
Draft

Groundwater Monitoring Well Work Plan

**Beverly Hills Land Corporation Site
9315 Civic Center Drive (Lots 12 and 13)
Beverly Hills, California**

Prepared for
Union Pacific Railroad
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Roseville, California 95747

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December 2008

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WORK PLAN**

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Prepared on behalf of:

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Date: December 18, 2008

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SECTION 1

Introduction

On behalf of Union Pacific Railroad (UPRR), CH2M HILL has prepared this *Groundwater Monitoring Well Work Plan* (Work Plan) for the installation of five groundwater monitoring wells to test for the presence of arsenic in groundwater at the Beverly Hills Land Company (BHLC) site located at 9315 Civic Center Drive in Beverly Hills, California (Site).

1.1 Site Location

The Site is located at 9315 Civic Center Drive, Beverly Hills, California. The site location is shown in Figure 1. The Site is the former railroad right-of-way adjacent to Santa Monica Boulevard between Alpine Avenue and North Doheny Drive.

The Site is approximately 3,600 feet long, 60 feet wide, and covers approximately 5 acres. It is divided into two parcels: Lot 12 and Lot 13. Most of the Site is unpaved. Several mature trees line the north and south sides of Lot 13. A chain-link fence surrounds the entire Site.

SECTION 2

Site Investigation Activities

This section describes groundwater monitoring well installation, sampling locations, and field methods to be followed during sample collection and shipment to the laboratory. Laboratory analytical methods are also described. Figure 2 illustrates proposed well installation locations. All field activities will be conducted in compliance with the site-specific Health and Safety Plan included in Appendix A.

2.1 Permits

Prior to beginning field activities, encroachment and drilling permits will be obtained from the City of Beverly Hills and Los Angeles County for purposes of drilling, installing, and sampling five monitoring wells. Three of the five monitoring wells will be located on public land (streets).

The CH2M HILL field supervisor will meet in person with City of Beverly Hills and Los Angeles County Department of Public Works personnel at their respective offices to discuss Work Plan objectives for purposes of obtaining permits within these jurisdictions.

2.2 Utility Clearance

Prior to drilling, the boring locations will be marked in white paint. Underground Services Alert (USA) will be contacted to identify subsurface utilities at the proposed offsite monitoring well locations. A private utility locator service will be contacted to identify subsurface utilities for the proposed onsite monitoring well locations. Additionally, the upper five feet of each boring will be hand-augered (or air-knifed) prior to drilling.

USA and the private utility locator service will be contacted at least 1 week prior to commencement of drilling activities so that subsurface utilities can be identified and marked. Proposed monitoring well locations will be moved to a nearby location if subsurface utilities are identified. The California Department of Toxic Substances Control (DTSC) will be informed by phone if a monitoring well location(s) needs to be moved.

2.3 Field Procedures

The following subsections describe the field procedures for drilling, lithologic logging, soil sampling, monitoring well installation, development and sampling, sample handling, and laboratory methods. Field and laboratory QA/QC are described in Section 3.0.

2.3.1 Drilling

Five boreholes will be advanced by a State of California licensed well driller using a hollow-stem auger drilling rig at locations illustrated in Figure 2. The location and rationale for each soil boring are described in Table 1.

Boreholes approximately 8 inches in diameter will be advanced to groundwater, to a maximum depth of approximately 65 feet below ground surface (bgs) (Table 2).

Temporary conductor casing for onsite boreholes will be installed to approximately 10 to 15 feet bgs to prevent soils with elevated concentrations of arsenic from being sloughed downhole.

All drilling equipment will be decontaminated prior to drilling and between boreholes to avoid cross-contamination of the subsurface.

2.3.2 Lithologic Logging

Boreholes will be continuously cored for purposes of lithologic logging and soil sampling. The lithology in the boreholes will be logged by a Professional Geologist registered in the State of California. A boring log form will be used to record the lithologic logging information. Information on the boring sheet includes the following:

- Borehole location
- Drilling information
- Well construction details
- Lithologic details (soil type, soil moisture, depth to groundwater, etc.)

Lithologic descriptions will be logged on standard boring logs in accordance with the Unified Soil Classification System. Additional information to be recorded includes the depth to the water table, areas of caving or sloughing in the borehole, changes in the drilling rate, presence of organic materials, presence of fractures or voids in consolidated materials, and other noteworthy observations or conditions such as changes in lithology.

2.3.3 Soil Sampling

Subsurface soil samples will be obtained using a 2.5-inch diameter, 5-foot-long, continuous-drive, split-barrel sampler that is advanced with the augers during drilling. When continuous drive sampling is not practical, a 24-inch stainless steel split-barrel sampler will be driven a total of 24 inches into the undisturbed materials by dropping a 140-pound weight 30 inches. A 2.5-inch diameter split spoon may be used to increase the chances of sufficient volume recovery for sampling purposes. The number of blows required to drive the sampler will be recorded on the boring log in 6-inch increments along with the amount of sample recovery in the drilling log. Sections of poor sample recovery will be noted on the boring log.

Soil samples will be collected at 5 feet bgs, at 10 feet bgs, then at 10-foot intervals until groundwater is encountered. A soil sample will also be collected immediately above the groundwater interface. Samples will be collected from the core with clean disposal trowels and placed in a laboratory-cleaned glass container and labeled accordingly.

2.3.4 Monitoring Well Installation

Five 2-inch diameter monitoring wells shall be constructed by a State of California licensed well driller in accordance with Los Angeles County and City of Beverly Hills requirements.

- Wells will be fully cased and constructed with 2-inch diameter clean (brand-new), threaded Schedule 40 polyvinyl chloride piping. Well screens will be approximately 10 feet in length with 0.020-inch slot or smaller (possibly 0.010-inch slot depending on sediments encountered at the site). A threaded end-cap will be placed at the bottom of each well casing.
- Stainless-steel centralizers will be installed above and below the screen to keep casing centered in the borehole.
- Filter (silica sand) pack appropriate for the screen size selected (Monterey-type sand #2/12 or #3) will be used. Silica sand will be rounded, clean, and free of organic materials.
- Transition seal - Secondary, finer-grained silica sand (# 60) pack will be installed for a minimum thickness of one foot above the coarse sand pack.
- Bentonite seal – Above the transition seal, a bentonite seal (bentonite chips) will be installed to for a minimum thickness of 2 feet.
- Annular Seal – Cement/bentonite or sand/cement grout will be tremied from top of the bentonite seal to the ground surface in one continuous pour in accordance with Los Angeles County and City of Beverly Hills requirements.

Onsite monitoring wells will be completed above-grade with a locking steel protective casing set into the concrete pad. The steel protective casing will extend at least 3 feet into the ground and 2 feet above ground but should not penetrate the bentonite seal. The concrete pad will be round, approximately 3 feet in diameter, and poured into a Sonotube® concrete form or similar. The concrete will slope uniformly away from the protective casing.

Guard posts (bollards) will be installed for onsite monitoring wells for additional protection. Four steel guard posts will be installed in concrete beyond the edge of the protective seal. Guard posts will be concrete-filled, at least 2 inches in diameter, and will extend at least 2 feet into the ground and 3 feet above the ground. The protective casing and guard posts will be painted with an epoxy paint or similar treatment to prevent rust.

Offsite monitoring wells will be completed with flush-mount, vehicle rated, 12-inch manhole covers, equipped with a rubber-sealed cover and drain. The top of the manhole cover will be positioned approximately 1 inch above grade. The concrete pad will be round, approximately 2 feet diameter, and poured into a Sonotube® concrete form or similar. The concrete will slope uniformly away from the protective casing. The concrete pad will be 12-inches thick at the center and taper to 6-inch thick at the edge. The surface of the pad will slope away from the protective casing to drain water away from the well. Protective casing and flush mounts will be installed into this concrete.

Each well will be properly labeled on the exterior of the locking cap or protective casing with a metal stamp indicating the permanent well number. See Figures 3 and 4 for above grade and flush mount well completion diagrams.

2.3.5 Well Development

Following a minimum of 48 hours after installation of the annular seal, the monitoring wells will be developed. Well development will be accomplished using a combination of surging, swabbing, and pumping throughout the length of the well screen. Surging and swabbing will begin starting at the bottom of the screen and proceeding upwards, throughout the screened zone. Following surging and swabbing, the well will be pumped to remove the fine materials that have been drawn into the well. Development will continue by alternately surging, swabbing, and pumping until turbidity of the development water is substantially reduced and physical parameters including temperature, pH, and specific conductance have stabilized. These parameters will be measured using a flow-through cell and values will be recorded at regular intervals. Stabilization is considered to be achieved when three consecutive readings, taken at three to five minute intervals are within the following limits.

- Turbidity (5 nephelometric turbidity units [NTUs] or when the CH2M HILL field supervisor determines further well development will not substantially improve turbidity)
- Specific conductance (3 percent)
- Temperature (3 percent)
- pH (± 0.1 unit)

Well development equipment will be decontaminated prior to initial use and after the development of each well. A minimum of 7 to 10 casing volumes will be extracted. Well development water will be contained onsite in polyethylene tanks (or 55-gallon drums) pending laboratory analysis and profiling for disposal.

2.3.6 Groundwater Sampling

Monitoring wells will be sampled by CH2M HILL as described below after well development. Sampling will not occur for a minimum of 72 hours after development.

Prior to collecting groundwater samples, depth-to-water measurements will be performed relative to the top of the casing at each well location to the nearest 0.01 (one-hundredth) of a foot. The wells will then be purged a minimum of three casing volumes while monitoring the field parameters: pH, specific conductance, temperature, and when the turbidity has reached 5 NTUs. These parameters will be measured using a flow-through cell and will be recorded at regular intervals until readings have stabilized as defined above.

After parameter stabilization, samples will be collected as follows:

Dissolved Metals (Arsenic)

Groundwater samples collected for dissolved metals will be filtered in the field using a 0.45-micron filter in accordance with EPA Method 6020 and collected in containers with an appropriate preservative supplied by TestAmerica. If dissolved arsenic samples cannot be filtered in the field, arrangements will be made to immediately transport these samples to TestAmerica so they can be filtered and preserved in the laboratory.

Total Metals (Arsenic)

Groundwater samples being collected for total arsenic will not be filtered. Groundwater samples for total arsenic will not be collected until the turbidity is 5 NTUs or less. Samples will be collected into containers with an appropriate preservative supplied by TestAmerica.

Following sample collection, the samples will be recorded on a chain-of-custody form, the containers will be labeled and stored on ice, and transported to TestAmerica in Irvine, CA (State Certification #1108) under chain-of-custody documentation. Groundwater samples will be analyzed for total and dissolved arsenic using EPA Method 6020.

2.3.7 Decontamination

All downhole equipment used during drilling and sample collection, including drive samplers, will be cleaned prior to arriving onsite and between each boring by steam pressure washing the equipment according to the following procedure prior to use at each well location:

- Wash with tap water, using a brush if necessary
- Wash with Alconox, or a phosphate-free detergent, and tap water solution, using a brush if necessary
- Rinse with tap water
- Rinse with distilled or deionized water
- Air dry

All decontamination water will be placed in labeled 55-gallon drums and managed as described in Section 4.0.

2.3.8 Street Cleaning

Streets will be kept free of unnecessary equipment, dirt, and debris during drilling activities. The area will be broom swept following the completion of the well installation.

2.3.9 Surveying

All borehole locations will be surveyed in the field using the Global Positioning Satellite (GPS) technology. Results will be reported in U.S. Survey feet. A State of California licensed surveyor will survey the top-of-casing elevations of the wells relative to a datum.

2.3.10 Laboratory Analysis

TestAmerica will conduct the laboratory analyses. Thirty-six soil samples and 12 groundwater samples will be analyzed at the laboratory. Soil samples will be analyzed using EPA Method 6010B (Table 2). Groundwater samples for (A) total and (B) dissolved arsenic will be analyzed with EPA Method 6020 (Table 3). Laboratory analysis will be on a normal turnaround time basis.

2.3.11 Sample Handling, Packaging, and Shipping

Groundwater samples will be stored in coolers immediately after collection and packaging. Groundwater samples will be collected into pre-preserved glass or plastic containers as specified in Table 3.

The samples will be placed in a chilled cooler for transport to the laboratory. A chain-of-custody record will accompany the samples to the laboratory. Coolers will be shipped through a courier service to TestAmerica. Sample handling, packaging, and shipping details are provided in Section 3.0.

Quality Assurance and Quality Control

3.1 QC Samples

A field QC program will be implemented to help maintain the required level of confidence in the field data and to provide cross-checks on the laboratory performing the analyses.

The following types of field QC samples will be collected:

- Field Duplicate samples
- Equipment rinsate samples

QC samples are described in detail in the following sections.

3.1.1 Duplicate Samples

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

3.1.2 Equipment Rinsate Samples

Equipment rinsate samples will be collected from the reusable sampling equipment to assess the effectiveness of equipment decontamination procedures and to evaluate the potential for cross-contamination between sample locations. An equipment rinsate blank sample will be collected daily. In general, the equipment rinsate sample will be collected from the last decontamination rinsate that has been poured over the equipment and following decontamination. The sample shall be analyzed for dissolved arsenic.

3.2 Field Documentation

Field documentation will include field data sheets, bound field log books, photographs, sample identification labels, custody seals, and chain-of-custody records. The field team leader will be responsible for maintaining appropriate field documentation. Documentation requirements, as well as procedures for correcting documentation, are briefly summarized below.

3.2.1 Field Data Sheets

Each field data sheet will have the appropriate site data entered. If some information requested on the data sheet is not applicable, a line or “N/A” (for “not applicable”) will be recorded for that entry. Entries will not be left blank. Loose data forms must be consecutively numbered and kept in a three-ring binder serialized as other log books.

3.2.2 Field Log Books

Field log books will be used for documenting data collection activities at each site. The log books will be permanently bound field log books consecutively paginated. The cover of each log book will specify the following:

- Person or organization to whom the book is assigned
- Book number
- Start date
- End date

Entries will be made in permanent, waterproof ink and will include sufficient detail to reconstruct site activities without reliance on memory. Field measurements and samples collected will be recorded. Log book entries will include the location of the sampling point, the depth of sample, observed character of the material, field measurements taken at the site, and other appropriate information.

Samples will be collected following the procedures specified in Section 3.3 of this work plan. The equipment used to collect samples will be noted, as well as the sampling date and time, sampling description, sample depth, field screening results and volume, number of containers, and sample number.

3.2.3 Sample Identification

All samples will be labeled with information identifying sample location, date and time of sample collection, and other relevant data, as appropriate. Samples will be assigned a unique identifying number that will be written on the sample label and affixed as a separate printed label. Labels will be filled out using indelible ink and affixed to sample containers via the adhesive backing. The samples will be identified by the borehole number.

3.2.4 Sample Labeling

A sample label will be attached to each sample submitted to a laboratory for analysis. Information recorded on the label will include the following, as appropriate:

- Sample Identification Number: Borehole number and Date: Six-digit number (YYMMDD) indicating the year, month, and day of collection
- Time: Four-digit number indicating the military time of collection (e.g., 0910)
- Preservative: Type of preservative used, if any
- Analyses: Type of analysis required

3.2.5 Chain-of-Custody Records

All samples will be accompanied by a chain-of-custody record. All chain-of-custody records will be unique for samples contained in each cooler. The following information will be recorded on the chain-of-custody form:

- CH2M HILL Project Number
- Project Name: “BHLC 2008 GW Monitoring Well Installation Work Plan”
- Samplers: Signatures of the individuals who collected the samples
- Location No.: Number assigned to each sampling location
- Date: Six-digit number (YYMMDD) indicating the year, month, and day of collection
- Time: Four-digit number indicating the military time of sample collection (e.g., 1320)
- Number of Containers: Number of containers used for each sample; the type of analytical parameters should be indicated in the columns directly right of this column
- Remarks: Pertinent observations
- Relinquished/Received: Documentation, in the form of signature, date, and time, recorded by individuals relinquishing and receiving samples
- Signatures and Date: Documentation of sample custody transfer from the sampler, often through another person, to the analyst at the laboratory

3.2.6 Corrections to Documentation

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

If an error is made on a document assigned to one individual, the individual will make corrections by lining through the error and entering the correct information.

3.3 Sample Handling

3.3.1 Sample Containers

The groundwater samples will be collected in precleaned plastic sample bottles provided by TestAmerica.

3.3.2 Sample Preservation

Sample containers containing the proper preservatives will be supplied by the laboratory. Samples will be preserved in accordance with EPA method requirements. After each sample container has been filled, it will be immediately placed on ice in a cooler.

3.3.3 Sample Packaging and Shipment

Samples will be packed inside the ice cooler with inert cushioning material (e.g., styrofoam or vermiculite) to limit breakage. Ice cubes, double-sealed in Zip-Loc™ bags, will be added to the cooler. A chain-of-custody form shall be completed, sealed in a Zip-Loc™ bag, and placed inside the cooler. The samples will then be shipped or hand-delivered to TestAmerica.

Samples will be delivered to the laboratory as soon as practical after sampling, preferably the same day during which the samples were collected. Samples that cannot be shipped the same day will be properly preserved, and custody will be maintained in a locked area or vehicle.

3.4 Laboratory Reporting Limits

Samples will be analyzed at Test America laboratory for total and dissolved arsenic using EPA Method 6020. The laboratory method reporting limit (MRL) is 1.0 micrograms per liter (µg/L).

3.5 Data Quality and Data Validation

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

Representativeness is a measure of how closely the results reflect the actual concentration or distribution of the chemical compounds in the matrix samples. Sampling plan design, sampling techniques, and sample-handling protocols (e.g., for storage, preservation, and transportation) have been developed and are discussed in previous sections of this document. The proposed documentation will establish that protocols have been followed and sample identification and integrity maintained. Equipment rinsate blanks (collected at a frequency of approximately one per location per day) and the one field duplicate samples will be used to assess field and transport contamination and method variation. To assess laboratory contamination, laboratory method blanks will be run at a minimum frequency of five percent of samples.

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

Accuracy is an assessment of the closeness of the measured value to the true value. For samples, accuracy of chemical test results is assessed by spiking samples with known standards and establishing the average recovery. For a matrix spike, known amounts of a standard compound identical to the compounds being measured are added to the sample. Accuracy measurement will be carried out with a minimum frequency of 1 in 20 samples

analyzed. Target accuracy goals for the analytical methods proposed, expressed as percent recovery of spiked sample, are 75 to 125 percent.

Precision of the data is a measure of the data spread when more than one measurement has been taken on the same sample. Precision can be expressed as the relative percent difference. The level of effort for precision measurements will be a minimum of 1 in 20 samples. Target precision goal for the analytical methods proposed, expressed as relative percent difference between duplicate samples, is ± 25 percent.

Validation of the analytical data will include these activities:

- Review holding times
- Review field blanks
- Review duplicate sample results, calculate the relative percent difference, and compare to typical EPA QC criteria
- Review matrix spike/matrix spike duplicate (MS/MSD), calculate the percent recovery of the spiked compounds, and compare to typical EPA QC criteria

SECTION 4

Investigation-Derived Waste

Three types of investigation-derived waste (IDW) materials will be generated during the field activities. These waste materials include:

- Sampling supplies and discarded personal protective equipment (PPE)
- Drill cuttings
- Decontamination water

All IDW will remain the property of UPRR. On behalf of UPRR, CH2M HILL will coordinate disposal of IDW.

The waste materials generated during the field activities will be managed in accordance with procedures listed below. Any deviation from the procedures described below will be noted in the field log book and will be included in the *2008 GW Investigation Report*.

Disposable materials will include:

- Sampling supplies such as paper towels and cups
- PPE, such as gloves and Tyvek®

These wastes will be contained in trash bags and disposed of as municipal solid waste.

Soil cuttings will be generated during drilling soil borings. During these activities, the soil cuttings will be containerized in separate 55-gallon drums. Each drum will be sealed and labeled to indicate the date, content, drilling location, and point of contact at CH2M HILL. Laboratory results will be used to determine the proper storage, transport, and disposal mechanism for soil IDW. Upon receipt of laboratory analytical results, CH2M HILL will advise UPRR whether additional analyses are required before selecting appropriate disposal options. Until analytical results are received, each drum will be labeled as nonhazardous waste and marked "awaiting analytical results." If the analytical results indicate that the soil cuttings are nonhazardous, the soil cuttings will be spread upon the ground at the Site. If the analytical results indicate the soil cuttings contain elevated concentrations of arsenic the cutting will be disposed at permitted disposal facility.

Decontamination water generated during the field activities will be placed in separate drums or buckets from the drill cuttings. Each drum will be labeled to indicate the date, content, drilling locations, and point of contact at UPRR. Laboratory results of soil will be used to determine the proper storage, transport, and disposal. If arsenic is not detected in the decontamination water at a concentration greater than the maximum contaminant limit (MCL) of 10.0 µg/L it will be disposed spreading on the ground surface at the Site. If the analytical results indicate groundwater concentrations of arsenic greater than the MCL (10.0 µg/L) the decontamination water will be disposed at permitted disposal facility.

Each drum will be inventoried and clearly labeled using waterproof labels and permanent ink. Before disposal, the drums will be stored within the fenced area of the Site. The waste will not be stored more than 90 days beyond receipt of laboratory results used to characterize the material.

SECTION 5

Reporting

CH2M HILL will discuss the results of the groundwater monitoring well sampling with DTSC by phone. If an additional well(s) is needed to address a data gap a site map showing the proposed location will be provided to DTSC and the location agreed upon by phone and email. If needed the additional well(s) will be installed in accordance with the procedures presented herein.

When DTSC, UPRR, and CH2M HILL agree that characterization of the groundwater is completed, CH2M HILL will summarize the results of the field investigation. The summary will be included as an appendix to the draft *Remedial Action Work Plan*. The summary will include:

- A description of activities performed
- Figures indicating sampling locations
- Field observations and field measurements
- Discussion of results
- Tabulated laboratory analytical data
- Raw laboratory analytical data reports
- Discussion of the results of this and previous investigations

SECTION 6

Well Abandonment

When UPRR, DTSC, and CH2M HILL determine that the groundwater investigation is complete, the monitoring wells will be abandoned in accordance with Los Angeles County and City of Beverly Hills well abandonment requirements.

In general, well construction materials will be removed by means of drilling, including overdrilling, if necessary. The well casing, filter pack, and annular seal materials may be left in place during sealing operations, if the County and City agree they cannot or should not be removed. In such a case, appropriate sealing material (cement/bentonite grout) shall be placed in the well casing, filter pack, and all other significant voids within the entire well boring. Casing left in place may require perforation or puncturing to allow proper placement of sealing materials. Sealing material may be applied under pressure to ensure proper distribution.

SECTION 7

Schedule

Following DTSC approval of the *Groundwater Monitoring Well Work Plan*, mobilization to the field shall commence (e.g., drilling subcontractor procurement, securing access from the current property owner, scheduling resources, and procurement of field supplies). It is assumed that field work will commence within 30 days of DTSC approval of the Work Plan, pending driller availability.

The field work is expected to be completed within 2 weeks. The laboratory is expected to provide analytical results within two weeks following receipt of the samples.

The revised draft *Remedial Action Work Plan* will be submitted to DTSC within 45 days upon receipt of laboratory analytical results.

SECTION 8

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Tables

TABLE 1
Sampling Locations and Rationale for Placement
GW Monitoring Well Work Plan, BHLC Site

Sample Location ID	Description of Sampling Location	Rationale
MW-1	Downgradient	Offsite. Downgradient from proposed MW-2 (Lot 12).
MW-2	Lot 12	Onsite. Located on Lot 12.
MW-3	Upgradient	Offsite. Upgradient of proposed MW-3 (Lot 12).
MW-4	Lot 13	Onsite. Located on Lot 13.
MW-5	Downgradient	Offsite. Downgradient proposed MW-4 (Lot 13).

Note: Groundwater direction is assumed to be to the northwest based on recent hydropunch groundwater levels (CH2M HILL, 2008).

TABLE 2
Proposed Soil Sampling Locations and Analyses
GW Monitoring Well Work Plan, BHLC Site

Sample Location ID	Number of Samples	Sampling Depths (in feet) ^a	Laboratory Analyses ^b
MW-1	7	5, 10, 20, 30, 40, 50, and approximately 2 feet above the groundwater interface	Arsenic
MW-2	7	5, 10, 20, 30, 40, 50, and approximately 2 feet above the groundwater interface	Arsenic
MW-3	7	5, 10, 20, 30, 40, 50, and approximately 2 feet above the groundwater interface	Arsenic
MW-4	5	5, 10, 20, 30, and approximately 2 feet above the groundwater interface	Arsenic
MW-5	5	5, 10, 20, 30, and approximately 2 feet above the groundwater interface	Arsenic
Field duplicates	3	1 field duplicate per 10 normal samples	Arsenic
Matrix spike/Matrix spike duplicate	2	1 MS/MSD per 20 normal samples	Arsenic
Equipment blanks	See Table 3	1 per day	Arsenic
Total	36		

^aSample depths will not exceed 65 feet bgs based on recent hydropunch data (CH2M HILL, 2008).

^bLaboratory analyses will be conducted by TestAmerica using EPA SW-846 Method 6010B for arsenic.

TABLE 3
 Groundwater Sampling Locations and Analyses
GW Monitoring Well Work Plan, BHLC Site

Sample Location ID	Number of Samples	Sampling Depths^a	Laboratory Analyses^b
MW-1	1	Groundwater	Arsenic
MW-2	1	Groundwater	Arsenic
MW-3	1	Groundwater	Arsenic
MW-4	1	Groundwater	Arsenic
MW-5	1	Groundwater	Arsenic
Field duplicates	1	Groundwater	Arsenic
Equipment blanks (five from drilling and one from GW sampling)	6	1 per day	Arsenic
Total	12		

^aSample depths will not exceed 100 feet bgs

^bLaboratory analyses will be conducted by TestAmerica using EPA SW-846 Method 6020 for total and dissolved arsenic.

TABLE 4
Sample Collection and Laboratory Analysis Requirements
GW Monitoring Well Work Plan, BHLC Site

Sample Container and Preservative Requirements

Analyte	Method	Preservation	Holding Time	Sample Container
Total metals for arsenic	EPA METHOD 6020	HNO ₃ to pH <2, Chill to 4°C	6 months	500-mL HDPE
Dissolved metals for arsenic	EPA METHOD 6020	Filter in field or lab using 0.45 micron filter*. HNO ₃ to pH <2, Chill to 4°C	6 months	500-mL HDPE
Total metals for arsenic	EPA METHOD 6010B	Chill to 4°C	6 months	8-ounce, wide mouth amber glass jar

Sample Container and Preservative Requirements

Media	Analysis	Sample Container	No. of Containers	Preservatives	Comments
Groundwater	Total and dissolved metals for arsenic	500-mL HDPE	1	HNO ₃ to pH <2, Chill to 4°C	Fill bottle to neck
Soil	Total arsenic	8-ounce, wide mouth amber glass jar	1	Chill to 4°C	Fill container to neck
Equipment Rinsate	Total and dissolved metals for arsenic	500-mL HDPE	1	Filter the dissolved metals sample in field using 0.45 micron filter*. HNO ₃ to pH <2, Chill to 4°C	Fill bottle to neck

*Dissolved metals for arsenic sample must be filtered in the field using a 0.45 micron filter per EPA SW-846 Method 6020. If the sample for some reason cannot be filtered in the field, arrangements will be made with Test America to immediately get these samples to the laboratory after collection so the laboratory can filter and preserve them in accordance with EPA Method 6020.

Notes:

HNO₃ Nitric acid
mL milliliter

Figures

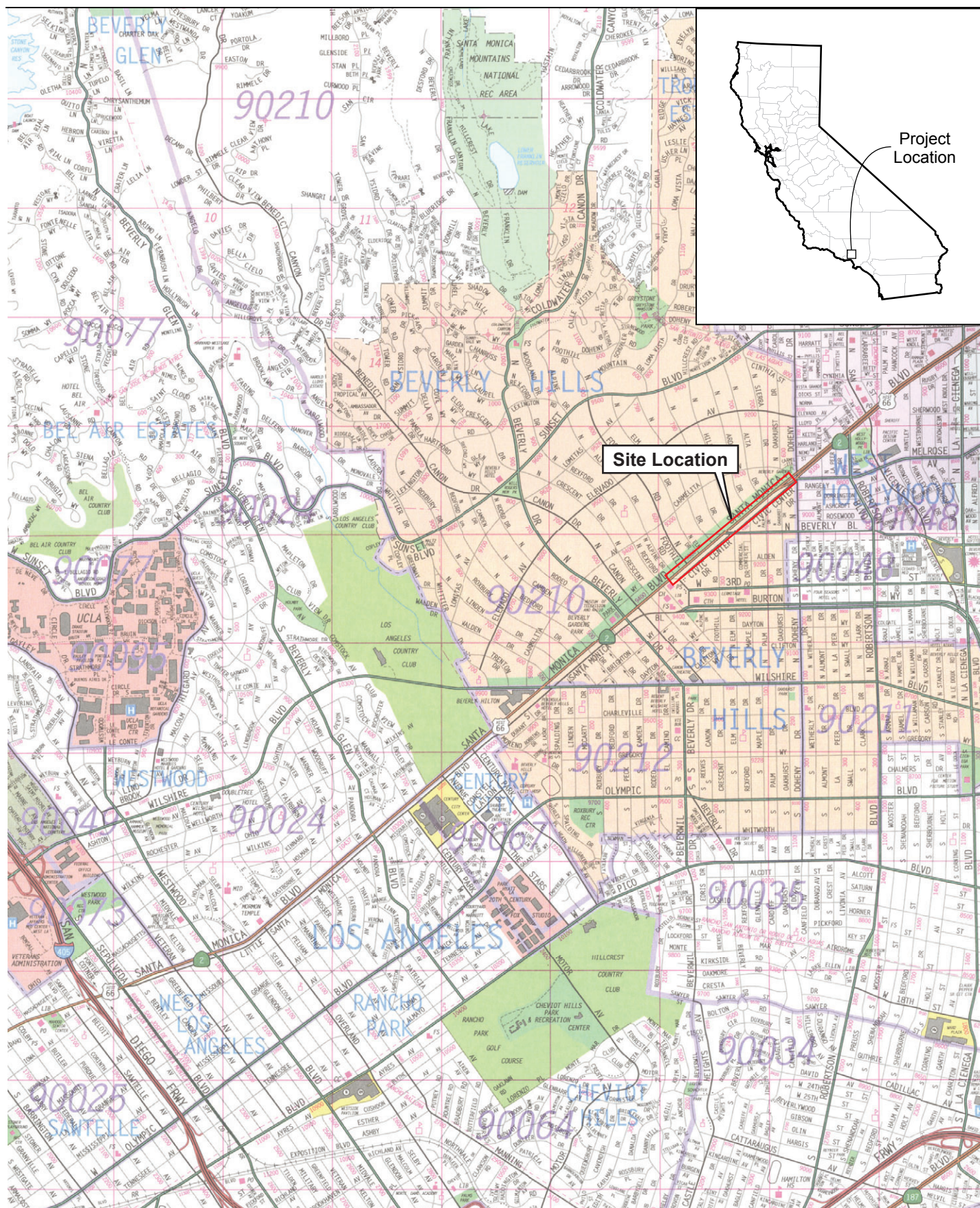


FIGURE 1

Site Location

Groundwater Monitoring Well Work Plan
 Union Pacific Railroad
 Beverly Hills, California

Source: Thomas Guide, Los Angeles and Orange Counties, 2003

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CH2MHILL

Legend

- Streets
- Property boundary
- ▲ Proposed monitoring well locations

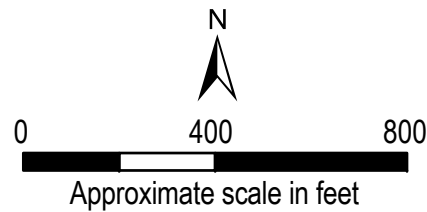
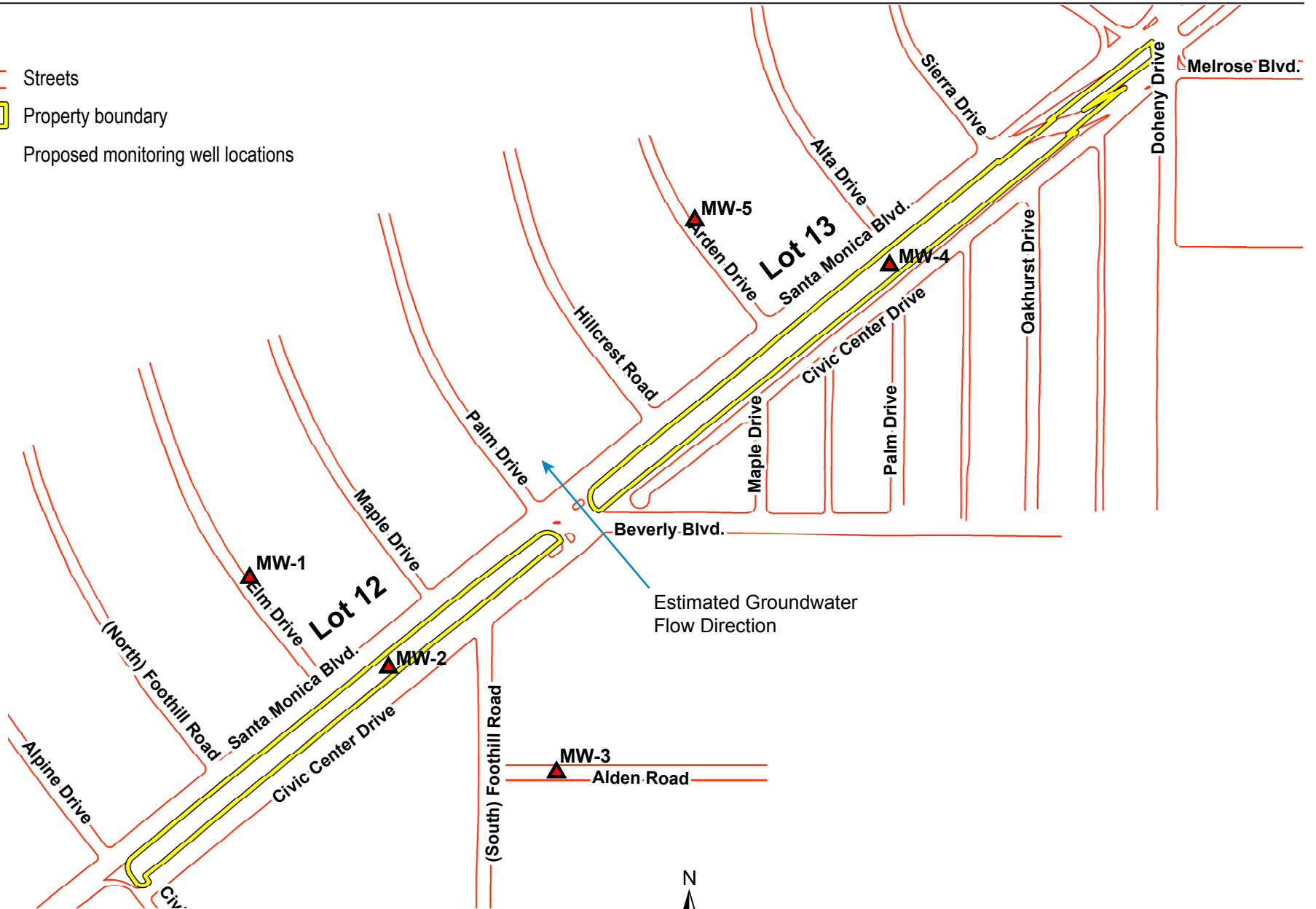
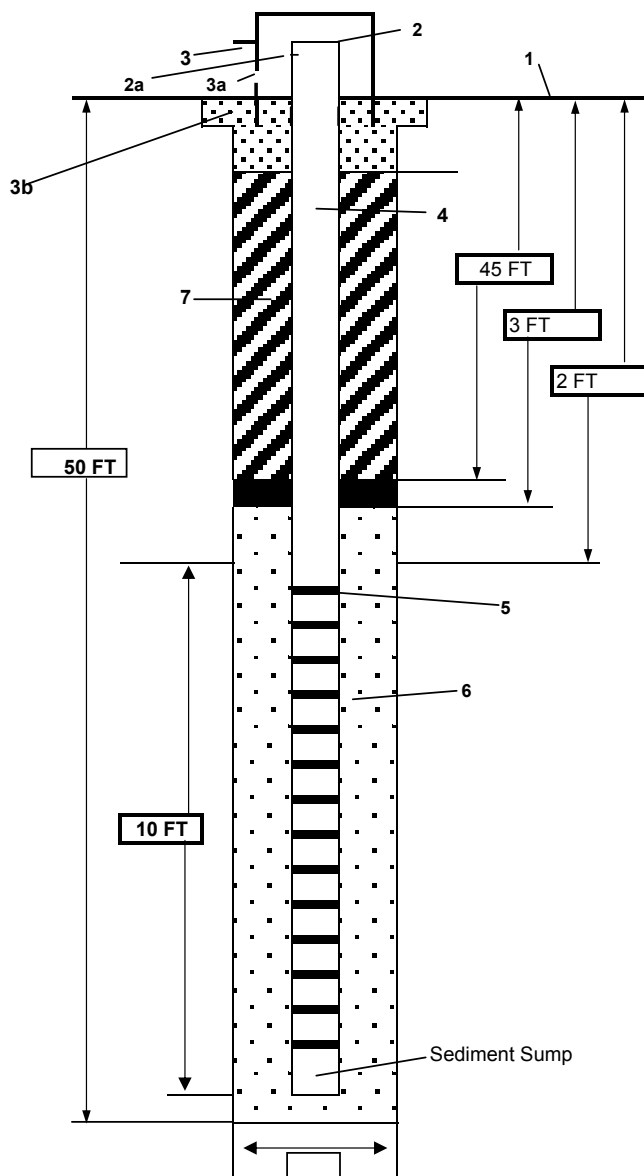


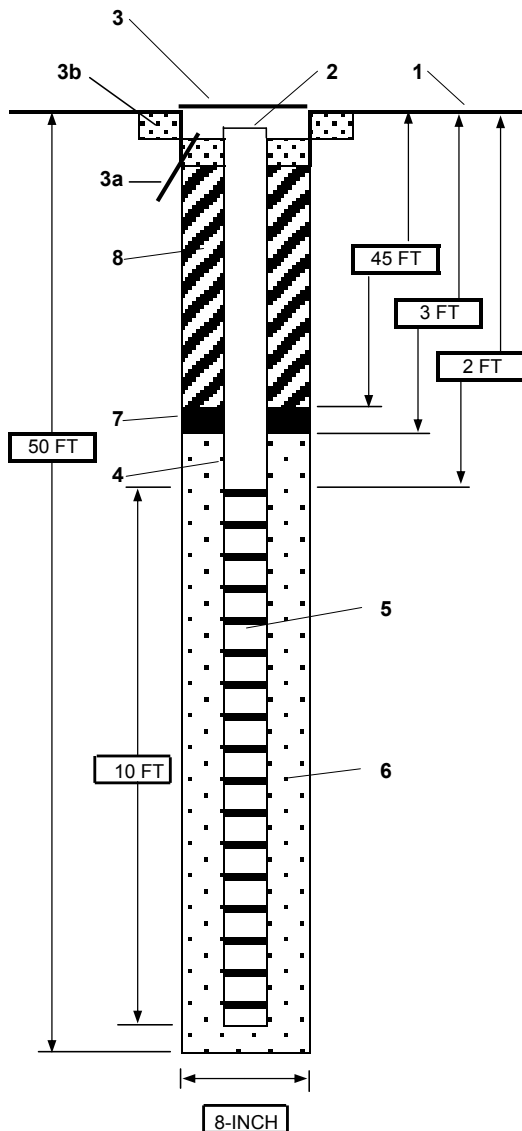
FIGURE 2
Proposed Monitoring Well Locations
 Groundwater Monitoring Well Work Plan
 Union Pacific Railroad
 Beverly Hills, California



Note: Diagram not to scale
TBD - To be determined at time of completion

1- Ground elevation at well	TBD
2- Top of casing elevation	TBD
a) vent hole?	YES
3- Wellhead protection cover type	STEEL LOCKING COVER
a) weep hole?	YES
b) concrete pad dimensions	36-INCHES DIAMETER
4- Diameter/type of well casing	2-INCH/SCH 40 PVC
5- Type/slot size of screen	PVC/0.020-INCH
6- Type screen filter	MONTEREY-TYPE SILICA SAND
a) Quantity used	TBD
7- Type of seal	BENTONITE
a) Quantity used	TBD
8- Grout	
a) Grout mix used	CEMENT/BENTONITE
b) Method of placement	TREMIE
c) Vol. of well casing grout	TBD
Development method	SURGE/PUMP/SWAB
Development time	TBD
Estimated purge volume	TBD
Comments:	
Grout weight =	lbs/gal
Total Depth (BTOC) =	feet
Final field parameters collected during well development ():	
pH =	
Conductivity =	mS/cm
Temperature =	°C
Dissolved Oxygen =	mg/L
Oxidation/Reduction Potential =	millivolts

FIGURE 3
General Well Completion
Diagram - Above Ground
Groundwater Monitoring Well Work Plan
Union Pacific Railroad
Beverly Hills, California



Note: Diagram not to scale.

TBD - To be determined at time of construction

1- Ground elevation at well	TBD
2- Top of casing elevation	TBD feet
3- Wellhead protection cover type	VEHICLE RATED FLUSH MOUNT
a) drain tube?	YES
b) concrete pad dimensions	24-INCH DIAMETER
4- Dia./type of well casing	2-INCH/PVC
5- Type/slot size of screen	PVC/0.020
6- Type screen filter	MONTEREY-TYPE SILICA SAND
a) Quantity used	TBD
7- Type of seal	BENTONITE
a) Quantity used	TBD
8- Grout	CEMENT/BENTONITE
a) Grout mix used	TREMIE
b) Method of placement	TBD
c) Vol. of well casing grout	TBD
Development method	SURGE/PUMP/SWAB
Development time	TBD Hr
Estimated purge volume	TBD Gal
Comments:	
Grout weight =	lbs/gal
Total Depth (BTOC) =	TBD feet
Final field parameters collected during well development ():	
pH =	TBD
Conductivity =	TBD mS/cm
Temperature =	TBD °C
Dissolved Oxygen =	TBD mg/L
Oxidation/Reduction Potential =	TBD millivolts

FIGURE 4
General Well Completion
Diagram - Flush Mount
 Groundwater Monitoring Well Work Plan
 Union Pacific Railroad
 Beverly Hills, California

APPENDIX A

Health and Safety Plan

The Health and Safety Plan will be included in the final Work Plan.