
  - ☐ **Leaking (transferred into Calscience Tedlar® Bag*)**
  - ☐ **Leaking (transferred into Client's Tedlar® Bag*)**
- ☐ **Other:** _____

**Comments:**

(-2) SAMPLING DATE IS 12/14/11
TIME MATCHED.

## HEADSPACE – Containers with Bubble > 6mm or ¼ inch:

| Sample # | Container ID(s) | # of Vials Received | Sample # | Container ID(s) | # of Vials Received | Sample # | Container ID(s) | # of Cont. received | Analysis |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

**Comments:** _____

*Transferred at Client's request.

Initial / Date: WB 12/16/11



Return to Contents

Calscience Environmental Laboratories, Inc.

# CALSCIENCE

## WORK ORDER NUMBER: 11-12-1370

*The difference is service*

AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** URS Corporation

**Client Project Name:** Barstow Perchlorate / 29403643

**Attention:** Roberto Pinon
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Vikas Patel

Approved for release on 12/19/2011 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

# Contents

Client Project Name: Barstow Perchlorate / 29403643
Work Order Number: 11-12-1370

Calscience Environmental Laboratories, Inc.

| | | | |
|---|---|---|---|
| Client: | URS Corporation<br>915 Wilshire Blvd., Suite 700<br>Los Angeles, CA 90017-3437 | Work Order: | 11-12-1370 |
| | | Project name: | Barstow Perchlorate / 29403643 |
| | | Received: | 12/17/11 08:30 |
| Attn: | Roberto Pinon | | |

## DETECTIONS SUMMARY

| Client Sample ID<br>Analyte | Result | Qualifiers | Reporting Limit | Units | Method | Extraction |
|---|---|---|---|---|---|---|
| TW-17 | | | | | | |
| Perchlorate | **4.5** | | 2.0 | ug/L | EPA 314.0 | N/A |

Subcontracted analyses, if any, are not included in this summary.

Return to Contents

*MDL is shown.

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/17/11
Work Order No: 11-12-1370
Preparation: N/A
Method: EPA 314.0

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-17** | **11-12-1370-1-A** | **12/15/11 16:45** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 11:48** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 4.5 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-121511** | **11-12-1370-2-A** | **12/15/11 16:55** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 11:19** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-18** | **11-12-1370-3-A** | **12/16/11 08:45** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:03** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-19** | **11-12-1370-4-A** | **12/16/11 09:50** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:17** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-16** | **11-12-1370-5-A** | **12/16/11 11:15** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:31** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-15** | **11-12-1370-6-A** | **12/16/11 13:00** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:46** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Analytical Report

| | |
|---|---|
| URS Corporation | Date Received: 12/17/11 |
| 915 Wilshire Blvd., Suite 700 | Work Order No: 11-12-1370 |
| Los Angeles, CA 90017-3437 | Preparation: N/A |
| | Method: EPA 314.0 |

Project: Barstow Perchlorate / 29403643 

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-121611** | **11-12-1370-7-A** | **12/16/11 13:10** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 11:34** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-05-203-1,383** | **N/A** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 10:36** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/17/11
Work Order No: 11-12-1370
Preparation: N/A
Method: EPA 314.0

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-18** | **Aqueous** | **IC 8** | **N/A** | **12/17/11** | **111217S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 50 | 96 | 94 | 80-120 | 2 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1370 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-05-203-1,383** | **Aqueous** | **IC 8** | **N/A** | **12/17/11** | **111217L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 25 | 99 | 98 | 85-115 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Glossary of Terms and Qualifiers

ACCREDITED IN ACCORDANCE WITH nelac

Work Order Number: 11-12-1370

| Qualifier | Definition |
|---|---|
| * | See applicable analysis comment. |
| < | Less than the indicated value. |
| > | Greater than the indicated value. |
| 1 | Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification. |
| 2 | Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. |
| 3 | Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification. |
| 4 | The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification. |
| 5 | The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification. |
| 6 | Surrogate recovery below the acceptance limit. |
| 7 | Surrogate recovery above the acceptance limit. |
| B | Analyte was present in the associated method blank. |
| BU | Sample analyzed after holding time expired. |
| E | Concentration exceeds the calibration range. |
| ET | Sample was extracted past end of recommended max. holding time. |
| HD | The chromatographic pattern was inconsistent with the profile of the reference fuel standard. |
| HDH | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected). |
| HDL | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected). |
| J | Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated. |
| ME | LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range. |
| ND | Parameter not detected at the indicated reporting limit. |
| Q | Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. |
| SG | The sample extract was subjected to Silica Gel treatment prior to analysis. |
| X | % Recovery and/or RPD out-of-range. |
| Z | Analyte presence was not confirmed by second column or GC/MS analysis. |

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

Return to Contents

# Calscience Environmental Laboratories, Inc.

**CHAIN OF CUSTODY RECORD**

☒ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WO # / LAB USE ONLY: **11-12-1370**

Date 12/15/11 & 12/16/11

Page 1 of 1

LABORATORY CLIENT: URS Corporation

ADDRESS: 915 Wilshire Blvd. Ste. 700

CITY: LA STATE: CA ZIP: 90017

TEL: 213 996 2200 E-MAIL: Roberto.Piñon@URS.com

CLIENT PROJECT NAME / NUMBER: Barstow Perchlorate 29403643

P.O. NO.:

PROJECT CONTACT: Roberto Piñon

SAMPLER(S): (PRINT) Andrew Vigna

TURNAROUND TIME: ☒ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ STANDARD

☐ COELT EDF

GLOBAL ID:

LOG CODE:

SPECIAL INSTRUCTIONS: Please allow aqueous samples to settle prior to taking aliquot.

## REQUESTED ANALYSES

| LAB USE ONLY | SAMPLE ID | SAMPLING DATE | SAMPLING TIME | MATRIX | NO. OF CONT. | Unpreserved | Preserved | Field Filtered | TPH (g) or GRO | TPH (d) or DRO or (C6-C36) or (C6-C44) | TPH ( ) | BTEX / MTBE (8260) or ( ) | VOCs (8260) | Oxygenates (8260) | En Core / Terra Core Prep (5035) | SVOCs (8270) | Pesticides (8081) | PCBs (8082) | PNAs (8310) or (8270) | T22 Metals (6010/747X) | Cr(VI) [7196 or 7199 or 218.6] | Air - VOCs (TO-14A) or (TO-15) | Air - TPH (g) [TO-3] | USEPA 314.0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TW-17 | 12/15/11 | 1645 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 2 | EB-121511 | 12/15/11 | 1655 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 3 | TW-18 | 12/16/11 | 0845 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 4 | TW-19 | | 0950 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 5 | TW-16 | | 1115 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 6 | TW-15 | | 1300 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 7 | EB-121611 | | 1310 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |

Relinquished by: (Signature) Andrew Vigna — Received by: (Signature/Affiliation) — Date: 12/16/11 — Time: 1530

Relinquished by: (Signature) UPS — Received by: (Signature/Affiliation) — Date: 12/17/11 — Time: 0830

Relinquished by: (Signature) — Received by: (Signature/Affiliation) — Date: — Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

Return to Contents

1370

ANDREW VIGNA
(213) 219-8735
THE UPS STORE #5055
STE A
12127 MALL BLVD
VICTORVILLE CA 92392-7657

**18 LBS 1 OF 1**
SHP WT: 18 LBS
DATE: 16 DEC 2011
AH

**SHIP SOCAL LABRATORY**
**TO: 7440 LINCOLN WAY**

GARDEN GROVE CA 92841-1427

CA 927 9-09

UPS EARLY A.M.

TRACKING #: 1Z A69 19A 41 6007 9202

1+S

BILLING: P/P
UPS CARBON NEUTRAL SHIPMENT

REF #2: PP121611



Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1370

# SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: URS DATE: 12/17/11

**TEMPERATURE:** Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 2.0 °C - 0.3 °C (CF) = 1.7 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

**Ambient Temperature:** ☐ Air ☐ Filter Initial: YC

**CUSTODY SEALS INTACT:**

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial: YC

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: KM

| SAMPLE CONDITION: | Yes | No | N/A |
|---|---|---|---|
| Chain-Of-Custody (COC) document(s) received with samples | ☑ | ☐ | ☐ |
| COC document(s) received complete | ☐ | ☑ | ☐ |
| ☑ Collection date/time, matrix, and/or # of containers logged in based on sample labels. | | | |
| ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished. | | | |
| Sampler's name indicated on COC | ☑ | ☐ | ☐ |
| Sample container label(s) consistent with COC | ☑ | ☐ | ☐ |
| Sample container(s) intact and good condition | ☑ | ☐ | ☐ |
| Proper containers and sufficient volume for analyses requested | ☑ | ☐ | ☐ |
| Analyses received within holding time | ☑ | ☐ | ☐ |
| pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours | ☐ | ☐ | ☑ |
| Proper preservation noted on COC or sample container | ☑ | ☐ | ☐ |
| ☐ Unpreserved vials received for Volatiles analysis | | | |
| Volatile analysis container(s) free of headspace | ☐ | ☐ | ☑ |
| Tedlar bag(s) free of condensation | ☐ | ☐ | ☑ |

**CONTAINER TYPE:**

**Solid:** ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

**Water:** ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☑125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

**Air:** ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** KM

**Container:** **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** YC

**Preservative:** **h:** HCL **n:** $HNO_3$ **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** $H_3PO_4$ **s:** $H_2SO_4$ **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:**_____

Return to Contents

Calscience Environmental Laboratories, Inc.

Supplemental Report 1

Additional requested analyses have been added to the original report.

# CALSCIENCE

## WORK ORDER NUMBER: 11-12-1370

*The difference is service*

AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** URS Corporation

**Client Project Name:** Barstow Perchlorate / 29403643

**Attention:** Roberto Pinon
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Vikas Patel

Approved for release on 01/3/2012 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

# Contents

Client Project Name: Barstow Perchlorate / 29403643
Work Order Number: 11-12-1370

Calscience Environmental Laboratories, Inc.

| | | | |
|---|---|---|---|
| Client: | URS Corporation<br>915 Wilshire Blvd., Suite 700<br>Los Angeles, CA 90017-3437 | Work Order: | 11-12-1370 |
| | | Project name: | Barstow Perchlorate / 29403643 |
| | | Received: | 12/17/11 08:30 |
| Attn: | Roberto Pinon | | |

## DETECTIONS SUMMARY

| Client Sample ID<br>Analyte | Result | Qualifiers | Reporting Limit | Units | Method | Extraction |
|---|---|---|---|---|---|---|
| TW-17 | | | | | | |
| Perchlorate | **4.5** | | 2.0 | ug/L | EPA 314.0 | N/A |
| Perchlorate | **7.4** | | 1.0 | ug/L | EPA 331.0 (M) | N/A |

Subcontracted analyses, if any, are not included in this summary.

Return to Contents

*MDL is shown.

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/17/11
Work Order No: 11-12-1370
Preparation: N/A
Method: EPA 314.0

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-17** | **11-12-1370-1-A** | **12/15/11 16:45** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 11:48** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 4.5 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-121511** | **11-12-1370-2-A** | **12/15/11 16:55** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 11:19** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-18** | **11-12-1370-3-A** | **12/16/11 08:45** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:03** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-19** | **11-12-1370-4-A** | **12/16/11 09:50** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:17** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-16** | **11-12-1370-5-A** | **12/16/11 11:15** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:31** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-15** | **11-12-1370-6-A** | **12/16/11 13:00** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 12:46** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Analytical Report

| | |
|---|---|
| URS Corporation | Date Received: 12/17/11 |
| 915 Wilshire Blvd., Suite 700 | Work Order No: 11-12-1370 |
| Los Angeles, CA 90017-3437 | Preparation: N/A |
| | Method: EPA 314.0 |

Project: Barstow Perchlorate / 29403643 

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-121611** | **11-12-1370-7-A** | **12/16/11 13:10** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 11:34** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-05-203-1,383** | **N/A** | **Aqueous** | **IC 8** | **N/A** | **12/17/11 10:36** | **111217L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/17/11
Work Order No: 11-12-1370
Preparation: N/A
Method: EPA 331.0 (M)

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-17** | **11-12-1370-1-A** | **12/15/11 16:45** | **Aqueous** | **LC/MS 1** | **12/21/11** | **12/21/11 17:32** | **111221L01A** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 7.4 | 1.0 | 1 | | ug/L |

| Method Blank | 099-12-420-38 | N/A | Aqueous | LC/MS 1 | 01/01/95 | 12/21/11 15:34 | 111221L01A |
|---|---|---|---|---|---|---|---|

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 1.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

# Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/17/11
Work Order No: 11-12-1370
Preparation: N/A
Method: EPA 314.0

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-18** | **Aqueous** | **IC 8** | **N/A** | **12/17/11** | **111217S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 50 | 96 | 94 | 80-120 | 2 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/17/11
Work Order No: 11-12-1370
Preparation: N/A
Method: EPA 6850

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **11-12-1441-1** | **Aqueous** | **LC/MS 1** | **12/21/11** | **12/21/11** | **111221S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 10 | 82 | 81 | 80-120 | 0 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1370 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-05-203-1,383** | **Aqueous** | **IC 8** | **N/A** | **12/17/11** | **111217L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 25 | 99 | 98 | 85-115 | 1 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: N/A
Work Order No: 11-12-1370
Preparation: N/A
Method: EPA 331.0 (M)

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-12-420-38** | **Aqueous** | **LC/MS 1** | **01/01/95** | **12/21/11** | **111221L01A** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 10 | 90 | 92 | 85-115 | 2 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Glossary of Terms and Qualifiers

ACCREDITED IN ACCORDANCE WITH nelac

Work Order Number: 11-12-1370

| Qualifier | Definition |
|---|---|
| * | See applicable analysis comment. |
| < | Less than the indicated value. |
| > | Greater than the indicated value. |
| 1 | Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification. |
| 2 | Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. |
| 3 | Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification. |
| 4 | The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification. |
| 5 | The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification. |
| 6 | Surrogate recovery below the acceptance limit. |
| 7 | Surrogate recovery above the acceptance limit. |
| B | Analyte was present in the associated method blank. |
| BU | Sample analyzed after holding time expired. |
| E | Concentration exceeds the calibration range. |
| ET | Sample was extracted past end of recommended max. holding time. |
| HD | The chromatographic pattern was inconsistent with the profile of the reference fuel standard. |
| HDH | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected). |
| HDL | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected). |
| J | Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated. |
| ME | LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range. |
| ND | Parameter not detected at the indicated reporting limit. |
| Q | Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. |
| SG | The sample extract was subjected to Silica Gel treatment prior to analysis. |
| X | % Recovery and/or RPD out-of-range. |
| Z | Analyte presence was not confirmed by second column or GC/MS analysis. |

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

Return to Contents

# Calscience Environmental Laboratories, Inc.

# CHAIN OF CUSTODY RECORD

☒ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WO # / LAB USE ONLY
**11-12-1370**

Date 12/15/11 & 12/16/11

Page 1 of 1

LABORATORY CLIENT: URS Corporation

ADDRESS: 915 Wilshire Blvd. Ste. 700

CITY: LA STATE: CA ZIP: 90017

TEL: 213 996 2200 E-MAIL: Roberto.Piñon@URS.com

CLIENT PROJECT NAME / NUMBER: Barstow Perchlorate 29403643

P.O. NO.:

PROJECT CONTACT: Roberto Piñon

SAMPLER(S): (PRINT) Andrew Vigna

TURNAROUND TIME:
☒ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ STANDARD

☐ COELT EDF

GLOBAL ID

LOG CODE

SPECIAL INSTRUCTIONS: Please allow aqueous samples to settle prior to taking aliquot.

## REQUESTED ANALYSES

| LAB USE ONLY | SAMPLE ID | SAMPLING DATE | SAMPLING TIME | MATRIX | NO. OF CONT. | Unpreserved | Preserved | Field Filtered | TPH (g) or GRO | TPH (d) or DRO or (C6-C36) or (C6-C44) | TPH ( ) | BTEX / MTBE (8260) or ( ) | VOCs (8260) | Oxygenates (8260) | En Core / Terra Core Prep (5035) | SVOCs (8270) | Pesticides (8081) | PCBs (8082) | PNAs (8310) or (8270) | T22 Metals (6010/747X) | Cr(VI) [7196 or 7199 or 218.6] | Air - VOCs (TO-14A) or (TO-15) | Air - TPH (g) [TO-3] | USEPA 314.0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TW-17 | 12/15/11 | 1645 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 2 | EB-121511 | 12/15/11 | 1655 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 3 | TW-18 | 12/16/11 | 0845 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 4 | TW-19 | | 0950 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 5 | TW-16 | | 1115 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 6 | TW-15 | | 1300 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| 7 | EB-121611 | | 1310 | Aqueous | 1 | X | | | | | | | | | | | | | | | | | | X | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |

Relinquished by: (Signature) Received by: (Signature/Affiliation) Date: 12/16/11 Time: 1530

Relinquished by: (Signature) ups Received by: (Signature/Affiliation) Date: 12/17/11 Time: 0830

Relinquished by: (Signature) Received by: (Signature/Affiliation) Date: Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

Return to Contents

1370

ANDREW VIGNA
(213) 219-8735
THE UPS STORE #5055
STE A
12127 MALL BLVD
VICTORVILLE CA 92392-7657

**18 LBS 1 OF 1**
SHP WT: 18 LBS
DATE: 16 DEC 2011
AH

**SHIP SOCAL LABRATORY**
**TO: 7440 LINCOLN WAY**

GARDEN GROVE CA 92841-1427

CA 927 9-09

UPS EARLY A.M.

TRACKING #: 1Z A69 19A 41 6007 9202

1+S

BILLING: P/P
UPS CARBON NEUTRAL SHIPMENT

REF #2: PP121611



Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1370

# SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: URS DATE: 12/17/11

**TEMPERATURE:** Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 2.0 °C - 0.3 °C (CF) = 1.7 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

**Ambient Temperature:** ☐ Air ☐ Filter Initial: YC

**CUSTODY SEALS INTACT:**

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial: YC

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: KM

| SAMPLE CONDITION: | Yes | No | N/A |
|---|---|---|---|
| Chain-Of-Custody (COC) document(s) received with samples | ☑ | ☐ | ☐ |
| COC document(s) received complete | ☐ | ☑ | ☐ |
| ☑ Collection date/time, matrix, and/or # of containers logged in based on sample labels. | | | |
| ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished. | | | |
| Sampler's name indicated on COC | ☑ | ☐ | ☐ |
| Sample container label(s) consistent with COC | ☑ | ☐ | ☐ |
| Sample container(s) intact and good condition | ☑ | ☐ | ☐ |
| Proper containers and sufficient volume for analyses requested | ☑ | ☐ | ☐ |
| Analyses received within holding time | ☑ | ☐ | ☐ |
| pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours | ☐ | ☐ | ☑ |
| Proper preservation noted on COC or sample container | ☑ | ☐ | ☐ |
| ☐ Unpreserved vials received for Volatiles analysis | | | |
| Volatile analysis container(s) free of headspace | ☐ | ☐ | ☑ |
| Tedlar bag(s) free of condensation | ☐ | ☐ | ☑ |

**CONTAINER TYPE:**

**Solid:** ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

**Water:** ☐VOA ☐VOA**h** ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☐250PB**n** ☑125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

**Air:** ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** KM

**Container:** **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** YC

**Preservative:** **h:** HCL **n:** $HNO_3$ **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** $H_3PO_4$ **s:** $H_2SO_4$ **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:**_____

Return to Contents

**Vikas Patel**

**From:** Roberto Pinon [rpinon@wtechtransfer.com]
**Sent:** Wednesday, December 21, 2011 1:57 PM
**To:** Vikas Patel
**Subject:** Re: Barstow: Sample T-17 Analysis with EPA Method 331

Standard tat

---

----- Reply message -----
From: "Vikas Patel" <vipatel@calscience.com>
To: "Roberto Pinon" <rpinon@wtechtransfer.com>
Cc: "TPost@waterboards.ca.gov" <TPost@waterboards.ca.gov>, "andrew.vigna@urs.com" <andrew.vigna@urs.com>, "Vikas Patel" <vipatel@calscience.com>
Subject: Barstow: Sample T-17 Analysis with EPA Method 331
Date: Wed, Dec 21, 2011 1:08 pm

How soon did you need the results. Do you plan on sending more samples for EPA 331 tonight?

Vik Patel
Project Manager
Calscience Environmental Laboratories, Inc.
714-895-5494 x211

---

**From:** Roberto Pinon [mailto:rpinon@wtechtransfer.com]
**Sent:** Wednesday, December 21, 2011 8:26 AM
**To:** Vikas Patel
**Cc:** 'Tim Post (TPost@waterboards.ca.gov)'; andrew.vigna@urs.com
**Subject:** Barstow: Sample T-17 Analysis with EPA Method 331

Vik,

For the barstow samples, please re-run sample T-17 using EPA Method 331 (the method with the lower 1ppb reporting limit).

If you have questions or require clarification, please do not hesitate to contact me.

---

Roberto Piñón, P.Eng., P.E. | Senior Engineer
Direct: (213) 996-2462
URS Corporation
915 Wilshire Boulevard, Suite 700 | Los Angeles, CA 90017-3409

Calscience Environmental Laboratories, Inc.

# CALSCIENCE

## WORK ORDER NUMBER: 11-12-1644

*The difference is service*

AIR | SOIL | WATER | MARINE CHEMISTRY

**Analytical Report For**

**Client:** URS Corporation

**Client Project Name:** Barstow Perchlorate / 29403643

**Attention:** Roberto Pinon
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Vikas Patel

Approved for release on 01/3/2012 by:
Vikas Patel
Project Manager

ResultLink

Email your PM

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

# Contents

Client Project Name: Barstow Perchlorate / 29403643
Work Order Number: 11-12-1644

Calscience Environmental Laboratories, Inc.

| | | | |
|---|---|---|---|
| Client: | URS Corporation<br>915 Wilshire Blvd., Suite 700<br>Los Angeles, CA 90017-3437 | Work Order: | 11-12-1644 |
| | | Project name: | Barstow Perchlorate / 29403643 |
| | | Received: | 12/21/11 16:15 |
| Attn: | Roberto Pinon | | |

## DETECTIONS SUMMARY

| Client Sample ID<br>Analyte | Result | Qualifiers | Reporting Limit | Units | Method | Extraction |
|---|---|---|---|---|---|---|
| **Decon** | | | | | | |
| Barium | **0.0131** | | 0.0100 | mg/L | EPA 6010B | EPA 3010A Total |
| Chromium | **0.0166** | | 0.0100 | mg/L | EPA 6010B | EPA 3010A Total |
| Molybdenum | **0.0197** | | 0.0100 | mg/L | EPA 6010B | EPA 3010A Total |
| Vanadium | **0.0482** | | 0.0100 | mg/L | EPA 6010B | EPA 3010A Total |
| Zinc | **0.0173** | | 0.0100 | mg/L | EPA 6010B | EPA 3010A Total |
| Perchlorate | **120** | | 4.0 | ug/L | EPA 314.0 | N/A |
| C6-C44 Total | **100** | | 50 | ug/L | EPA 8015B (M) | EPA 3510C |
| Acetone | **22** | | 20 | ug/L | EPA 8260B | EPA 5030C |
| n-Butylbenzene | **1.1** | | 1.0 | ug/L | EPA 8260B | EPA 5030C |
| Ethylbenzene | **1.3** | | 1.0 | ug/L | EPA 8260B | EPA 5030C |
| Toluene | **2.3** | | 1.0 | ug/L | EPA 8260B | EPA 5030C |
| 1,2,4-Trimethylbenzene | **3.8** | | 1.0 | ug/L | EPA 8260B | EPA 5030C |
| 1,3,5-Trimethylbenzene | **1.9** | | 1.0 | ug/L | EPA 8260B | EPA 5030C |
| p/m-Xylene | **4.7** | | 1.0 | ug/L | EPA 8260B | EPA 5030C |
| o-Xylene | **2.4** | | 1.0 | ug/L | EPA 8260B | EPA 5030C |
| **TW-9** | | | | | | |
| Perchlorate | **5600** | | 200 | ug/L | EPA 314.0 | N/A |
| **TW-21** | | | | | | |
| Perchlorate | **13** | | 2.0 | ug/L | EPA 314.0 | N/A |
| **TW-22** | | | | | | |
| Perchlorate | **8.0** | | 2.0 | ug/L | EPA 314.0 | N/A |

Subcontracted analyses, if any, are not included in this summary.

*MDL is shown.

Return to Contents

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: N/A
Method: EPA 314.0

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Decon** | **11-12-1644-1-E** | **12/20/11 11:20** | **Aqueous** | **IC 13** | **N/A** | **12/23/11 14:55** | **111223L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 120 | 4.0 | 2 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-20** | **11-12-1644-2-A** | **12/21/11 08:00** | **Aqueous** | **IC 13** | **N/A** | **12/23/11 13:57** | **111223L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-9** | **11-12-1644-3-A** | **12/21/11 09:40** | **Aqueous** | **IC 13** | **N/A** | **12/23/11 15:09** | **111223L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 5600 | 200 | 100 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-21** | **11-12-1644-4-A** | **12/21/11 11:00** | **Aqueous** | **IC 13** | **N/A** | **12/23/11 14:26** | **111223L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 13 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **TW-22** | **11-12-1644-5-A** | **12/21/11 00:15** | **Aqueous** | **IC 13** | **N/A** | **12/23/11 14:40** | **111223L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | 8.0 | 2.0 | 1 | | ug/L |

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **EB-122111** | **11-12-1644-6-A** | **12/21/11 00:30** | **Aqueous** | **IC 13** | **N/A** | **12/23/11 13:28** | **111223L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Analytical Report

| | |
|---|---|
| URS Corporation | Date Received: 12/21/11 |
| 915 Wilshire Blvd., Suite 700 | Work Order No: 11-12-1644 |
| Los Angeles, CA 90017-3437 | Preparation: N/A |
| | Method: EPA 314.0 |

Project: Barstow Perchlorate / 29403643 

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-05-203-1,387** | **N/A** | **Aqueous** | **IC 13** | **N/A** | **12/23/11 10:50** | **111223L01** |

| Parameter | Result | RL | DF | Qual | Units |
|---|---|---|---|---|---|
| Perchlorate | ND | 2.0 | 1 | | ug/L |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | 12/21/11 |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1644 |
| Los Angeles, CA 90017-3437 | | Preparation: | EPA 3510C |
| | | Method: | EPA 8015B (M) |
| | | Units: | ug/L |

Project: Barstow Perchlorate / 29403643 

| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Decon** | **11-12-1644-1-G** | **12/20/11 11:20** | **Aqueous** | **GC 46** | **12/22/11** | **12/27/11 23:04** | **111222B15A** |

Comment(s): -The Total concentration includes individual carbon range concentrations (estimated), if any, below the RL reported as ND.

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| C6 | ND | 50 | 1 | | C21-C22 | ND | 50 | 1 | |
| C7 | ND | 50 | 1 | | C23-C24 | ND | 50 | 1 | |
| C8 | ND | 50 | 1 | | C25-C28 | ND | 50 | 1 | |
| C9-C10 | ND | 50 | 1 | | C29-C32 | ND | 50 | 1 | |
| C11-C12 | ND | 50 | 1 | | C33-C36 | ND | 50 | 1 | |
| C13-C14 | ND | 50 | 1 | | C37-C40 | ND | 50 | 1 | |
| C15-C16 | ND | 50 | 1 | | C41-C44 | ND | 50 | 1 | |
| C17-C18 | ND | 50 | 1 | | C6-C44 Total | 100 | 50 | 1 | |
| C19-C20 | ND | 50 | 1 | | | | | | |

| Surrogates: | REC (%) | Control Limits | Qual |
|---|---|---|---|
| Decachlorobiphenyl | 91 | 68-140 | |

| Method Blank | 099-14-065-132 | N/A | Aqueous | GC 46 | 12/22/11 | 12/27/11 20:33 | 111222B15A |
|---|---|---|---|---|---|---|---|

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| C6 | ND | 50 | 1 | | C21-C22 | ND | 50 | 1 | |
| C7 | ND | 50 | 1 | | C23-C24 | ND | 50 | 1 | |
| C8 | ND | 50 | 1 | | C25-C28 | ND | 50 | 1 | |
| C9-C10 | ND | 50 | 1 | | C29-C32 | ND | 50 | 1 | |
| C11-C12 | ND | 50 | 1 | | C33-C36 | ND | 50 | 1 | |
| C13-C14 | ND | 50 | 1 | | C37-C40 | ND | 50 | 1 | |
| C15-C16 | ND | 50 | 1 | | C41-C44 | ND | 50 | 1 | |
| C17-C18 | ND | 50 | 1 | | C6-C44 Total | ND | 50 | 1 | |
| C19-C20 | ND | 50 | 1 | | | | | | |

| Surrogates: | REC (%) | Control Limits | Qual |
|---|---|---|---|
| Decachlorobiphenyl | 115 | 68-140 | |

Return to Contents



7440 Lincoln Way, Garden Grove, CA 92841-1427 • TEL:(714) 895-5494 • FAX: (714) 894-7501

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Decon** | **11-12-1644-1-A** | **12/20/11 11:20** | **Aqueous** | **GC/MS QQ** | **12/22/11** | **12/22/11 20:50** | **111222L01** |

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | 22 | 20 | 1 | | 1,3-Dichloropropane | ND | 1.0 | 1 | |
| Benzene | ND | 0.50 | 1 | | 2,2-Dichloropropane | ND | 1.0 | 1 | |
| Bromobenzene | ND | 1.0 | 1 | | 1,1-Dichloropropene | ND | 1.0 | 1 | |
| Bromochloromethane | ND | 1.0 | 1 | | c-1,3-Dichloropropene | ND | 0.50 | 1 | |
| Bromodichloromethane | ND | 1.0 | 1 | | t-1,3-Dichloropropene | ND | 0.50 | 1 | |
| Bromoform | ND | 1.0 | 1 | | Ethylbenzene | 1.3 | 1.0 | 1 | |
| Bromomethane | ND | 10 | 1 | | 2-Hexanone | ND | 10 | 1 | |
| 2-Butanone | ND | 10 | 1 | | Isopropylbenzene | ND | 1.0 | 1 | |
| n-Butylbenzene | 1.1 | 1.0 | 1 | | p-Isopropyltoluene | ND | 1.0 | 1 | |
| sec-Butylbenzene | ND | 1.0 | 1 | | Methylene Chloride | ND | 10 | 1 | |
| tert-Butylbenzene | ND | 1.0 | 1 | | 4-Methyl-2-Pentanone | ND | 10 | 1 | |
| Carbon Disulfide | ND | 10 | 1 | | Naphthalene | ND | 10 | 1 | |
| Carbon Tetrachloride | ND | 0.50 | 1 | | n-Propylbenzene | ND | 1.0 | 1 | |
| Chlorobenzene | ND | 1.0 | 1 | | Styrene | ND | 1.0 | 1 | |
| Chloroethane | ND | 5.0 | 1 | | 1,1,1,2-Tetrachloroethane | ND | 1.0 | 1 | |
| Chloroform | ND | 1.0 | 1 | | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 1 | |
| Chloromethane | ND | 10 | 1 | | Tetrachloroethene | ND | 1.0 | 1 | |
| 2-Chlorotoluene | ND | 1.0 | 1 | | Toluene | 2.3 | 1.0 | 1 | |
| 4-Chlorotoluene | ND | 1.0 | 1 | | 1,2,3-Trichlorobenzene | ND | 1.0 | 1 | |
| Dibromochloromethane | ND | 1.0 | 1 | | 1,2,4-Trichlorobenzene | ND | 1.0 | 1 | |
| 1,2-Dibromo-3-Chloropropane | ND | 5.0 | 1 | | 1,1,1-Trichloroethane | ND | 1.0 | 1 | |
| 1,2-Dibromoethane | ND | 1.0 | 1 | | 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 10 | 1 | |
| Dibromomethane | ND | 1.0 | 1 | | 1,1,2-Trichloroethane | ND | 1.0 | 1 | |
| 1,2-Dichlorobenzene | ND | 1.0 | 1 | | Trichloroethene | ND | 1.0 | 1 | |
| 1,3-Dichlorobenzene | ND | 1.0 | 1 | | Trichlorofluoromethane | ND | 10 | 1 | |
| 1,4-Dichlorobenzene | ND | 1.0 | 1 | | 1,2,3-Trichloropropane | ND | 5.0 | 1 | |
| Dichlorodifluoromethane | ND | 1.0 | 1 | | 1,2,4-Trimethylbenzene | 3.8 | 1.0 | 1 | |
| 1,1-Dichloroethane | ND | 1.0 | 1 | | 1,3,5-Trimethylbenzene | 1.9 | 1.0 | 1 | |
| 1,2-Dichloroethane | ND | 0.50 | 1 | | Vinyl Acetate | ND | 10 | 1 | |
| 1,1-Dichloroethene | ND | 1.0 | 1 | | Vinyl Chloride | ND | 0.50 | 1 | |
| c-1,2-Dichloroethene | ND | 1.0 | 1 | | p/m-Xylene | 4.7 | 1.0 | 1 | |
| t-1,2-Dichloroethene | ND | 1.0 | 1 | | o-Xylene | 2.4 | 1.0 | 1 | |
| 1,2-Dichloropropane | ND | 1.0 | 1 | | Methyl-t-Butyl Ether (MTBE) | ND | 1.0 | 1 | |

| Surrogates: | REC (%) | Control Limits | Qual | Surrogates: | REC (%) | Control Limits | Qual |
|---|---|---|---|---|---|---|---|
| 1,4-Bromofluorobenzene | 101 | 80-120 | | Dibromofluoromethane | 104 | 80-126 | |
| 1,2-Dichloroethane-d4 | 105 | 80-134 | | Toluene-d8 | 101 | 80-120 | |

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Return to Contents

Calscience Environmental Laboratories, Inc.

# Analytical Report

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 5030C
Method: EPA 8260B
Units: ug/L

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date/Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Method Blank** | **099-14-001-6,659** | **N/A** | **Aqueous** | **GC/MS QQ** | **12/22/11** | **12/22/11 14:55** | **111222L01** |

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | ND | 20 | 1 | | 1,3-Dichloropropane | ND | 1.0 | 1 | |
| Benzene | ND | 0.50 | 1 | | 2,2-Dichloropropane | ND | 1.0 | 1 | |
| Bromobenzene | ND | 1.0 | 1 | | 1,1-Dichloropropene | ND | 1.0 | 1 | |
| Bromochloromethane | ND | 1.0 | 1 | | c-1,3-Dichloropropene | ND | 0.50 | 1 | |
| Bromodichloromethane | ND | 1.0 | 1 | | t-1,3-Dichloropropene | ND | 0.50 | 1 | |
| Bromoform | ND | 1.0 | 1 | | Ethylbenzene | ND | 1.0 | 1 | |
| Bromomethane | ND | 10 | 1 | | 2-Hexanone | ND | 10 | 1 | |
| 2-Butanone | ND | 10 | 1 | | Isopropylbenzene | ND | 1.0 | 1 | |
| n-Butylbenzene | ND | 1.0 | 1 | | p-Isopropyltoluene | ND | 1.0 | 1 | |
| sec-Butylbenzene | ND | 1.0 | 1 | | Methylene Chloride | ND | 10 | 1 | |
| tert-Butylbenzene | ND | 1.0 | 1 | | 4-Methyl-2-Pentanone | ND | 10 | 1 | |
| Carbon Disulfide | ND | 10 | 1 | | Naphthalene | ND | 10 | 1 | |
| Carbon Tetrachloride | ND | 0.50 | 1 | | n-Propylbenzene | ND | 1.0 | 1 | |
| Chlorobenzene | ND | 1.0 | 1 | | Styrene | ND | 1.0 | 1 | |
| Chloroethane | ND | 5.0 | 1 | | 1,1,1,2-Tetrachloroethane | ND | 1.0 | 1 | |
| Chloroform | ND | 1.0 | 1 | | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 1 | |
| Chloromethane | ND | 10 | 1 | | Tetrachloroethene | ND | 1.0 | 1 | |
| 2-Chlorotoluene | ND | 1.0 | 1 | | Toluene | ND | 1.0 | 1 | |
| 4-Chlorotoluene | ND | 1.0 | 1 | | 1,2,3-Trichlorobenzene | ND | 1.0 | 1 | |
| Dibromochloromethane | ND | 1.0 | 1 | | 1,2,4-Trichlorobenzene | ND | 1.0 | 1 | |
| 1,2-Dibromo-3-Chloropropane | ND | 5.0 | 1 | | 1,1,1-Trichloroethane | ND | 1.0 | 1 | |
| 1,2-Dibromoethane | ND | 1.0 | 1 | | 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 10 | 1 | |
| Dibromomethane | ND | 1.0 | 1 | | 1,1,2-Trichloroethane | ND | 1.0 | 1 | |
| 1,2-Dichlorobenzene | ND | 1.0 | 1 | | Trichloroethene | ND | 1.0 | 1 | |
| 1,3-Dichlorobenzene | ND | 1.0 | 1 | | Trichlorofluoromethane | ND | 10 | 1 | |
| 1,4-Dichlorobenzene | ND | 1.0 | 1 | | 1,2,3-Trichloropropane | ND | 5.0 | 1 | |
| Dichlorodifluoromethane | ND | 1.0 | 1 | | 1,2,4-Trimethylbenzene | ND | 1.0 | 1 | |
| 1,1-Dichloroethane | ND | 1.0 | 1 | | 1,3,5-Trimethylbenzene | ND | 1.0 | 1 | |
| 1,2-Dichloroethane | ND | 0.50 | 1 | | Vinyl Acetate | ND | 10 | 1 | |
| 1,1-Dichloroethene | ND | 1.0 | 1 | | Vinyl Chloride | ND | 0.50 | 1 | |
| c-1,2-Dichloroethene | ND | 1.0 | 1 | | p/m-Xylene | ND | 1.0 | 1 | |
| t-1,2-Dichloroethene | ND | 1.0 | 1 | | o-Xylene | ND | 1.0 | 1 | |
| 1,2-Dichloropropane | ND | 1.0 | 1 | | Methyl-t-Butyl Ether (MTBE) | ND | 1.0 | 1 | |

| Surrogates: | REC (%) | Control Limits | Qual | Surrogates: | REC (%) | Control Limits | Qual |
|---|---|---|---|---|---|---|---|
| 1,4-Bromofluorobenzene | 99 | 80-120 | | Dibromofluoromethane | 91 | 80-126 | |
| 1,2-Dichloroethane-d4 | 87 | 80-134 | | Toluene-d8 | 99 | 80-120 | |

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Return to Contents

Calscience Environmental Laboratories, Inc.

# Analytical Report

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 3010A Total / EPA 7470A Total
Method: EPA 6010B / EPA 7470A
Units: mg/L

Project: Barstow Perchlorate / 29403643



| Client Sample Number | Lab Sample Number | Date /Time Collected | Matrix | Instrument | Date Prepared | Date/Time Analyzed | QC Batch ID |
|---|---|---|---|---|---|---|---|
| **Decon** | **11-12-1644-1-F** | **12/20/11 11:20** | **Aqueous** | **ICP 5300** | **12/22/11** | **12/29/11 11:19** | **111222LA3** |

Comment(s): -Mercury analysis was performed on 12/22/11 19:06 with batch 111222L01.

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | 0.0150 | 1 | | Molybdenum | 0.0197 | 0.0100 | 1 | |
| Arsenic | ND | 0.0100 | 1 | | Nickel | ND | 0.0100 | 1 | |
| Barium | 0.0131 | 0.0100 | 1 | | Selenium | ND | 0.0150 | 1 | |
| Beryllium | ND | 0.0100 | 1 | | Silver | ND | 0.00500 | 1 | |
| Cadmium | ND | 0.0100 | 1 | | Thallium | ND | 0.0150 | 1 | |
| Chromium | 0.0166 | 0.0100 | 1 | | Vanadium | 0.0482 | 0.0100 | 1 | |
| Cobalt | ND | 0.0100 | 1 | | Mercury | ND | 0.000500 | 1 | |
| Copper | ND | 0.0100 | 1 | | Zinc | 0.0173 | 0.0100 | 1 | |
| Lead | ND | 0.0100 | 1 | | | | | | |

| Method Blank | 099-04-008-5,751 | N/A | Aqueous | Mercury | 12/22/11 | 12/22/11 14:05 | 111222L01 |
|---|---|---|---|---|---|---|---|

Comment(s): -Preparation/analysis for Mercury was performed by EPA 7470A.

| Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|
| Mercury | ND | 0.000500 | 1 | |

| Method Blank | 097-01-003-12,253 | N/A | Aqueous | ICP 5300 | 12/22/11 | 12/22/11 15:01 | 111222LA3 |
|---|---|---|---|---|---|---|---|

| Parameter | Result | RL | DF | Qual | Parameter | Result | RL | DF | Qual |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | ND | 0.0150 | 1 | | Lead | ND | 0.0100 | 1 | |
| Arsenic | ND | 0.0100 | 1 | | Molybdenum | ND | 0.0100 | 1 | |
| Barium | ND | 0.0100 | 1 | | Nickel | ND | 0.0100 | 1 | |
| Beryllium | ND | 0.0100 | 1 | | Selenium | ND | 0.0150 | 1 | |
| Cadmium | ND | 0.0100 | 1 | | Silver | ND | 0.00500 | 1 | |
| Chromium | ND | 0.0100 | 1 | | Thallium | ND | 0.0150 | 1 | |
| Cobalt | ND | 0.0100 | 1 | | Vanadium | ND | 0.0100 | 1 | |
| Copper | ND | 0.0100 | 1 | | Zinc | ND | 0.0100 | 1 | |

Return to Contents

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 3010A Total
Method: EPA 6010B

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **11-12-1631-1** | **Aqueous** | **ICP 5300** | **12/22/11** | **12/22/11** | **111222SA3** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Antimony | 0.5000 | 83 | 84 | 72-132 | 1 | 0-10 | |
| Arsenic | 0.5000 | 89 | 89 | 80-140 | 1 | 0-11 | |
| Barium | 0.5000 | 110 | 108 | 87-123 | 1 | 0-6 | |
| Beryllium | 0.5000 | 104 | 103 | 89-119 | 1 | 0-8 | |
| Cadmium | 0.5000 | 107 | 106 | 82-124 | 1 | 0-7 | |
| Chromium | 0.5000 | 104 | 104 | 86-122 | 1 | 0-8 | |
| Cobalt | 0.5000 | 113 | 111 | 83-125 | 1 | 0-7 | |
| Copper | 0.5000 | 103 | 103 | 78-126 | 1 | 0-7 | |
| Lead | 0.5000 | 112 | 110 | 84-120 | 1 | 0-7 | |
| Molybdenum | 0.5000 | 104 | 104 | 78-126 | 1 | 0-7 | |
| Nickel | 0.5000 | 109 | 108 | 84-120 | 1 | 0-7 | |
| Selenium | 0.5000 | 104 | 101 | 79-127 | 2 | 0-9 | |
| Silver | 0.2500 | 101 | 99 | 86-128 | 2 | 0-7 | |
| Thallium | 0.5000 | 111 | 110 | 79-121 | 1 | 0-8 | |
| Vanadium | 0.5000 | 101 | 101 | 88-118 | 0 | 0-7 | |
| Zinc | 0.5000 | 109 | 108 | 89-131 | 0 | 0-8 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - PDS / PDSD

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | PDS / PDSD Batch Number |
|---|---|---|---|---|---|
| **11-12-1631-1** | **Aqueous** | **ICP 5300** | **12/22/11** | **12/22/11** | **111222SA3** |

| Parameter | SPIKE ADDED | PDS %REC | PDSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Antimony | 0.5000 | 79 | 78 | 75-125 | 1 | 0-10 | |
| Arsenic | 0.5000 | 88 | 87 | 75-125 | 1 | 0-11 | |
| Barium | 0.5000 | 107 | 107 | 75-125 | 0 | 0-6 | |
| Beryllium | 0.5000 | 101 | 101 | 75-125 | 0 | 0-8 | |
| Cadmium | 0.5000 | 104 | 103 | 75-125 | 0 | 0-7 | |
| Chromium | 0.5000 | 102 | 101 | 75-125 | 1 | 0-8 | |
| Cobalt | 0.5000 | 110 | 109 | 75-125 | 1 | 0-7 | |
| Copper | 0.5000 | 102 | 103 | 75-125 | 1 | 0-7 | |
| Lead | 0.5000 | 109 | 107 | 75-125 | 1 | 0-7 | |
| Molybdenum | 0.5000 | 102 | 101 | 75-125 | 1 | 0-7 | |
| Nickel | 0.5000 | 107 | 106 | 75-125 | 1 | 0-7 | |
| Selenium | 0.5000 | 99 | 99 | 75-125 | 0 | 0-9 | |
| Silver | 0.2500 | 87 | 86 | 75-125 | 1 | 0-7 | |
| Thallium | 0.5000 | 108 | 106 | 75-125 | 2 | 0-8 | |
| Vanadium | 0.5000 | 99 | 99 | 75-125 | 1 | 0-7 | |
| Zinc | 0.5000 | 107 | 106 | 75-125 | 1 | 0-8 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | |
|---|---|
| URS Corporation | Date Received: 12/21/11 |
| 915 Wilshire Blvd., Suite 700 | Work Order No: 11-12-1644 |
| Los Angeles, CA 90017-3437 | Preparation: N/A |
| | Method: EPA 314.0 |

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **TW-20** | **Aqueous** | **IC 13** | **N/A** | **12/23/11** | **111223S01B** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 50 | 88 | 91 | 80-120 | 3 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 3510C
Method: EPA 8015B (M)

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **11-12-1638-2** | **Aqueous** | **GC 46** | **12/22/11** | **12/27/11** | **111222S15** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| TPH as Diesel | 2000 | 96 | 96 | 55-133 | 1 | 0-30 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 7470A Total
Method: EPA 7470A

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **11-12-1631-2** | **Aqueous** | **Mercury** | **12/22/11** | **12/22/11** | **111222S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Mercury | 0.01000 | 89 | 89 | 57-141 | 0 | 0-10 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - Spike/Spike Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: 12/21/11
Work Order No: 11-12-1644
Preparation: EPA 5030C
Method: EPA 8260B

Project Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | MS/MSD Batch Number |
|---|---|---|---|---|---|
| **Decon** | **Aqueous** | **GC/MS QQ** | **12/22/11** | **12/22/11** | **111222S01** |

| Parameter | SPIKE ADDED | MS %REC | MSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Benzene | 50.00 | 100 | 99 | 78-120 | 0 | 0-20 | |
| Carbon Tetrachloride | 50.00 | 102 | 102 | 67-139 | 0 | 0-20 | |
| Chlorobenzene | 50.00 | 102 | 102 | 80-120 | 0 | 0-20 | |
| 1,2-Dibromoethane | 50.00 | 100 | 101 | 80-123 | 1 | 0-20 | |
| 1,2-Dichlorobenzene | 50.00 | 104 | 103 | 76-120 | 1 | 0-20 | |
| 1,2-Dichloroethane | 50.00 | 104 | 104 | 76-130 | 0 | 0-20 | |
| 1,1-Dichloroethene | 50.00 | 112 | 95 | 70-130 | 16 | 0-27 | |
| Ethylbenzene | 50.00 | 101 | 102 | 73-127 | 1 | 0-20 | |
| Toluene | 50.00 | 101 | 101 | 72-126 | 0 | 0-20 | |
| Trichloroethene | 50.00 | 100 | 100 | 74-122 | 0 | 0-20 | |
| Vinyl Chloride | 50.00 | 103 | 107 | 65-131 | 4 | 0-24 | |
| Methyl-t-Butyl Ether (MTBE) | 50.00 | 99 | 101 | 69-123 | 2 | 0-20 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: N/A
Work Order No: 11-12-1644
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **097-01-003-12,253** | **Aqueous** | **ICP 5300** | **12/22/11** | **12/22/11** | **111222LA3** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | ME_CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|---|
| Antimony | 0.5000 | 98 | 97 | 80-120 | 73-127 | 1 | 0-20 | |
| Arsenic | 0.5000 | 101 | 101 | 80-120 | 73-127 | 0 | 0-20 | |
| Barium | 0.5000 | 107 | 107 | 80-120 | 73-127 | 0 | 0-20 | |
| Beryllium | 0.5000 | 100 | 100 | 80-120 | 73-127 | 0 | 0-20 | |
| Cadmium | 0.5000 | 102 | 102 | 80-120 | 73-127 | 0 | 0-20 | |
| Chromium | 0.5000 | 100 | 101 | 80-120 | 73-127 | 0 | 0-20 | |
| Cobalt | 0.5000 | 109 | 109 | 80-120 | 73-127 | 1 | 0-20 | |
| Copper | 0.5000 | 100 | 100 | 80-120 | 73-127 | 0 | 0-20 | |
| Lead | 0.5000 | 106 | 106 | 80-120 | 73-127 | 0 | 0-20 | |
| Molybdenum | 0.5000 | 102 | 101 | 80-120 | 73-127 | 1 | 0-20 | |
| Nickel | 0.5000 | 105 | 105 | 80-120 | 73-127 | 0 | 0-20 | |
| Selenium | 0.5000 | 99 | 98 | 80-120 | 73-127 | 1 | 0-20 | |
| Silver | 0.2500 | 98 | 98 | 80-120 | 73-127 | 0 | 0-20 | |
| Thallium | 0.5000 | 106 | 105 | 80-120 | 73-127 | 1 | 0-20 | |
| Vanadium | 0.5000 | 99 | 99 | 80-120 | 73-127 | 0 | 0-20 | |
| Zinc | 0.5000 | 103 | 103 | 80-120 | 73-127 | 0 | 0-20 | |

Total number of LCS compounds : 16
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1644 |
| Los Angeles, CA 90017-3437 | | Preparation: | N/A |
| | | Method: | EPA 314.0 |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-05-203-1,387** | **Aqueous** | **IC 13** | **N/A** | **12/23/11** | **111223L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Perchlorate | 25 | 93 | 98 | 85-115 | 5 | 0-15 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1644 |
| Los Angeles, CA 90017-3437 | | Preparation: | EPA 3510C |
| | | Method: | EPA 8015B (M) |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-14-065-132** | **Aqueous** | **GC 46** | **12/22/11** | **12/27/11** | **111222B15A** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| TPH as Diesel | 2000 | 97 | 111 | 75-117 | 13 | 0-13 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

| | | | |
|---|---|---|---|
| URS Corporation | | Date Received: | N/A |
| 915 Wilshire Blvd., Suite 700 | | Work Order No: | 11-12-1644 |
| Los Angeles, CA 90017-3437 | | Preparation: | EPA 7470A Total |
| | | Method: | EPA 7470A |

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-04-008-5,751** | **Aqueous** | **Mercury** | **12/22/11** | **12/22/11** | **111222L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|
| Mercury | 0.01000 | 91 | 91 | 85-121 | 1 | 0-10 | |

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Quality Control - LCS/LCS Duplicate

ACCREDITED IN ACCORDANCE WITH nelac

URS Corporation
915 Wilshire Blvd., Suite 700
Los Angeles, CA 90017-3437

Date Received: N/A
Work Order No: 11-12-1644
Preparation: EPA 5030C
Method: EPA 8260B

Project: Barstow Perchlorate / 29403643

| Quality Control Sample ID | Matrix | Instrument | Date Prepared | Date Analyzed | LCS/LCSD Batch Number |
|---|---|---|---|---|---|
| **099-14-001-6,659** | **Aqueous** | **GC/MS QQ** | **12/22/11** | **12/22/11** | **111222L01** |

| Parameter | SPIKE ADDED | LCS %REC | LCSD %REC | %REC CL | ME_CL | RPD | RPD CL | Qualifiers |
|---|---|---|---|---|---|---|---|---|
| Benzene | 50.00 | 99 | 99 | 80-120 | 73-127 | 0 | 0-20 | |
| Carbon Tetrachloride | 50.00 | 102 | 102 | 66-138 | 54-150 | 0 | 0-20 | |
| Chlorobenzene | 50.00 | 103 | 102 | 80-120 | 73-127 | 1 | 0-20 | |
| 1,2-Dibromoethane | 50.00 | 101 | 100 | 80-120 | 73-127 | 1 | 0-20 | |
| 1,2-Dichlorobenzene | 50.00 | 104 | 102 | 80-120 | 73-127 | 2 | 0-20 | |
| 1,2-Dichloroethane | 50.00 | 105 | 104 | 80-129 | 72-137 | 1 | 0-20 | |
| 1,1-Dichloroethene | 50.00 | 111 | 92 | 71-131 | 61-141 | 19 | 0-20 | |
| Ethylbenzene | 50.00 | 102 | 102 | 80-123 | 73-130 | 1 | 0-20 | |
| Toluene | 50.00 | 102 | 101 | 79-121 | 72-128 | 0 | 0-20 | |
| Trichloroethene | 50.00 | 100 | 101 | 80-120 | 73-127 | 1 | 0-20 | |
| Vinyl Chloride | 50.00 | 100 | 104 | 70-136 | 59-147 | 4 | 0-20 | |
| Methyl-t-Butyl Ether (MTBE) | 50.00 | 99 | 100 | 72-126 | 63-135 | 1 | 0-22 | |

Total number of LCS compounds : 12
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

Return to Contents

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

## Glossary of Terms and Qualifiers

ACCREDITED IN ACCORDANCE WITH nelac

Work Order Number: 11-12-1644

| Qualifier | Definition |
|---|---|
| * | See applicable analysis comment. |
| < | Less than the indicated value. |
| > | Greater than the indicated value. |
| 1 | Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification. |
| 2 | Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification. |
| 3 | Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification. |
| 4 | The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification. |
| 5 | The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported without further clarification. |
| 6 | Surrogate recovery below the acceptance limit. |
| 7 | Surrogate recovery above the acceptance limit. |
| B | Analyte was present in the associated method blank. |
| BU | Sample analyzed after holding time expired. |
| E | Concentration exceeds the calibration range. |
| ET | Sample was extracted past end of recommended max. holding time. |
| HD | The chromatographic pattern was inconsistent with the profile of the reference fuel standard. |
| HDH | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected). |
| HDL | The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected). |
| J | Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated. |
| ME | LCS/LCSD Recovery Percentage is within Marginal Exceedance (ME) Control Limit range. |
| ND | Parameter not detected at the indicated reporting limit. |
| Q | Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater. |
| SG | The sample extract was subjected to Silica Gel treatment prior to analysis. |
| X | % Recovery and/or RPD out-of-range. |
| Z | Analyte presence was not confirmed by second column or GC/MS analysis. |

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
MPN - Most Probable Number

Return to Contents

# Calscience Environmental Laboratories, Inc.

**CHAIN OF CUSTODY RECORD**

Date 12/20/11 & 12/21/11

Page 1 of 1

☒ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WO # / LAB USE ONLY
**11-12-1644**

LABORATORY CLIENT: URS Corporation

ADDRESS: 915 Wilshire Blvd. Ste. 700

CITY: LA STATE: CA ZIP: 90017

TEL: 213 996 2200 E-MAIL: Andrew.Vigna@URS.com; Roberto.Pinon@URS.com

CLIENT PROJECT NAME / NUMBER: Barstow Perchlorate 29403643

P.O. NO.:

PROJECT CONTACT: Roberto Pinon

SAMPLER(S): (PRINT) A. Vigna

TURNAROUND TIME:
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ STANDARD

☐ COELT EDF GLOBAL ID LOG CODE

SPECIAL INSTRUCTIONS:
(N) ~~*Total metals analysis for "Decon" only~~
*Extra VOA included

**REQUESTED ANALYSES**

| LAB USE ONLY | SAMPLE ID | SAMPLING DATE | SAMPLING TIME | MATRIX | NO. OF CONT. (N) | Unpreserved | Preserved | Field Filtered | TPH (g) or GRO | TPH (d) or DRO or (C6-C36) or (C6-C44) | TPH ( ) | BTEX / MTBE (8260) or ( ) | VOCs (8260) | Oxygenates (8260) | En Core / Terra Core Prep (5035) | SVOCs (8270) | Pesticides (8081) | PCBs (8082) | PNAs (8310) or (8270) | T22 Metals (6010/747X) | Cr(VI) [7196 or 7199 or 218.6] | Air - VOCs (TO-14A) or (TO-15) | Air - TPH (g) [TO-3] | USEPA 314.0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Decon | 12/20/11 | 1120 | Aqueous | 6/7 | | X | | | X | | | X | | | | | | | X | | | | | X | |
| 2 | TW-20 | 12/21/11 | 0800 | Aqueous | 1 | | | | | | | | | | | | | | | | | | | X | |
| 3 | TW-9 | " | 0940 | Aqueous | 1 | | | | | | | | | | | | | | | | | | | X | |
| 4 | TW-21 | " | 1100 | Aqueous | 1 | | | | | | | | | | | | | | | | | | | X | |
| 5 | TW-22 | " | 1215 | Aqueous | 1 | | | | | | | | | | | | | | | | | | | X | |
| 6 | ~~TW-(N)~~ EB-122111 | " | 1230 | Aqueous | 1 | | | | | | | | | | | | | | | | | | | X | |
| | | | | | | | | | | | | | | | | | | | | | | | | (N) | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: 12/21/11 | Time: 1615 |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: | Time: |
| Relinquished by: (Signature) | Received by: (Signature/Affiliation) | Date: | Time: |

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision



Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1644

# SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: URS CORP DATE: 12/21/11

**TEMPERATURE:** Thermometer ID: SC3 (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 4.7 °C - 0.3 °C (CF) = 4.4 °C ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

**Ambient Temperature:** ☐ Air ☐ Filter Initial: JR

**CUSTODY SEALS INTACT:**

☐ Cooler ☐_____ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial: JR

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: JR

| SAMPLE CONDITION: | Yes | No | N/A |
|---|---|---|---|
| Chain-Of-Custody (COC) document(s) received with samples | ☑ | ☐ | ☐ |
| COC document(s) received complete | ☑ | ☐ | ☐ |
| ☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels. | | | |
| ☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished. | | | |
| Sampler's name indicated on COC | ☑ | ☐ | ☐ |
| Sample container label(s) consistent with COC | ☐ | ☑ | ☐ |
| Sample container(s) intact and good condition | ☑ | ☐ | ☐ |
| Proper containers and sufficient volume for analyses requested | ☑ | ☐ | ☐ |
| Analyses received within holding time | ☑ | ☐ | ☐ |
| pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours | ☐ | ☐ | ☑ |
| Proper preservation noted on COC or sample container | ☑ | ☐ | ☐ |
| ☐ Unpreserved vials received for Volatiles analysis | | | |
| Volatile analysis container(s) free of headspace | ☑ | ☐ | ☐ |
| Tedlar bag(s) free of condensation | ☐ | ☐ | ☑ |

**CONTAINER TYPE:**

**Solid:** ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

**Water:** ☐VOA ☑VOA**h** (4) ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☑1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☑250PB**n** ☑125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

**Air:** ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:**_____ **Labeled/Checked by:** JR

**Container:** **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** JL

**Preservative:** **h:** HCL **n:** $HNO_3$ **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** $H_3PO_4$ **s:** $H_2SO_4$ **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:**_____



Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-12-1644

# SAMPLE ANOMALY FORM

## SAMPLES - CONTAINERS & LABELS:

Comments:

- ☐ **Sample(s) NOT RECEIVED but listed on COC**
- ☐ **Sample(s) received but NOT LISTED on COC**
- ☐ **Holding time expired** – list sample ID(s) and test
- ☐ **Insufficient quantities for analysis** – list test
- ☐ **Improper container(s) used** – list test
- ☐ **Improper preservative used** – list test
- ☐ **No preservative noted on COC or label** – list test & notify lab
- ☐ **Sample labels illegible** – note test/container type
- ☑ **Sample label(s) do not match COC** – Note in comments
  - ☑ **Sample ID** — (-5) LABELED AS TW-23, 12/21/11 @ 1215
  - ☐ **Date and/or Time Collected**
  - ☐ **Project Information**
  - ☐ **# of Container(s)**
  - ☐ **Analysis**
- ☐ **Sample container(s) compromised** – Note in comments
  - ☐ **Water present in sample container**
  - ☐ **Broken**
- ☐ **Sample container(s) not labeled**
- ☐ **Air sample container(s) compromised** – Note in comments
  - ☐ **Flat**
  - ☐ **Very low in volume**
  - ☐ **Leaking (Not transferred - duplicate bag submitted)**
  - ☐ **Leaking (transferred into Calscience Tedlar® Bag*)**
  - ☐ **Leaking (transferred into Client's Tedlar® Bag*)**
- ☐ **Other:** _____

## HEADSPACE – Containers with Bubble > 6mm or ¼ inch:

| Sample # | Container ID(s) | # of Vials Received | Sample # | Container ID(s) | # of Vials Received | Sample # | Container ID(s) | # of Cont. received | Analysis |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Comments: _____

*Transferred at Client's request.

Initial / Date: PS 12/21/11



Return to Contents

# APPENDIX E – WASTE MANIFESTS

**NON-HAZARDOUS WASTE MANIFEST**

| 1. Generator ID Number | 2. Page 1 of | 3. Emergency Response Phone | 4. Waste Tracking Number |
|---|---|---|---|
| NOT REQUIRED | 1 | 800-424-9300 | 0305718 |

**GENERATOR**

5. Generator's Name and Mailing Address
Lahontan Regional Water Quality Control Board
14440 Civic Drive, Suite 200, Victorville, CA. 92392
Generator's Phone:

Generator's Site Address (if different than mailing address)
30433 Poplar Street, Barstow, CA. 92311

6. Transporter 1 Company Name: American Integrated Services, Inc.
U.S. EPA ID Number: CAR000148338

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Crosby & Overton, Inc.
1630 W. 16th Street
Long Beach, CA. 90813 562-432-5445
Facility's Phone:
U.S. EPA ID Number: CAD028409019

| | 9. Waste Shipping Name and Description | 10. Containers No. | 10. Containers Type | 11. Total Quantity | 12. Unit Wt./Vol. | |
|---|---|---|---|---|---|---|
| 1. | Non-Hazardous Waste Liquid (Decon Water) | 1 | T ~~DM~~ | 55 | G | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |

13. Special Handling Instructions and Additional Information
L135TO D59525
Wear protective equipment while handling. Weights or volumes are approximate. 24 hour emergency number (800) 424-9300 Chemtrec.
Profile#: 27578
Project #: 32009-3-24 I drum

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Tim E. Post
Signature: Tim E. Post
Month 1 Day 18 Year 12

**INT'L**

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

**TRANSPORTER**

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Ben Burgess
Signature:
Month 1 Day 18 Year 12

Transporter 2 Printed/Typed Name
Signature
Month Day Year

**DESIGNATED FACILITY**

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

H135

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: [illegible]
Signature:
Month 01 Day 20 Year 12

**NON-HAZARDOUS WASTE MANIFEST**

| 1. Generator ID Number | 2. Page 1 of | 3. Emergency Response Phone | 4. Waste Tracking Number |
|---|---|---|---|
| NOT REQUIRED | 1 | 800-424-9300 | 0305716 |

**GENERATOR**

5. Generator's Name and Mailing Address
Lahontan Regional Water Quality Control Board
14440 Civic Drive, Suite 200, Victorville, CA. 92392
Generator's Phone:

Generator's Site Address (if different than mailing address)
30433 Poplar Street, Barstow, CA. 92311

6. Transporter 1 Company Name
American Integrated Services, Inc.
U.S. EPA ID Number
CAR000148338

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Crosby & Overton, Inc.
1630 W. 16th Street
Long Beach, CA. 90813 562-432-5445
Facility's Phone:
U.S. EPA ID Number
CAD028408018

| | 9. Waste Shipping Name and Description | 10. Containers No. | 10. Containers Type | 11. Total Quantity | 12. Unit Wt./Vol. | |
|---|---|---|---|---|---|---|
| 1. | Non-Hazardous Waste Solid (Soil) | 27 | DM | 15.500 | P | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |

13. Special Handling Instructions and Additional Information
D59378.
Wear protective equipment while handling. Weights or volumes are approximate. 24 hour emergency number (800) 424-9300 Chemtrec.
Profile#: 83897
Project #: 32009-3-24 27559

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Tim E. Post | Signature: Tim E Post | Month: 1 | Day: 18 | Year: 12

**INT'L**

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

**TRANSPORTER**

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name | Signature | Month | Day | Year

Transporter 2 Printed/Typed Name: Ben Burgos | Signature | Month: 1 | Day: 18 | Year: 12

**DESIGNATED FACILITY**

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) | Month | Day | Year

HH

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Laura Christie | Signature | Month: 01 | Day: 18 | Year: 12