Appendix I

Hazardous Materials Documentation

Appendix I Index:

1. **Silicon Valley Rapid Transit Project Project-Wide Contaminant Management Plan, July 2008**

2. **Site Management Plan for Former Ford Automobile Assembly Plant Formerly 1100 South Main Street, Milpitas, California, March 1997**

3. **Letter From California Regional Water Quality Control Board, April 16, 2001**

Revision 0

SILICON VALLEY RAPID TRANSIT PROJECT
PROJECT-WIDE

Contaminant Management Plan

July 31, 2008

Issued for Use

SANTA CLARA VALLEY TRANSPORTATION AUTHORITY (VTA)

BART EXTENSION TO MILPITAS, SAN JOSE AND SANTA CLARA

Contaminant Management Plan (CMP)

Prepared by Earth Tech, Inc.

July 2008

CONTAMINANT MANAGEMENT PLAN (CMP)

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CONTAMINANT MANAGEMENT PLAN (CMP)

1.0 INTRODUCTION

The Santa Clara Valley Transportation Authority (VTA) and Bay Area Rapid Transit (BART) are planning the extension of the BART system from Fremont through Milpitas, San Jose and Santa Clara, California. The general location of this project is presented on **Figure 1-1**. Because of the extensive length of this project, additional sectional maps with more detail are provided as **Figure 1-2a** through **Figure 1-6**.

The *Contaminant Management Plan (CMP)* addresses the management of potentially contaminated materials generated during construction activities, including soil, existing railroad ballast, groundwater from construction dewatering, and debris from building demolition. The *CMP* is intended for use during design and construction of the extension, after review, comment and approval by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) and the California Environmental Protection Agency Department of Toxic Substances Control (Cal EPA-DTSC).

1.1 PROJECT DESCRIPTION

VTA is responsible for the extension of the BART system through Silicon Valley for 16.3 miles, from Fremont to Santa Clara. This project is known as the Silicon Valley Rapid Transit (SVRT) project, or the BART SJX extension. The extension will connect the BART system at the Warm Springs Station (planned by BART under the BART Warm Springs extension [WSX] project) and extend just beyond the planned Santa Clara Station, as shown on Figure 1-1.

The planned expansion of the BART system will have two parallel tracks over which passenger trains will travel. The tracks will be predominantly at-grade, though certain sections will be elevated (aerial), below grade in retained cuts, or below grade in tunnels. Six new BART stations are currently planned along the SVRT extension and include the following: the Montague/Capitol, Berryessa, Alum Rock, Downtown San Jose, Diridon/Arena, and Santa Clara Stations. One future station, South Calaveras Station, is optional. A maintenance facility for train cars and other equipment will be located adjacent to the Santa Clara Station on Figure 1-6.

The significant differences between tracks, tunnels, stations, and maintenance facilities mean that different design and construction specialties are necessary. In order to retain the best design and construction teams for these different challenges, VTA has divided the 16.3-mile extension into five separate segments:

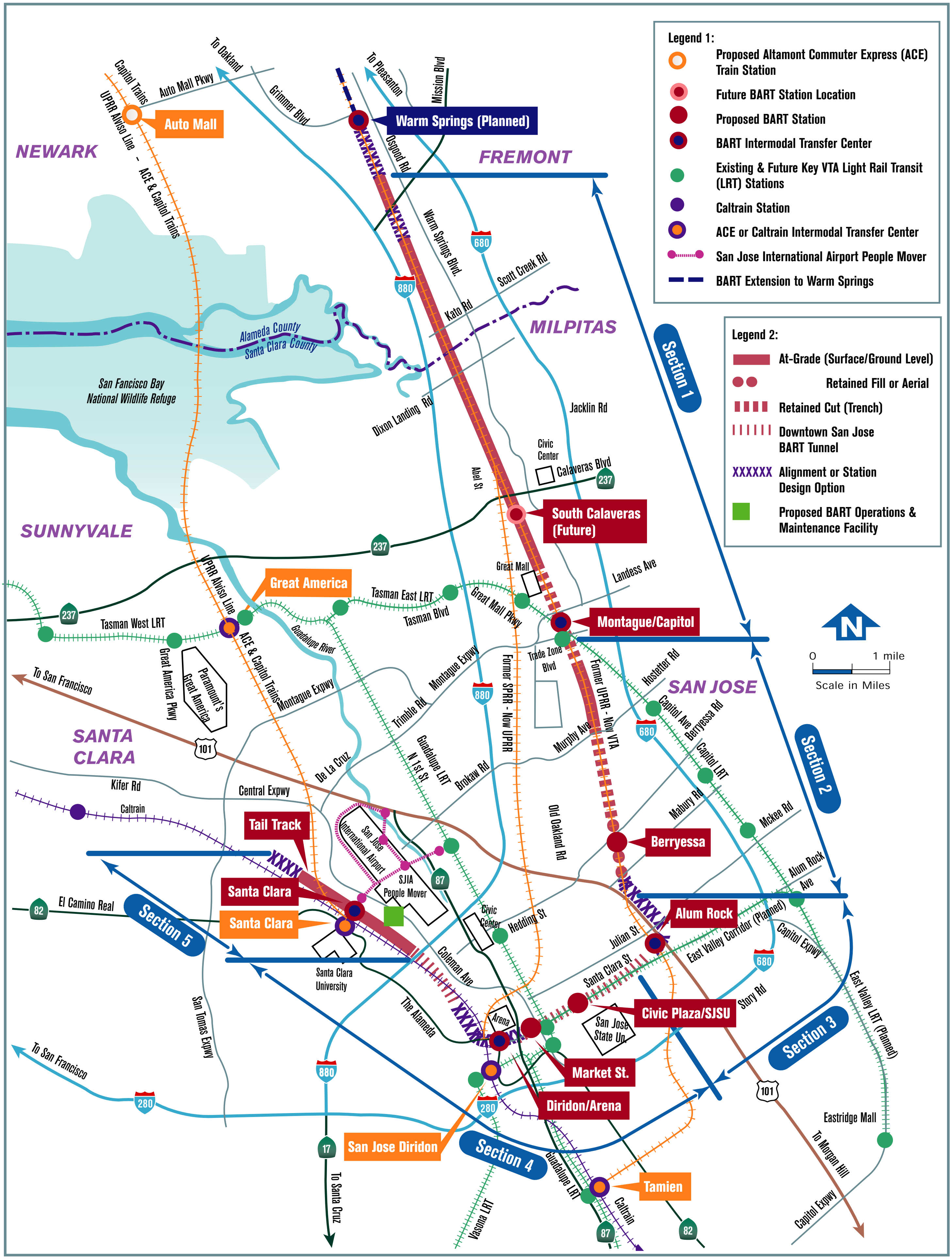

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Figure 1-1: BART Extension Alignment and Sections

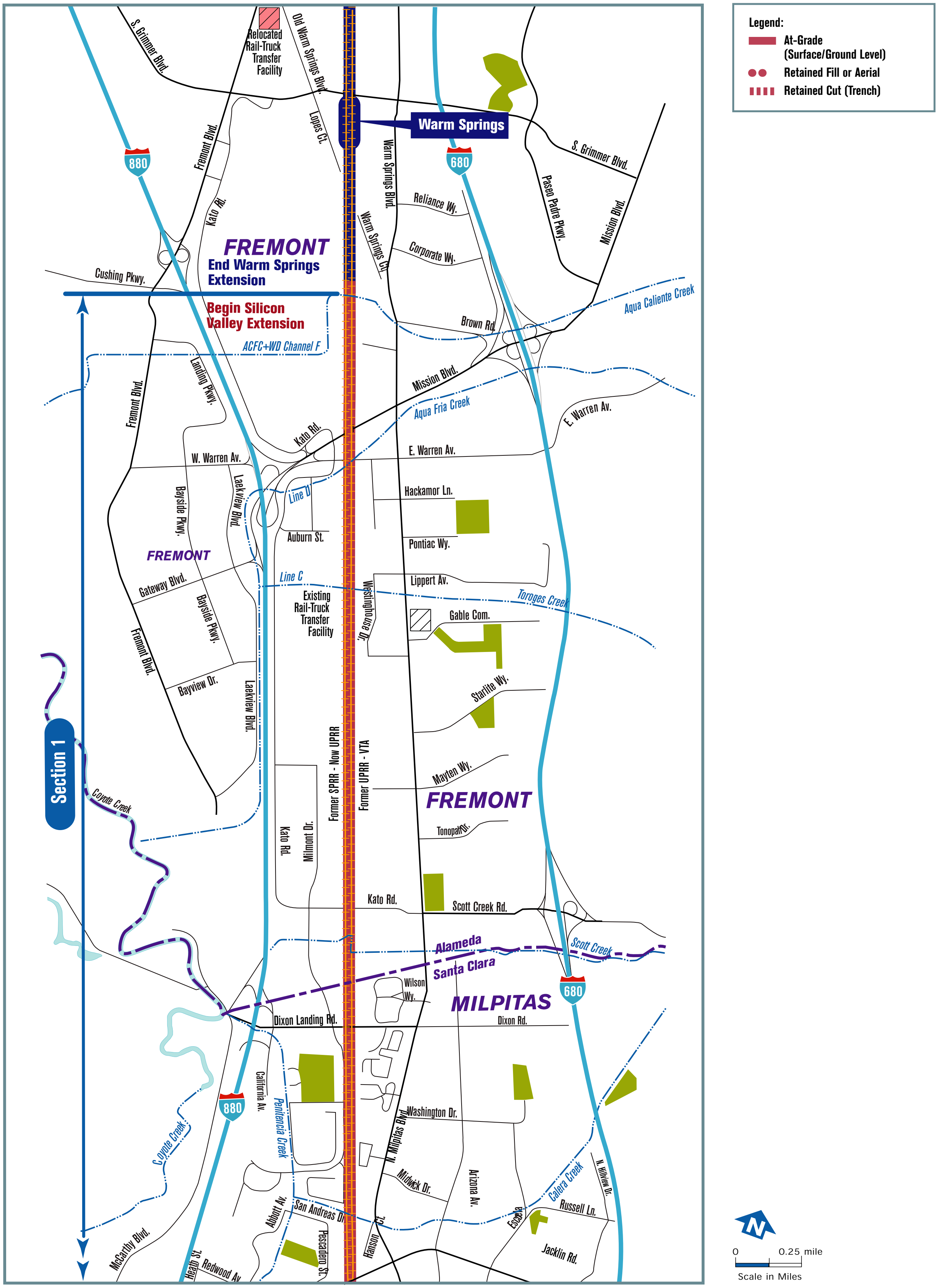

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Figure 1-2a: Section 1 from Planned BART Warm Springs Station to Trade Zone Boulevard

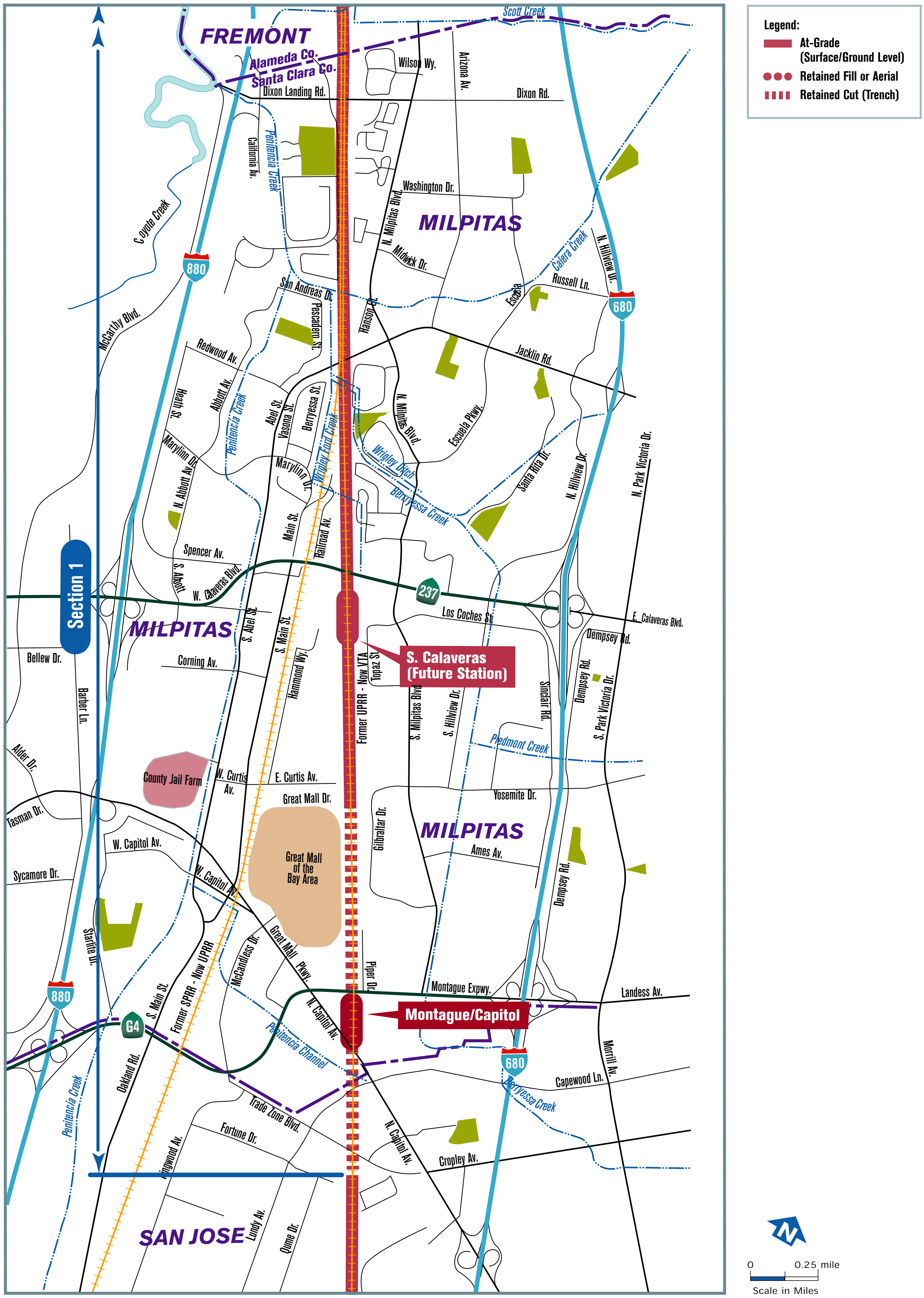


Figure 1-2b: **Section 1 (continued) from**
Planned BART Warm Springs Station to Trade Zone Boulevard

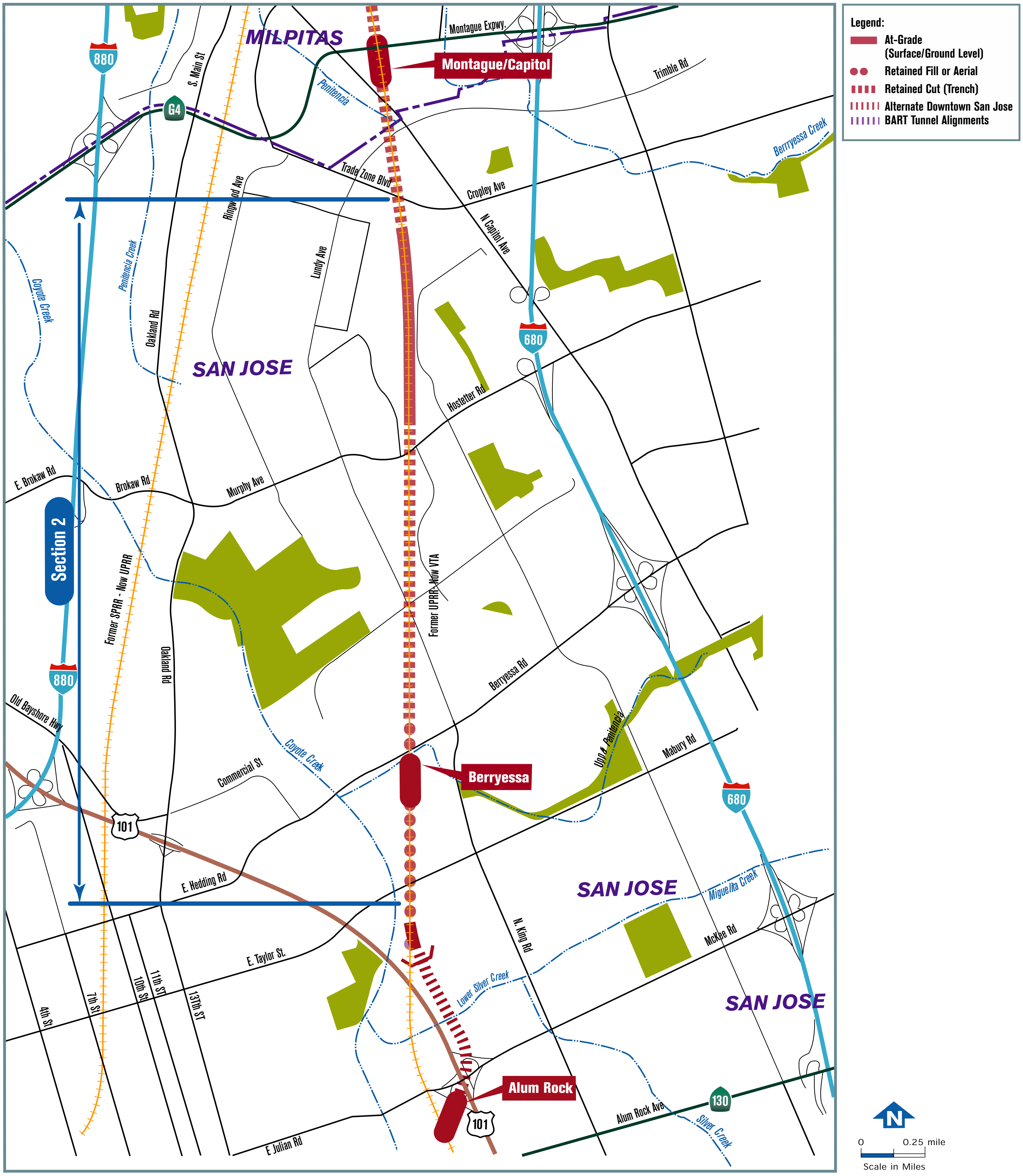


Figure 1-3: Section 2 from Trade Zone Boulevard to Mabury Road

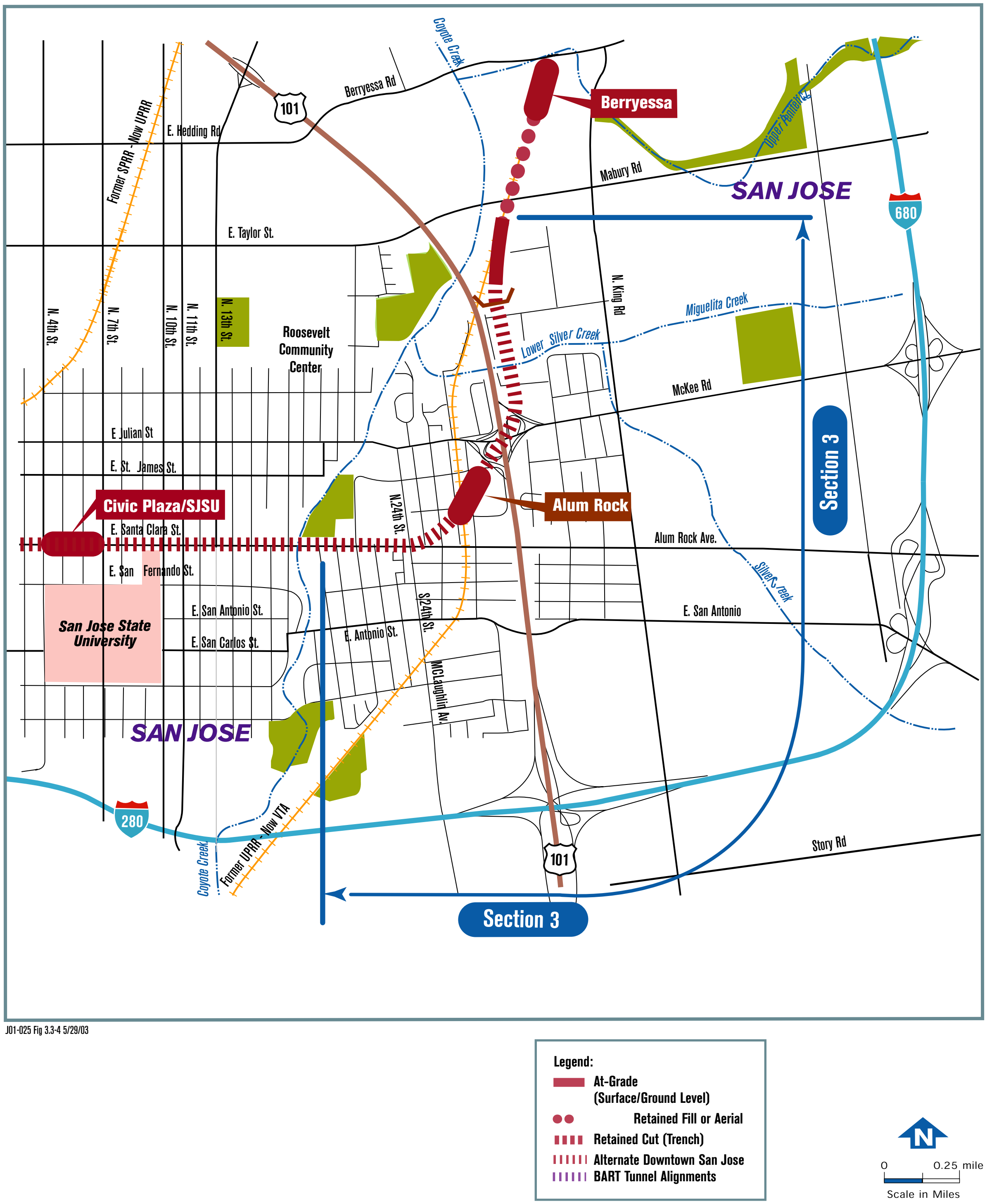


Figure 1-4: **Section 3 from Mabury Road to 19th Streets**

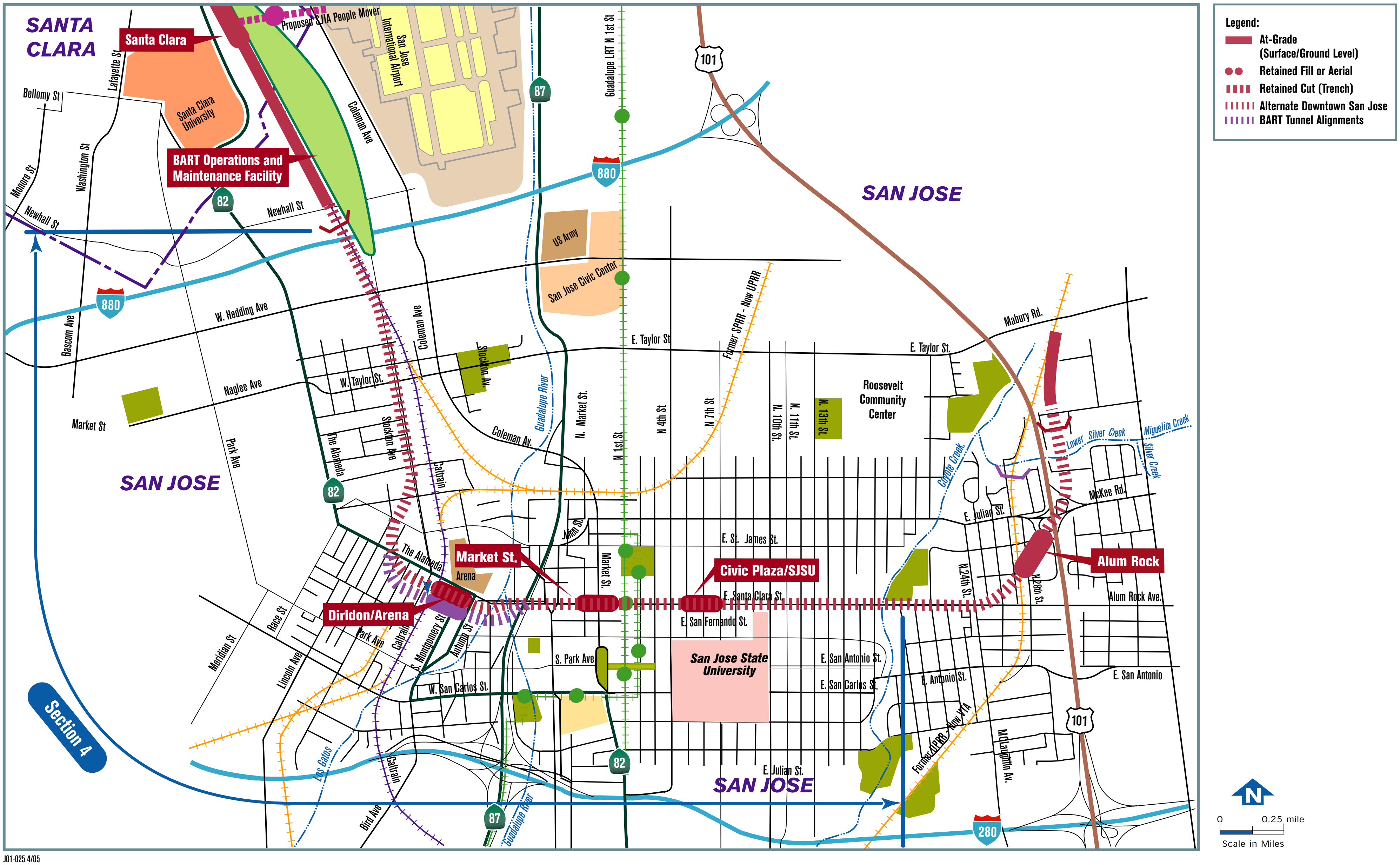
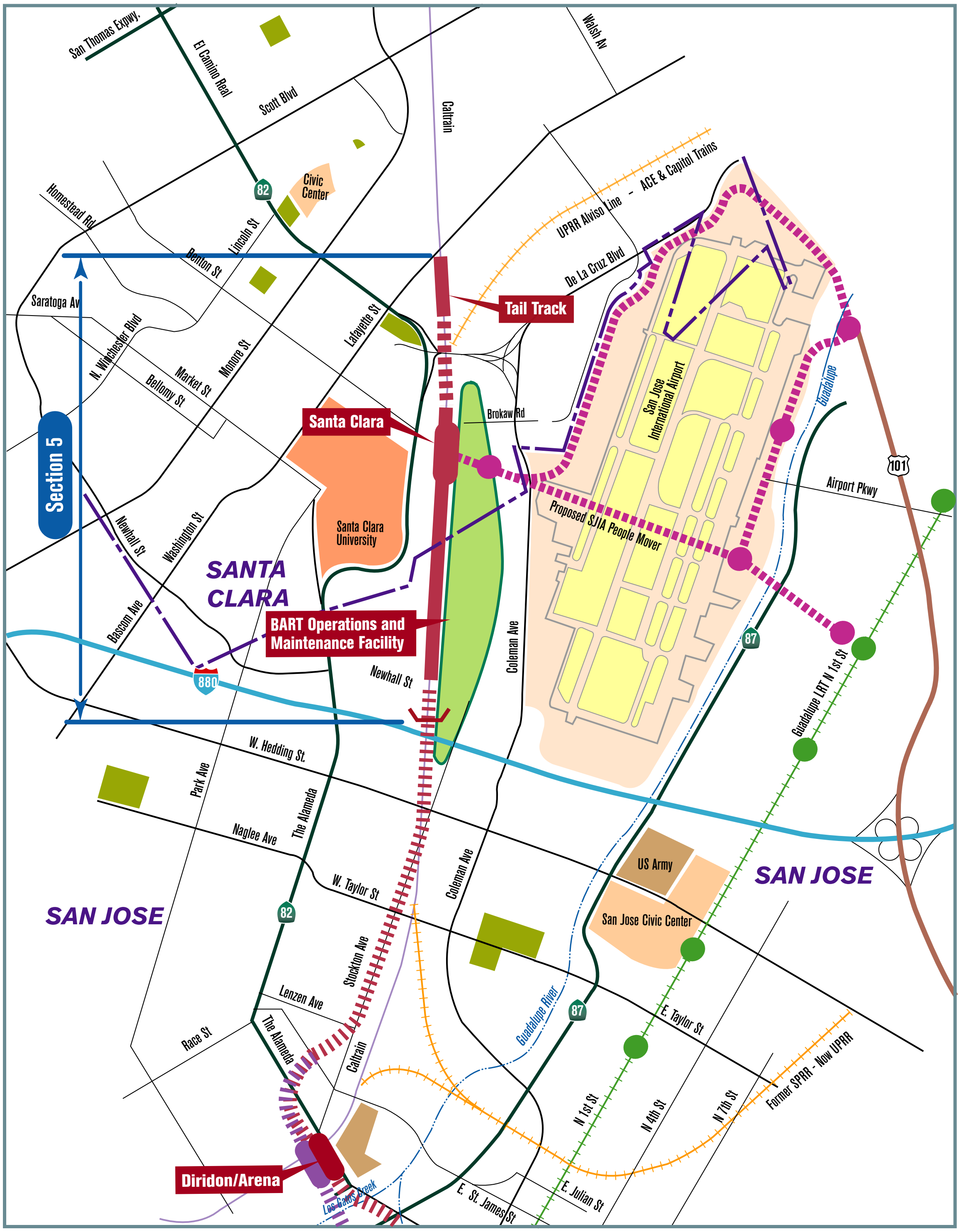


Figure 1-5: Section 4 from 19th Streets to I-880



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Legend:
- At-Grade (Surface/Ground Level)
- Retained Fill or Aerial
- Retained Cut (Trench)
- Alternate Downtown San Jose BART Tunnel Alignments

N

0 0.25 mile
Scale in Miles

Figure 1-6: Section 5 from I-880 to Lafayette Street

1. Line Segment: The Line Segment extends in a north-south alignment from the planned Warm Springs BART Station in Fremont along a former Union Pacific Railroad (UPRR) right-of-way (ROW) through Milpitas to the East Tunnel Portal in San Jose.

2. Tunnel Segment: The Tunnel Segment extends in a general east-west alignment beginning at the East Tunnel Portal located at the southern limit of the Line Segment, extends towards the west as a subway under Santa Clara Street in downtown San Jose, and ends at the West Tunnel Portal near Newhall Street in San Jose.

3. Yard and Shops Segment (Facilities Segment): The Yard and Shops Segment begins at the West Tunnel Portal and extends to the Project's terminus near the existing Caltrain Station in the City of Santa Clara and will include a maintenance facility.

4. Stations Segment: The Stations Segment includes project improvements, such as parking garages, access roads, and bus transit facilities, on the portions of the stations campuses not directly on the BART alignment.

5. System Segment: The System Segment includes project improvements not provided by the other four project segments, and systems elements to be installed throughout the entire SVRT project.

VTA has contracted separate design project teams for each of these segments and intends to contract separate construction contractors. Design of the station buildings are covered by the segment that they fall along. The distribution of station buildings among project segments are described in detail in the following sections.

1.2 PROJECT AREAS ADDRESSED

The SVRT project areas addressed in the *CMP* includes the Line Segment, the Stations Segment, Yard and Shops Segment (which includes the planned maintenance facility), and portions (cut-and-cover stations and retained cuts) of the Tunnel Segment. The twin-bored tunnels portion of the Tunnel Segment has been excluded from the *CMP* because: 1) the subsurface materials encountered while tunneling are expected to be uncontaminated due to their depth (approximately 25 to 50 feet below the groundwater table), and 2) the soil handling procedures will be dramatically different when removing the thoroughly mixed soil and groundwater generated while advancing the twin-bored tunnels. The tunnel design team will handle the appropriate precautions for managing contaminated materials, if any, encountered during the tunnel construction separately. The segments discussed in the *CMP* are described in greater detail in Section 2.

Based on preliminary investigations and prior uses of the properties, contaminants are known to be present in some of the materials that will be disturbed or encountered during project work, including soil, railroad ballast, groundwater and building materials.

1.3 PURPOSE AND OBJECTIVES

The purpose of the *CMP* is to present a consistent framework that the designers of the project can operate in designing and obtaining regulatory approval for specific construction activities within a project segment. This framework integrates the following key objectives of the *CMP*:

- Identifying the various scenarios under which large volumes of soil and railroad ballast generated during construction can be safely reused;
- Identifying maximum acceptable contaminant levels for each reuse scenario, by combining existing regulatory agency guidance with calculation of risk-based cleanup goals;
- Identifying sampling and analysis, stockpiling, transportation, health and safety, and other procedures by which soil and ballast must be managed in order to meet safety, regulatory and other standards;
- Defining how the groundwater that will be encountered during construction will be characterized, properly treated and discharged; and
- Defining how building materials that will be encountered during construction will be characterized, handled and disposed.

1.4 CONTAMINANT MANAGEMENT PLAN ORGANIZATION

Section 1 presents a description of the project areas covered by the *CMP*, and the purpose and objectives of the *CMP*. Section 2 presents a detailed description of the project, with a separate description for each of the project segments, which will be designed and built separately. The calculation of risk-based levels for protection of human health and ecological receptors are presented in Section 3. Section 4 details the mitigation measures for soil and railroad ballast. Section 5 details the mitigation measures for groundwater as part of the dewatering activities, and Section 6 presents the mitigation measures for building materials. Section 7 discusses reporting requirements, and Section 8 lists reference documents.

2.0 BACKGROUND

The following sections present a more detailed picture of the physical setting for the SVRT project, and include additional background regarding the SVRT project segments addressed in this *CMP*. Separate design and construction teams will work on each of the segments discussed below.

Previous analytical data collected in investigations associated with the SVRT project, including a quality assurance/quality control review, are presented in Appendix A.

2.1 PHYSICAL SETTING DESCRIPTION

The geology, hydrogeology, and hydrology of the SVRT project are discussed below in the broad context of the South Bay region's physical setting.

2.1.1 Geology

The SVRT project alignment is located in the Santa Clara Valley, a northwest trending valley separated by intervening ranges within the Coast Ranges geomorphic province of Northern California. The Santa Clara Valley is an alluvial basin located between the Santa Cruz Mountains to the southwest and the Diablo Range to the northeast. The valley is covered by alluvial fan, levee, and active stream channel deposits with marine estuary deposits along the San Francisco Bay (Bay) margins. These unconsolidated deposits cover Tertiary through Cretaceous age bedrock.

The entire SVRT alignment will lie on alluvial deposits that are underlain, at depths much greater than would be encountered during construction, by Tertiary age and upper Cretaceous age marine sedimentary rocks and Cretaceous age Franciscan Complex bedrock. These older rocks appear at the surface in the ranges southwest and northeast of the SVRT alignment. The alluvium has been described as Holocene age alluvial fan deposits, fine-grained Holocene alluvial fan deposits, and Holocene alluvial fan levee deposits. These alluvial fan deposits consist of sand, gravel, silt, and clay. Fine-grained alluvial fan deposits occur on the flatter distal portions of fans and consist primarily of silt and clay-rich sediments with interbedded lobes of coarser sand and occasional gravel. The Holocene alluvial fan levee deposits consist of silt, sand, and clay.

Near the north end of the alignment, the alluvial fan deposits grade into Holocene alluvial fan-estuarine complex deposits and Holocene Bay Mud. Holocene alluvial fan-estuarine complex deposits form where the distal zone of the fan and basin environments transition to the estuarine environment at the edge of San Francisco Bay between the Guadalupe River and Coyote Creek. These deposits are transitional from sand, silt, and clay of the alluvial environment to Bay Mud.

Artificial fill may be present over any of these Holocene age deposits along the SVRT alignment. Areas within the SVRT alignment with other soil conditions such as expandable or compressible soils will be identified by detailed geotechnical studies during the design phase of the project.

2.1.2 Hydrogeology

The alignment is located within two South Bay groundwater basins, the Niles Cone Basin and the Santa Clara Basin. The Niles Cone Basin is located in the northern portion of the SVRT alignment, in Alameda County, while the Santa Clara Basin is located in the southern portion of the SVRT alignment, in Santa Clara County.

As specified in the regional Basin Plan, the current and potential uses of groundwater in the Niles Cone Basin are municipal and domestic supply, industrial process supply, industrial service water supply, and agricultural water supply. The Niles Cone Basin produces moderately low groundwater yields to wells. Groundwater is typically encountered within 50 feet of the ground surface and the flow is generally westward. Given the elevation of the SVRT alignment, groundwater depths on the order of 20 feet and under potentially confined conditions are anticipated. The Niles Cone Basin receives limited recharge from the Warm Springs Sub-basin and the Mission Uplands farther to the east. The construction of facilities for artificial recharge or diversion, in conjunction with the availability of imported water, has increased the safe yield of the Niles Cone Basin. Overall, groundwater quality in the Niles Cone Basin is good and generally meets the RWQCB's groundwater quality objectives (RWQCB, 2001).

In the Santa Clara Basin, groundwater is relatively shallow (10 to 50 feet) in the headwater area of the Santa Clara Basin. The groundwater depth increases to depths of 100 to 300 feet in the interior of the basin, and then decreases to zero approaching the Bay. In the downtown San Jose portion of the SVRT alignment, groundwater elevations between 13 and 21 feet below ground surface (bgs) are reported. From the Santa Clara County boundary north to Calaveras Boulevard, groundwater elevations are reported between 0 to 5 feet bgs. Between Calaveras Boulevard and Berryessa Creek, groundwater elevations reportedly range from 5 to 15 feet bgs. Between Berryessa Creek and US 101, groundwater elevations reportedly range from 15 to 30 feet bgs, while between Lower Silver Creek and Coyote Creek, groundwater elevations reportedly range from 0 to 5 feet bgs.

Groundwater monitoring results in the Santa Clara Valley show that water quality is excellent to good for all major zones of the Santa Clara Basin. Drinking water standards are met at public water supply wells without the use of treatment methods, and contamination in general has not been detected. However, some limited areas of the Santa Clara Basin contain concentrations of mineral salts, which adversely affect groundwater uses (VTA, 2004).

2.1.3 Hydrology

Westward flowing streams draining the foothills of the Diablo Range characterize the surface hydrology of eastern Fremont and Milpitas. Northward flowing streams draining the foothills of the Diablo Range and the Santa Clara Valley characterize the surface hydrology of eastern and southern San Jose. The lower reaches of many streams have been modified and constructed as storm drainage channels, designed to convey stormwater flow through the urbanized area. The project alignment crosses several major drainage lines in Alameda and Santa Clara counties.

Creeks in the Alameda County portion of the SVRT alignment drain small watersheds and collect water from a limited (generally under 5 square miles), mostly urbanized area. These watercourses include Agua Caliente Creek, Agua Fria Creek, Toroges Creek, and Scott Creek. Most of these creeks have water only during the wet season. In general, the existing drainage structures within the SVRT alignment in Alameda County have been sized to effectively convey the stormwater flows of the 15-year stormwater runoff event, although the VTA plans to upgrade these facilities to convey a 100-year storm event without causing upstream flooding. The quality of surface water within the SVRT alignment in Alameda County has been degraded due to non-point source pollution.

The principal drainage feature of the Santa Clara Basin is Coyote Creek, which originates in the Diablo Range, enters the Coyote Valley at its southeastern end, and flows northwesterly through the Coyote Valley and the Santa Clara Valley before entering San Francisco Bay. Other major drainages passing through the Santa Clara Basin and within the SVRT project area include the Guadalupe River and Los Gatos Creek, which originate in the Santa Cruz Mountains. Drainages entering the Santa Clara Valley from the east are generally smaller, and the largest are Upper and Lower Penitencia Creeks and Berryessa Creek. In Santa Clara County, most of the creek cross drainage structures along the SVRT project have been sized or are in the process of being resized for the 100-year flood event. A non-point source pollution study conducted in Santa Clara County by the RWQCB found that contaminant loads are directly proportional to stormwater runoff. The estimated annual pollutant loads are highly variable, depending on the volume of runoff. In addition, the erosion of sediments containing naturally occurring minerals is another source of contaminants (specifically metals) in stormwater runoff. As creeks carry eroded materials down from the Diablo Range, heavier coarser sediments are deposited first, while lighter and finer particles are carried further downstream towards the Bay.

2.2 PROJECT SEGMENTS

As previously noted, the SVRT project has been divided into five segments for design and construction:

- Line Segment
- Tunnel Segment
- Yard and Shops Segment
- Stations Segment
- Systems Segment

This *CMP* is intended to cover the Line Segment, the Stations Segment, Yard and Shops Segment (which includes the planned maintenance facility), and portions (cut-and-cover stations and retained cuts) of the Tunnel Segment. These areas are discussed in further detail below.

2.2.1 Line Segment

The Line Segment of the SVRT project is a 9.8-mile section of track that will be located along the former UPRR ROW. The UPRR ROW was owned and operated by Western Pacific Railroad (WPRR) before it was purchased by UPRR. VTA has since purchased the alignment from UPRR.

The Line Segment project will include the construction of twin tracks from the Warm Springs Station (to be constructed by BART) south to the retained cut leading to the portal for the tunnel. The Line Segment will be primarily built at-grade, though the preliminary design currently includes: aerial sections, two retained cuts, and new depressed roadways. The retained cuts currently planned include:

- Retained cut for Montague Expressway and Trade Zone Boulevard, approximately 5,650 feet long and 20 to 24 feet deep; and
- Retained cut for Hostetter Road, Lundy Avenue, and Sierra Road, approximately 5,100 feet long and 30 to 35 feet deep.

It should be noted that an aerial alternative replacing the retained cut for Montague Expressway and Trade Zone Boulevard is currently under consideration.

The new depressed roadways include:

- East Warren Avenue (to be designed and constructed by others);
- Kato Road; and
- Dixon Landing Road.

For design purposes, the stations along the Line Segment are included as part of the Line Segment. These stations include:

- The future South Calaveras Station in Milpitas;
- The Montague/Capitol Station in Milpitas; and
- The Berryessa Station in San Jose.

Parking areas, drop off areas, and other support facilities for the above stations were included in the Stations Segment.

2.2.2 Stations Segment

There are six planned BART stations and campuses and one future station. These include:

- South Calaveras Station (Future): Planned as an at-grade station just south of Calaveras Blvd. This station will include an at-grade parking structure and encompass up to 22 acres.
- Montague/Capitol Station and Campus: Planned as a below grade station (although an aerial alternative is currently under consideration). This station will include an at-grade parking structure and encompass up to 21 acres.
- Berryessa Station and Campus: Planned as an aerial station. This station will include an at-grade parking structure and encompass up to 43 acres.
- Alum Rock Station and Campus: Planned as a below grade station in San Jose, just south of East Julian Street at North 28th Street. Includes an at-grade parking structure and support infrastructure on approximately 17 acres.
- Downtown San Jose Station: Planned as a below grade station underneath East Santa Clara Street, between Second Street and Market Street in downtown San Jose, in an area approximately 1 acre in size.
- Diridon/Arena Station and Campus: Planned as a below grade station just south of the HP Pavilion and east of the Diridon Caltrain station, in San Jose. The Diridon/Arena Station includes a parking structure and support infrastructure adjacent to and west of the HP Pavilion. The Diridon/Arena Station will cover approximately 9.5 acres.
- Santa Clara Station and Campus: Planned as an at-grade station west of Coleman Avenue at Brokaw Road in Santa Clara. This station will include a parking structure and support infrastructure on approximately 12 acres.

Three of these stations will be constructed by the cut-and-cover method: Alum Rock Station, Downtown San Jose Station, and Diridon/Arena Station. Cut-and-cover stations will require vertical excavation to the designed depth (often 50 to 75 feet below grade), connection to the twin bored tunnels, construction of the station, and backfilling so the overlying ground surface can be utilized. For Alum Rock and Diridon/Arena Station, the below grade stations will have parking structures located at-grade.

As noted in Sections 2.2.1, 2.2.3, and 2.2.4, the actual stations along the Line Segment (future South Calaveras Station, Montague Station, and Berryessa Station), Yard and Shops Segment (Santa Clara Station), and Tunnel Segment (Alum Rock Station, Downtown San Jose Station, and Diridon/Arena Station) will be included with those segments accordingly for design purposes.

2.2.3 Yard and Shops Segment

The Yard and Shops Segment includes a new BART maintenance and storage facility, the retained cut leading from the maintenance yard to the tunnel portal, and the Santa Clara Station. The maintenance and storage facility will be located on approximately 50 acres in the eastern portion of the UPRR Newhall Yard and will likely extend into the western portion of the former Food Machinery Corporation (FMC) manufacturing facility in San Jose and Santa Clara, including as an option extending into the former portion of the FMC facility at 333 Brokaw Road, which is now occupied by Fedex Corporation. As the terminus of the BART extension, this new facility will include single and double story buildings for maintenance, repair, and training, transfer tracks, a turntable, a yard control tower, and two parking areas. Construction of the BART maintenance and storage facility is anticipated to occur primarily at-grade. For design purposes, the Santa Clara Station will be included with the Yard and Shops Segment.

2.2.4 Tunnel Segment

The Tunnel Segment of the SVRT project, approximately a 5-mile section, extends in a general east-west alignment beginning at the retained cut leading to the East Tunnel Portal located at the southern limit of the Line Segment, extends towards the west as a subway under Santa Clara Street in downtown San Jose, and ends at the West Tunnel Portal near Newhall Street in San Jose. The Tunnel Segment consists of a twin-bored tunnel, cut-and-cover subways at the ends of the tunnel, and a retained cut leading Line Segment to the portal for the tunnel.

For design purposes, the stations along the Tunnel Segment are included as part of the Tunnel Segment. These stations include:

- The Alum Rock Station in San Jose;
- The Downtown San Jose Station; and
- The Diridon/Arena Station in San Jose.

Parking areas, drop off areas, and other support facilities for the stations were included in the Stations Segment.

2.3 PREVIOUS INVESTIGATIONS

2.3.1 Line Segment

There were two environmental investigations initiated by VTA and one by UPRR as part of the due diligence process for the acquisition of a portion of the UPRR Milpitas Corridor railroad alignment from UPRR by VTA for the SVRT project:

- URS Corporation (URS) was retained by VTA to conduct a Phase I Environmental Site Assessment (ESA) to identify potential environmental concerns along a section of the UPRR alignment: from Paseo Padre Parkway in Fremont southward to the intersection of the railroad near Highway 87 in San Jose. URS conducted the Phase I ESA in the summer of 2001 and subsequently prepared four reports for four segments of the potential acquisition alignment. Typical of these report titles was *Phase I Environmental Site Assessment, Silicon Valley Rapid Transit Corridor, Segment "A", Milpitas and Fremont, CA*; the report titles for Segments "B", "C" and "D" were analogous. These reports were released on October 11, 2001.

- Geomatrix Consultants, on behalf of UPRR, collected samples of shallow soil and ballast in July and August 2001. These samples were primarily analyzed for arsenic and lead, though selected samples were also analyzed for other metals and organic chemicals. The data collected during this investigation was released to VTA in a letter from Jacobs, Chase, Frick, Kleinkopf & Kelley, LLC, dated October 10, 2001.

- Earth Tech conducted a Phase II environmental investigation within the potential sale area in late 2001 and early 2002. The Phase II investigation was based on the results of the Phase I data by URS and site-specific analytical data collected by UPRR, as discussed above. Because UPRR had identified significant levels of arsenic and lead along the alignment, this investigation focused on evaluating site arsenic and lead levels. However, a large number of chemical analyses were also performed for other metals and organic chemicals. The results of this investigation were presented in the report *UPRR Alignment Investigation Data for BART extension to San Jose, Fremont/Milpitas/San Jose, CA*, dated March 29, 2002.

Following acquisition of the railroad alignment from UPRR, Earth Tech conducted additional hazardous materials investigation as part of the preliminary engineering design phase of the project to further characterize the Line Segment alignment. The investigation was conducted between July and October 2004. A draft of the Line Segment Hazardous Materials Characterization report was issued in March 2005.

2.3.2 Stations Segment

With the exception of the portions of the three stations (future South Calaveras Station, Montague/Capital Station, and Berryessa Station) that fall within the former UPRR right-of-way under the Line Segment, there have been no previous environmental investigations performed on behalf of VTA at any of the stations and corresponding campus areas. However, investigations are in the planning stages and are expected to occur during the final design phase.

2.3.3 Yard and Shops Segment

UPRR Newhall Yard

There were two environmental investigations initiated by VTA as part of the due diligence process for the acquisition of land from the UPRR Newhall Yard for the SVRT project:

- Earth Tech was retained by VTA to conduct a Phase I Environmental Site Assessment (ESA) to identify potential environmental concerns within UPRR Newhall Yard. Earth Tech conducted the Phase I ESA in July and August 2002 and subsequently prepared the combined report *Phase I Environmental Site Assessment and Phase II Investigation Work Plan for the Newhall Yard, San Jose/Santa Clara, California* (*Phase I ESA and Phase II Work Plan*), released in draft in September 2002 and finalized in February 2003.
- Earth Tech conducted a Phase II environmental investigation within the potential sale area in the UPRR Newhall Yard. The investigation was performed in two phases:
    1) In December 2002, Earth Tech focused its evaluation on the eastern portion of the yard where there were no tracks and investigated the western portion of the yard (containing numerous sets of tracks for railroad car storage) by collecting a total of forty-six soil samples from twenty-one locations. This investigation was described in the Earth Tech report *Draft Phase II Investigation Data Summary Report for UPRR Newhall Yard, San Jose/Santa Clara, California*, dated February 2003; and
    2) In June 2003, Earth Tech primarily focused on the western portion of the yard and collected an additional 26 soil samples from nine locations. This investigation was described in the Earth Tech report *Draft Additional Investigation Data Summary Report for UPRR Newhall Yard, San Jose/Santa Clara, California*, dated July 2003.

FMC Facility

In addition to the environmental investigations presented above for the UPRR Newhall Yard, environmental investigations and corrective actions have been ongoing at the adjacent former FMC facility site since 1996. The facility investigations and corrective actions have been focused on the following three site addresses:

- 333 West Brokaw Road, which was the northernmost section of the facility immediately north of Brokaw Road. VTA plans for this area to be included in the Santa Clara Station, as an option. This area is now occupied by FedEx Corporation;
- 328 West Brokaw Road, which was the portion of the facility immediately south of Brokaw Road. VTA plans for this area to be included in the Santa Clara Station, as an option; and
- 1125 Coleman Avenue, which comprised the remainder and largest portion of the facility.

Soil and groundwater beneath the former FMC facility is impacted with petroleum hydrocarbons, metals, and volatile organic compounds (VOCs). The primary chemicals of concern are trichloroethylene (TCE) and tetrachloroethylene (PCE) in groundwater.

Groundwater extraction and monitoring at the 333 and 328 West Brokaw portions are under RWQCB oversight. Based on groundwater monitoring data and estimates of groundwater flow directions, there is a potential for the TCE plume beneath the former FMC facility to extend beneath the UPRR Newhall Yard.

Remediation and monitoring at the 1125 Coleman Avenue portion has been under DTSC oversight. As of April 2005, two groundwater treatment systems are in operation at the 1125 Coleman Avenue portion.

2.4 SUMMARY OF CURRENT ENVIRONMENTAL CONTAMINATION

The prior characterization efforts described above have identified current environmental contamination, or the reasonable potential of contamination, in soil, ballast, groundwater, and building materials which will be demolished during project construction. Arsenic and lead in soil and/or ballast and VOCs in groundwater appear to be the main contaminants that may be encountered. Other media, such as surface water bodies, do not appear likely to have been impacted by existing contaminants.

2.4.1 Impacts to Soil and Ballast

2.4.1.1 Line Segment

Geomatrix and Earth Tech have conducted several investigations (between 2001 and 2004) designed to evaluate the environmental issues related with the soil and ballast along the Line Segment of the proposed SVRT alignment. The results from the investigations indicate no apparent significant impacts in soil or ballast associated with polychlorinated biphenyls (PCBs), VOCs, semivolatile organic compounds (SVOCs), or petroleum hydrocarbons. However, significant arsenic and lead contamination in the ballast material is present along much of the SVRT alignment. The primary source of arsenic appears to be the metals refining slag used as ballast for track maintenance from about 1960 to 1983, and potential secondary sources may have included use of herbicides and insecticides. The occurrence of the elevated lead concentrations appears to be attributed to aerially-distributed automobile exhaust emissions and lead-acid batteries used to power signals near railroad crossings. Overall, arsenic appears to be the primary metal impacting soil and ballast along the Line Segment.

The data collected by Geomatrix and Earth Tech indicates that the shallow soil beneath the ballast (0 to 3 feet bgs) contains sufficient total and extractable arsenic to require the material be handled as a California Regulated Waste if disposal is considered. Data on deeper soil samples (3 feet to greater than 20 feet bgs) indicates that arsenic concentrations are not sufficient to classify the material as a California Regulated Waste for disposal purposes.

2.4.1.2 Stations Segment

As described in Sections 2.2.1, 2.2.3, and 2.3.4, the design of the actual stations will reside with the segment that they fall along (such as the Line Segment, Tunnel Segment, or Yard and Shop Segment). However, for ease of reference, impacts to soil and ballast are summarized below for each station and/or corresponding campus. With the exception of the portions of the three stations (future South Calaveras Station, Montague/Capital Station, and Berryessa Station) that fall within the former UPRR right-of-way under the Line Segment, there have been no previous environmental investigations performed on behalf of VTA at any of the stations and corresponding campus areas. However, investigations are in the planning stages and are expected to occur during the final design phase. The information provided below is generally based on database searches summarized in the *Final Environmental Impact Report* (*Final EIR*) prepared by VTA, or as otherwise indicated.

<u>Future South Calaveras Station, Montague/Capitol Station and Campus, and Berryessa Station and Campus</u>

The most significant hazardous materials at these station and campus areas are believed to be the impacted soil and ballast along the former UPRR tracks within the Line Segment, as described in Section 2.4.1.1. Based on the prior investigations within the former UPRR ROW, there are significant levels of arsenic and lead in soil and ballast along the former UPRR right-of-way, including the portion that passes through the station campuses.

<u>Alum Rock Station and Campus</u>

The database search summarized in the *Final EIR* identified a number of sites with hazardous materials releases on or near the Alum Rock Station campus. Most of these sites involve petroleum hydrocarbons such as gasoline or diesel releases from underground fuel storage tanks into soil and/or groundwater. At least three of these sites are located on the station campus. Although these sites have obtained regulatory agency case closure, this does not imply that no contamination from these sites will be encountered during construction. The sites include the following:

- Monarch Truck Center, a truck rental, leasing and repair company at 195 North 30th Street. Monarch Truck Center released moderate levels of petroleum hydrocarbons to soil and groundwater.
- Mission Concrete Products, at 125 North 30th Street (partially the location of the future transit oriented development), which released moderate levels of petroleum hydrocarbons to soil and groundwater.
- Security Contractor Services, at 170 North 28th Street (partially the location of the future transit oriented development), which released petroleum hydrocarbons to soil.

Downtown San Jose Station and Campus

The database search summarized in the *Final EIR* identified a number of sites with hazardous materials releases near the Downtown San Jose Station campus. Most of these sites involve petroleum hydrocarbons such as gasoline or diesel releases from underground storage tanks into soil and/or groundwater. Among these sites are 80 South Market Street, 101 San Fernando, 211 West Santa Clara Street, 95 Almaden Avenue, and 70 Almaden Avenue. Such impacts to soil may be encountered during station excavation.

Diridon Station and Campus

The database search summarized in the *Final EIR* identified a number of sites with hazardous materials releases near the Diridon Station and Campus. Most of the sites involve petroleum hydrocarbons releases into soil and/or groundwater. In addition, an encapsulated area beneath the planned North Parking Structure for the Diridon Station contains soil impacted with polynuclear aromatic hydrocarbons (PAHs) that resulted from a manufactured gas plant that operated in the late 1800s to early 1900s. Some of the impacted soils were encapsulated in place and others were relocated from their original positions during construction of the HP Pavilion. A deed restriction is in place in order to prevent land uses inconsistent with the residual contaminants beneath the encapsulation.

Santa Clara Station and Campus

The database search summarized in the *Final EIR* identified a number of sites with hazardous materials releases on or near the Santa Clara Station and Campus. Most of these sites involve petroleum hydrocarbons such as gasoline or diesel releases from underground storage tanks into soil and/or groundwater. In addition, chlorinated solvents including TCE and PCE, which originated from the FMC Corporation facilities, are also present in soil and groundwater in the vicinity of the station and campus, particularly to the south of Brokaw Road.

2.4.1.3 Yard and Shops Segment

Investigations were conducted by Earth Tech on behalf of VTA in December 2002 and June 2003 to evaluate soil and ballast conditions at the UPRR Newhall Yard facility, as described in Section 2.3.3. The investigations primarily focused on the evaluation of potential impacts from metals and petroleum hydrocarbons, while a limited number of samples were also analyzed for pesticides, PCBs, VOCs, and SVOCs. The results from the investigations did not identify significant impacts in soils or ballast from pesticides, PCBs, VOCs, or SVOCs. However, the results from the investigations did identify significant impacts to soil and ballast by lead and total petroleum hydrocarbons, particularly total petroleum hydrocarbons within the motor oil range (TPH-MO). Additionally, a large stockpile of soil was identified as containing relatively high levels of chromium.

The lead and petroleum hydrocarbon results from these investigations can be summarized as follows:

- The shallow soil beneath the ballast (0 to 3 feet bgs) contains sufficient total and extractable lead to require the material be handled as a California Regulated Waste if disposal is considered.
- One shallow soil sample contained a lead level high enough for the soil to be classified as a Resource Conservation and Recovery Act (RCRA) hazardous waste.
- Data on deeper soil samples (3 to greater than 20 feet bgs) indicates that lead concentrations are not sufficient to require classification of the soil as a RCRA hazardous waste or California (non-RCRA) hazardous waste.
- TPH-MO was found in approximately half of the shallow (up to a depth of 2 feet) soil samples at concentrations exceeding 100 mg/kg, up to a level of 25,000 mg/kg.
- Significant concentrations of TPH-MO were not detected in soil samples collected from depths of 5 feet or greater.

2.4.2 Impacts to Groundwater

2.4.2.1 Line Segment

Investigations of groundwater quality have been focused where retained cuts, depressed crossroads, and deep foundation footings are proposed and dewatering may be required. Depth to groundwater along the SVRT alignment is approximately 15 to 20 feet bgs, which may locally occur under confined or semi-confined conditions.

Based on the investigations described in Section 2.3.1, groundwater removed during dewatering activities is not expected to be contaminated with dissolved metals, although total metals levels (including metals in suspended solids) may be significant in some locations. In some locations, the groundwater is expected to be contaminated with organic chemicals from off-site sources. These locations include:

- Just north of Montague Expressway, where groundwater is impacted by a chlorinated solvent plume commonly referred to as the Jones Chemical plume, and groundwater treatment system piping passes under the UPRR tracks. This plume includes chlorinated solvents at concentrations generally below 200 micrograms per liter (µg/L);
- Just north of Montague Expressway, where groundwater on the adjacent Great Mall (formerly the Ford Automobile Assembly Plant) property is impacted with residual petroleum hydrocarbons. Note that the Jones Chemical Plume also extends onto this property; and
- The Kato Road underpass area, where groundwater is impacted by the Scott Creek Business Park chlorinated solvent and diesel plume, where levels are generally below 100 µg/L.

Relatively low concentrations of other organic chemicals, such as dissolved petroleum hydrocarbons like gasoline, have also been found in groundwater from a number of investigation locations along the alignment. Consequently, preparation for groundwater containing relatively low contaminant levels is appropriate along most if not all of the alignment.

2.4.2.2 Stations Segment

As described in Sections 2.2.1, 2.2.3, and 2.3.4, the design of the actual stations will reside with the segment that they fall along (such as the Line Segment, Tunnel Segment, or Yard and Shop Segment). However, for ease of reference, impacts to groundwater are summarized below for each station and/or corresponding campus. With the exception of the portions of the three stations (future South Calaveras Station, Montague/Capital Station, and Berryessa Station) that fall within the former UPRR right-of-way under the Line Segment, there have been no previous environmental investigations performed on behalf of VTA at any of the stations and corresponding campus areas. However, investigations are in the planning stages and are expected to occur during the final design phase. The information provided below is generally based on database searches summarized in the *Final EIR* prepared by VTA, or as otherwise indicated.

<u>Montague/Capitol Station and Campus</u>

The database search summarized in the *Final EIR* identified a number of sites with hazardous material releases on or near the Montague/Capitol Station campus. Most of these sites involve petroleum hydrocarbons such as gasoline or diesel releases from underground storage tanks into soil and/or groundwater. In addition, the following two sites involve chlorinated solvent releases:

- Jones Chemical, at 985 Montague Expressway, which released moderate levels of chlorinated VOCs to groundwater. These chlorinated VOCs have migrated to the groundwater along the SVRT ROW just to the north of the Montague/Capitol Station campus, and preliminary indications are that they may also be encountered during dewatering for station construction.
- North American Transformer, at 1200 Piper Drive, which also released moderate levels of chlorinated VOCs to groundwater. These chlorinated VOCs have likely mixed with groundwater containing VOCs from Jones Chemical.

<u>Berryessa Station and Campus</u>

The database search summarized in the *Final EIR* did not identify any sites with hazardous material releases on the Berryessa Station campus. However, sites were identified to involve petroleum hydrocarbons such as gasoline or diesel releases from underground storage tanks into soil and/or groundwater. The nearest of these sites include 796 North King Road, 697 Lenfest Road, and 681 Lenfest Road.

Alum Rock Station and Campus

Petroleum hydrocarbon release sites, located within the bounds of the Alum Rock Station and campus (as discussed in Section 2.4.1.2), may have the potential to affect site groundwater quality. Groundwater from dewatering, possibly generated during foundation construction, may be contaminated. Preliminary information suggests that dewatering may generate water containing primarily TPH, including constituents such as benzene.

Downtown San Jose Station and Campus

The database search summarized in the *Final EIR* identified a number of sites with hazardous material releases near the Downtown San Jose Station and campus. These sites involve petroleum hydrocarbons such as gasoline or diesel releases from underground storage tanks into soil and/or groundwater. Among these sites are 80 South Market Street, 101 San Fernando, 211 West Santa Clara Street, 95 Almaden Avenue, and 70 Almaden Avenue. Preliminary information suggests that dewatering will generate water containing primarily petroleum hydrocarbons, including constituents such as benzene.

Diridon Station and Campus

Based on documents in the public record prepared by RUST Environment & Infrastructure, Inc. (RUST), a predecessor company of Earth Tech, the shallow groundwater beneath the San Jose Arena Block 5A parking lot is contaminated with petroleum hydrocarbons, specifically gasoline, diesel, and their constituents. RUST performed investigations and installed a remediation system at this location. The source of the contamination is believed to be former underground fuel storage tanks that were removed from the site. After excavation and disposal of TPH-impacted soil, a combined air-sparging and vapor extraction system operated for twelve months, followed by quarterly and semi-annual groundwater monitoring. Groundwater quality data from 1998 showed that significant contaminant levels remained in the shallow groundwater, with benzene levels up to 13,000 µg/L, methyl tertiary-butyl ether (MTBE) levels up to 860 µg/L, and TPH-G levels up to 76,000 µg/L. Request for site closure under a deed restriction was made by the City of San Jose in March 2002.

Santa Clara Station and Campus

The database search summarized in the *Final EIR* identified sites with hazardous material releases on or near the Santa Clara Station and Campus. Most of these sites involve petroleum hydrocarbons such as gasoline or diesel releases from underground storage tanks into soil and/or groundwater. In addition, chlorinated solvents including TCE and PCE, which originated from the FMC Corporation facilities, are also present in soil and groundwater in the vicinity of the station and campus, particularly to the south of Brokaw Road. A groundwater extraction and treatment system, located at 328 Brokaw Road, treats groundwater extracted from both the former 333 and 328 Brokaw Road FMC sites. Note that the 333 Brokaw Road site is now occupied by Fedex Corporation. Groundwater monitoring reports for the former Brokaw Road FMC sites are currently submitted to the RWQCB on a semiannual basis.

2.4.2.3 Yard and Shops Segment

Investigations were conducted by Earth Tech on behalf of VTA in December 2002 and July 2003 to evaluate potential impacts to groundwater at the UPRR Newhall Yard facility, as described in Section 2.3.3. Limited (only six) grab groundwater samples were collected and analyzed for metals and organic chemicals. The investigation results indicated the following for the groundwater:

- Dissolved metals (antimony and selenium) were detected above their respective California primary maximum contaminant levels (MCLs).
- Dissolved lead was not detected above method reporting limits.
- Total concentrations (including contributions from sediments) of several metals, including antimony, chromium, nickel, selenium, and thallium, were detected in site groundwater, emphasizing the importance of thorough removal of suspended solids prior to any dewatering discharge.
- Chlorinated solvents, such as 1,2-dichloroethene (1,2-DCE) and vinyl chloride, were found in two grab groundwater samples and exceeded their California primary MCLs. These chlorinated solvents appear to represent residual groundwater contamination from a solvent plume that originated at the adjacent former FMC Corporation site.
- Petroleum hydrocarbons were not detected in any of the six grab groundwater samples. However, sufficient groundwater samples were not obtained within the 420 Brokaw Road portion of the UPRR Newhall Yard to perform diesel and motor oil range analyses on groundwater. A sheen of petroleum hydrocarbons was observed on surface water from a rainfall event within this area.

2.4.3 Impacts to Building Materials

Several buildings and structures reside at the planned locations of the station campus areas, maintenance yard, and northernmost area of the Line Segment, where the tracks are planned to be shifted from the existing SVRT ROW to the east. Since there have been no previous hazardous materials surveys for these buildings or structures performed on behalf of VTA, appropriate building materials characterization must be conducted prior to demolition, as described in Section 6. During demolition of buildings, potential hazardous and contaminated building materials encountered may include asbestos-containing materials, lead-based paints, PCB-containing light ballasts, mercury vapor lamps, and/or wood, concrete, or sheetrock contaminated from previous chemical use, storage, and/or handling. Additionally, chemicals from prior use, such as pesticides, may be present during demolition of buildings.

3.0 RISK-BASED EVALUATION OF CONTAMINANT LEVELS IN SOIL/BALLAST

This section presents an evaluation of the risks associated with exposure to site contamination during and after construction of the SVRT project. The evaluation includes both the calculation of human health risk-based levels and an assessment of ecological risk to determine appropriate soil and ballast management procedures.

3.1 HUMAN HEALTH RISK-BASED LEVELS

The calculation of acceptable human health risk-based levels for the various exposure scenarios is presented in Appendix B. The human health risk-based levels calculated in Appendix B are the Site-Specific Risk Assessment (SSRA) results used in Section 4.2 to help determine criteria for appropriate material reuse. The calculation of human health risk-based levels generally follows the guidance in *Risk Assessment Guidance for Superfund, Volume 1, Part A* (U.S. EPA, 1989).

3.2 ASSESSMENT OF ECOLOGICAL RISK

A screening level assessment of ecological risk for the SVRT project is presented in Appendix C. The screening level ecological risk assessment (ERA) generally follows the guidance in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessment - Interim Final* (U.S. EPA, 1997). The screening ERA integrates the detailed site-specific ecological evaluation results presented in the *Final EIR* (VTA, 2004), including the selection of the identified special status species (rare, threatened or endangered species as listed by state or federal agencies) potentially present within the project area as the key ecological receptors.

The screening ERA presented in Appendix C concludes that additional measures to protect potential ecological receptors are not needed in most areas covered by the project Migration Potential Zones (MPZ). For surface water protection, MPZs are within 50 feet of surface water features (Section 4.2.1). Based on the relatively flat land surface in these areas, this distance will provide a reasonable buffer between ecological receptors and significant contaminant exposure.

4.0 SOIL/BALLAST MITIGATION MEASURES

A wide variety of protective measures will be employed for both soil and railroad ballast encountered during project construction phase. These will include environmental characterization of the material, constraints on material transportation and stockpiling, restriction of reuse of the material to defined specific reuse scenarios, and air monitoring requirements. These mitigation measures are described further below.

4.1 SOIL/BALLAST CHARACTERIZATION

Soil and ballast that will be excavated or disturbed during project construction phase will be characterized through sampling, chemical analysis, and statistical analysis of the resulting data. The characterization process is detailed in the following sections.

4.1.1 Sampling Strategy

Soil and ballast that will be excavated or disturbed during the project construction phase will undergo preliminary characterization (sampling and chemical analysis) during the project design phase. In addition, there will be further soil and ballast characterization during the project construction phase. Reasons for additional characterization during project construction phase could include waste characterization, or the discovery and characterization of a previously unknown hot spot or unknown impact. In certain circumstances, characterization of potential hot spots may be included in project design and/or construction phases. All field characterization work will be performed in accordance with appropriate health and safety standards, including Title 29 Code of Federal Regulations (CFR) 1910.120, Hazardous Waste Operations and Emergency Response. The sampling strategy is detailed in the following sections.

4.1.1.1 Preliminary Reconnaissance Characterization

Each segment-specific design team will perform preliminary characterization of that segment. These activities will be conducted in the preliminary or final design phases based on availability of site access agreements and other project requirements. Either of two general approaches to preliminary reconnaissance characterization will be used, depending on the physical situation:

- in-situ reconnaissance characterization of soil/ballast by sampling at a minimum frequency of once every 1,000 feet along the SVRT project rail alignment within the area of the proposed construction. Sampling will occur at depths within specific stratigraphic intervals such that representative samples are collected throughout the construction depth interval; or

- in-situ reconnaissance characterization of soil by sampling at a minimum frequency of once every two acres for areas (such as at stations) within the project area but not along the rail alignment.

4.1.1.2 Hot Spot Characterization

The preliminary reconnaissance characterization may identify certain samples with unexpectedly high contaminant concentrations. The unexpectedly high concentration samples may indicate an area represented by either a single sample or a relatively small number of samples. When these concentrations threaten to adversely affect the final design and/or construction, these results will be considered a potential indicator of a "hot spot". In such circumstances, additional sampling and analysis will be performed to further characterize the hot spot.

The approach to additional sampling and analysis will be dependent on the specific concentrations and relative locations of the unexpectedly high concentration samples. "Step-out" sampling will continue until the extent is defined to the limits of proposed construction. Hot spot characterization may be performed during either the final engineering design or the construction phases of the project.

Once the vertical and horizontal extent of the hot spot is defined, this material will be removed during the construction phase. Hot spot material will be managed in accordance with the guidance provided herein, though handled separately from the surrounding excavated soils or ballast.

4.1.1.3 Discovery of Unknown Impact

Care will be taken during construction activities to note any stained, discolored, or odorous soils. If such soils are encountered, work will be stopped and the environmental engineer or geologist will be consulted. In the case of discolored soils, if the engineer or geologist decides that there is significant cause, the soil will be sampled for TPH-d (or any other suspected contaminant). In the case of strong odors or visual indications, the soil will be sampled for TPH-g, TPH-d, volatile organic compounds (VOCs), and/or SVOCs. No further work will be conducted with the impacted soil until analytical results have been received and reviewed, and either the soil has been found not to contain hazardous substances or engineering controls have been implemented to protect worker health and safety. During characterization, site control measures will be implemented to minimize exposure to potential hazardous substances.

4.1.1.4 Waste Disposal Characterization

Soil and ballast that contain chemical constituents at levels that are above the corresponding reuse concentrations (see Section 4.2) will be properly disposed off-site. Other material may also be disposed off-site at VTA's discretion, such as soil that is not appropriate for reuse due to geotechnical or other characteristics, or excess material. As part of this process, all material to be disposed off-site will be characterized for final disposition while still on-site.

Waste disposal sampling may be performed in one of two ways, depending on the disposal facility requirements:

- in-situ reconnaissance testing of soil/ballast by sampling within the area of the proposed construction area at the minimum frequency required by the disposal facility. Sampling will occur at depths within specific stratigraphic intervals such that representative samples are collected throughout the construction depth interval; or
- collection of four-point composite samples from excavated and stockpiled soil/ballast. Samples will be collected at the minimum frequency required by the disposal facility, which is expected to be one four-point composite sample for every 1,000 cubic yards (cy) of stockpiled material.

Waste disposal characterization will include additional chemical analyses, with the specific analyses and frequencies dependent on the requirements of the off-site disposal facilities under consideration. Waste disposal characterization will not be completed during design because of limitations by disposal facilities on the time period data is representative of the waste. Material will be characterized as waste in accordance with applicable sections of 40 CFR and Title 22 California Code of Regulations (CCR).

4.1.2 Chemical Analysis Methods

Soil/ballast samples will be submitted to a California state-certified analytical laboratory for analysis for selected analytes. The specific analytes for each sample will depend on the location of the sample and the previously-identified use history of the location, or according to requirements of the off-site disposal facility, if characterization is being done for waste disposal. Separate project segments may have substantially different target analytes, because of the substantial differences in each segment as discussed in Section 2. As a result, each segment can be divided into discrete sections, herein termed "data populations" and further described in Section 4.1.3.1. However, for consistency, each data population will have at least one chemical analysis performed for each of the following:

- California Assessment Manual (CAM) 17 metals (including lead and arsenic) using U.S. EPA SW-846 Test Method 6000/7000;
- Volatile organic compounds (VOCs) using U.S. EPA SW-846 Test Method 8260B;
- Semi-volatile organic compounds (SVOCs) including polynuclear aromatic hydrocarbons (PAHs) using U.S. EPA SW-846 Test Method 8270C;
- Organochlorine pesticides and PCBs using U.S. EPA SW-846 Test Method 8081/8082;
- Total petroleum hydrocarbons as gasoline with distinction (if VOCs are not analyzed separately) for gasoline constituents benzene, toluene, ethylbenzene, xylenes and methyl t-butyl ether (TPH-g/BTEX/MTBE) using U.S. EPA SW-846 Test Method 8015M/8020; and

- Total petroleum hydrocarbons as diesel and/or motor oil (TPH-d/TPH-mo) using U.S. EPA SW-846 Test Method 8015M.

4.1.3 Analysis of Data

The data generated during the characterization efforts described above will undergo statistical analysis to determine its representative contaminant concentrations. First, available data from all prior characterization efforts will be divided into discrete data populations based on the location and depth of the sample data. Then, a detailed evaluation of data from each data population will be conducted to determine representative exposure point concentrations (EPCs) for each contaminant. For chemicals where there are sufficient data (at least 10 analytical results for locations within a data population), this evaluation will include statistical analysis to determine the 95 percent upper confidence limits (UCL) of the data. For chemicals with less than 10 results in a data population, the highest analytical result within the data population will be designated the EPC for that chemical and data population.

4.1.3.1 Data Populations

Each discrete data population will represent a specific project area, different than other areas of the project alignment due to its location, depth, prior land usage, and/or EPC for the data population. Given the amount of information available, some of the data populations have been divided into sub-populations which will be evaluated separately. A preliminary listing of the different data populations, including sub-populations, is presented in **Table 1**.

Note that the designers for specific project segments may further subdivide these data populations, depending on the results of characterization.

4.1.3.2 Upper Confidence Limit Calculations

The standard bootstrap method as performed by the U.S. EPA program ProUCL will be used to calculate 95 percent UCLs where chemical data populations are sufficient. For chemicals with less than 10 results in a data population, the highest analytical result within the data population will be designated the EPC for that chemical and data population.

A bootstrap method uses computer-intensive Monte Carlo resampling techniques to resample a population data set at least a thousand times to form new data sets (called bootstrap samples), thereby arriving at an estimate of the mean for each resampling. The Upper confidence limit (UCL) of the mean is calculated from the standard errors of the bootstrap samples. A major advantage of the bootstrap UCL calculation method is that a specific population distribution function does not have to be assumed, so errors associated with an incorrect assumption regarding the population distribution function are avoided.

Table 1 - Discrete Environmental Data Populations

Population Designation		Description of Data Population	SVRT Stations Bounding the Population	
1		Line Segment - Top 4 Feet, Within 12 Feet of UPRR Track Centerline		
	1A	Subpopulation 1A	45+00	148+00
	1B	Subpopulation 1B	148+00	253+55
	1C	Subpopulation 1C	253+55	270+00
	1D	Subpopulation 1D	270+00	288+00
	1E	Subpopulation 1E	288+00	340+00
	1F	Subpopulation 1F	340+00	356+00
	1G	Subpopulation 1G	356+00	431+00
	1H	Subpopulation 1H	431+00	447+00
	1I	Subpopulation 1I	447+00	562+00
2		Line Segment - Top 4 Feet, 12 Feet or More from UPRR Track Centerline		
	2A	Subpopulation 2A	45+00	168+80
	2B	Subpopulation 2B	168+80	418+00
	2C	Subpopulation 2C	418+00	562+00
3		Kato Road Underpass		
	3A	More Than 4 Feet bgs, Within ROW	166+50	169+00
	3B	All Depths, The Perpendicular Excavation Outside ROW	166+50	169+00
4		Dixon Landing Underpass		
	4A	More Than 4 Feet bgs, Within ROW	191+00	192+50
	4B	All Depths, The Perpendicular Excavation Outside ROW	191+00	192+50
5		Berryessa Creek Culvert		
	5A	More Than 4 Feet bgs, Within ROW	245+00	247+50
	5B	All Depths, The Perpendicular Excavation Outside ROW	245+00	247+50
6		Retained Cut for Montague and Trade Zone		
	6A	4' to 12' bgs, Within ROW	358+00	414+50
	6B	More than 12 Feet bgs, Within ROW	358+00	414+50
7		Retained Cut for Hostetter and Lundy, 4' to 35' bgs, Within ROW	448+00	499+00
8		Retained Cut at End of Line Segment, 4' to 25' bgs, within ROW	559+00	562+00
9		Relocation of UPRR Main Rail Line		
10		Montague/Capitol Station Parking/Support Areas		
11		Berryessa Station Parking/Support Areas		
12		Alum Rock Station Cut and Cover Area		
13		Alum Rock Station Parking Structure Area		
14		Downtown San Jose Station Cut and Cover Area		
15		Diridon/Arena Station Cut and Cover Area		
16		Diridon/Arena Station North ("Arena") Parking Area		
17		Santa Clara Station Parking/Support Areas		
18		Maintenance Facility - City of San Jose Section		
19		Maintenance Facility - City of Santa Clara Section		
20		Future Calaveras Station Parking/Support Areas		

The Lognormal Distribution in Environmental Applications (U.S. EPA Office of Research and Development and U.S. EPA Office of Solid Waste and Emergency Response, EPA/600/R-97/006, December 1997) recommends that the bootstrap method or one of the other nonparametric methods be used to calculate the UCL if there is evidence of a mixture of two or more sub-populations or outlier data points are suspected. Such situations are expected to be encountered when statistically analyzing the data populations for the SVRT project, given the sub-populations of contaminated and uncontaminated material. In addition, the inaccurate estimates of the UCL that can result from small data population from small data population sizes (under 30 samples) and moderately skewed distributions can be minimized by using a bootstrap method.

The Draft *Risk Assessment Guidance for Superfund Volume 3 Part A – Process for Conducting Probabilistic Risk Assessment* (U.S. EPA Office of Solid Waste and Emergency Response, EPA 000-0-99-000, December 1999) notes that "there are three main advantages of using bootstrap techniques to characterize uncertainty. These advantages are as follows:

1. The methodology can estimate the standard error of a statistic for which an equation of standard error is either extremely complex or non-existent;
2. The methodology can estimate the standard error from the sample set itself without fitting it to a parametric distribution (in other words, the methods do no relay on the sample set or the underlying data population conforming to any particular distribution – thus they are referred to as non-parametric methods); and
3. The methods are relatively easy to implement on a computer.

In *Use of the Bootstrap Method in Calculating the Concentration Term for Estimating Risks at Contaminated Sites* (Technical Memorandum 01-004, January 2, 2003), the Alaska Department of Environmental Conservation notes that "bootstrap methods have been shown to perform substantially better, sometimes orders of magnitude better, in estimating the UCL of the mean from positively skewed data sets than the H statistic method" which is typically used for lognormal data.

Statisticians have developed a number of bootstrap methods to calculate UCLs. The standard bootstrap approach is the most common and is the bootstrap method proposed herein. For instance, the standard bootstrap approach is typically used to calculate the 95 percent UCL of lead levels under the Caltrans variance covering aerially deposited lead.

The program *ProUCL Version 3.0* (U.S. EPA, Technical Support Center for Monitoring and Site Characterization, April 2004) includes standard bootstrap approach among its many UCL calculation tools.

The default value of the number of bootstrap samples created by bootstrap runs is 2,000. VTA will use this default value.

For the purposes of statistical analysis and UCL calculation, additional hot spot characterization results (see Section 4.1.1.2) will not be included in the data population in which a potential hot spot is located. This is because the inclusion of this additional analytical data from a potential hot spot is equivalent to including a non-representative subpopulation which will skew the results of the overall data population. However, if the step out samples do not indicate a distinct second data population, the original sample will be included in the decision-making process.

4.1.3.3 Exposure Point Concentrations

According to *Supplemental Guidance to RAGS: Calculating the Concentration Term* (U.S. EPA Office of Solid Waste and Emergency Response, Publication 9285.7-081, May 1992), if the 95 percent UCL exceeds the maximum detected concentration, the maximum detected value should be used as the EPC. Consequently, the EPC for each data population used by VTA will be one of the following values:

- the 95 percent UCL of the mean, as calculated by the standard bootstrap method;
- the maximum detected concentration when the calculated 95 percent UCL is greater than the maximum detected concentration; or
- the maximum detected concentration when the 95 percent UCL cannot be calculated because the data population contains less than 10 data points.

4.2 SOIL/BALLAST REUSE

After the soil and ballast is adequately characterized for design purposes, the segment-specific designer will classify soil for potential reuse during construction. This section includes restrictive guidance on the reuse of soil and ballast, as described below.

4.2.1 Migration Potential Zones

A Migration Potential Zone (MPZ) is defined within the project boundary as an area within 50 feet of creeks, surface water or other aquatic habitat, or within 5 feet of groundwater. Potential uses for soil and ballast are severely limited within a MPZ, as described below.

4.2.2 Reuse Scenarios

The SVRT project will use the following five soil and railroad ballast reuse scenarios. These five reuse scenarios are listed below, in the order of lowest to highest acceptable reuse concentrations:

- Unrestricted Off-site Reuse, in which soil and ballast excavated from the project can be reused in any off-site situation without restriction, including residential uses, or near a stream or shallow groundwater.
- Unrestricted On-site Reuse, in which soil and ballast excavated from the project can be reused in any on-site area. This includes areas within a MPZ.
- Stations and Facilities, in which soil and ballast excavated from the project can be reused in areas where there is anticipated to be relatively frequent potential exposure, like stations and maintenance facilities, but not within a MPZ.
- Right-of-Way, in which soil and ballast excavated from the project can be reused in areas where there is anticipated to be relative infrequent potential exposure, like along the BART tracks and right-of-way, but not within a MPZ or areas which are part of a riparian fringe habitat.
- Encapsulation, in which soil and ballast excavated from the project can be reused under barriers or other structures (and covered on all exposed sides by clean material). Encapsulations will not be placed within a MPZ or areas which are part of a riparian fringe habitat.

Soil and ballast that contains chemical constituents at levels greater than the acceptable reuse concentrations for any of these five reuse scenarios will be disposed of off-site at an appropriate disposal facility in accordance with Section 4.4.

4.2.3 Reuse Scenario Selection Process

This section describes the process of classifying soil and ballast into one of the reuse scenarios listed in Section 4.2.2. In order to be eligible for a reuse scenario, a data population (Section 4.1.3.1) will have to meet the most restrictive of the reuse criteria for that scenario, as listed in subsequent sections. The reuse criteria are a combination of two types of values: 1) the site-specific risk assessment (SSRA) values for that chemical and exposure scenario (from Section 3), and 2) the screening values from existing regulatory agency guidance. For each reuse scenario, both SSRAs and regulatory agency screening values are developed specifically for that chemical and exposure scenario.

In order to determine the reuse scenario in which a data population should be classified, the designer for each project segment will compare the EPCs (either 95 percent UCLs or maximum values, as described in Section 4.1.3.3) to the SSRAs values and the screening values derived herein. Whichever is the least restrictive reuse scenario for which the data population satisfies all the requirements will be the classification received by that data population.

4.2.4 Screening Values

Screening values were obtained from a variety of sources, particularly existing regulatory agency screening values. Depending on the various exposure scenarios, separate screening values were selected for different reuse scenarios in order to protect potential human and ecological receptors. The sources of screening values were as follows:

- Site-Specific Risk Assessment (SSRA) results, derived as described in Section 3.
- RWQCB's Environmental Screening Levels (ESLs) (February 2005) for soil less than 3 meters below ground surface and ground water is a current or potential source of drinking water. Depending on the reuse scenario, values for either Residential or Commercial/Industrial land use scenarios were used. When available, values for both human health and groundwater protection (soil leaching) were used.
- US EPA, Region 9, Preliminary Remediation Goals (PRGs) (October 2004) for Residential Soil and Industrial Soil.
- Ten times the Soluble Threshold Limit Concentration (STLC), which would indicate that the soil might be characterized as hazardous waste, per 22 CCR Section 66261.
- RWQCB's Staff Report "Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments" (May 1998) listings of Effects Range Low (ER-L) values, in order to protect ecological receptors.
- National Oceanic and Atmospheric Administration (NOAA), Screening Quick Reference Table (SQuiRT) Sediment Threshold Effects Levels (TELs) (using more conservative of marine or freshwater). If unavailable, then the lowest of ARCs (Assessment and Remediation of Contaminated Sediments Program) or Apparent Effects Threshold (AET) levels are used in order to protect potential ecological receptors.

If background is higher than an appropriate screening value, then the background value is used for the ultimate reuse criteria. Background concentrations of arsenic in the Bay Area are known to be above most health-based risk values; however, a background arsenic value has not been definitively determined for the South San Francisco Bay Area. For the purposes of this *CMP*, an interim background value for arsenic of 5.5 mg/kg is used (Scott, 1991).

Details regarding the specific screening values used for each reuse scenario are presented below. The resultant screening values for each chemical and exposure scenario have been consolidated into **Table 2**.

4.2.4.1 Unrestricted Off-Site Reuse

Under the Unrestricted Off-Site Reuse Scenario, material must meet acceptable standards for "clean soil," which could be used as import fill at any off-site destination. It has been assumed that the soil will not be used at off-site aquatic areas and that soil intended for such use would be subject to additional screening by the end user.

Table 2 - Site Specific Soil/Ballast Reuse and Stockpile Criteria

Chemical of Concern	Screening Value for Unrestricted Off-site Reuse (mg/kg)	Screening Value for Unrestricted On-site Reuse (mg/kg)	Screening Value for Reuse in Stations and Facilities (mg/kg)	Screening Value for Reuse in Right-of-Way (mg/kg)	Screening Value for Reuse in Encapsulation (mg/kg)
Use Permitted in MPZ ?	**Yes**	**Yes**	**No**	**No**	**No**
Arsenic	5.5	5.5	5.5	21.8	830
Lead	30.24	30.24	646	262	262
TPH-Gasoline	100	100	100	100	N/A
TPH-Diesel (middle distillates)	100	100	100	100	N/A
TPH-Oil (residual fuels)	500	1,000	1,000	1,000	N/A
DDT	0.00158	0.00158	4.3	4.3	277
DDE	0.00158	0.00158	4.3	4.3	277

Notes:
All concentrations are in mg/kg unless otherwise noted.
Screening values listed here are a summary of the Resulting Screening Values selected in the following tables.
N/A : Not Applicable

The Unrestricted Off-Site Reuse Scenario is modeled by a residential scenario. Unrestricted Off-Site Reuse screening values are either background levels or the most conservative of the following:

- SSRA values calculated for the residential exposure scenario, in Appendix B;
- RWQCB ESLs for Human Health, Residential land use;
- RWQCB ESLs for Groundwater Protection, Residential land use;
- US EPA Region 9 Residential PRGs;
- Ten times the STLC;
- RWQCB Sediment ER-Ls; and
- NOAA SquiRT values.

Screening levels for each chemical under the Unrestricted Off-site Reuse Scenario are listed in **Table 3** by source, as well as the selected resulting screening value for each chemical.

4.2.4.2 Unrestricted On-Site Reuse

Under the Unrestricted On-Site Reuse Scenario, material must meet acceptable standards for “clean soil,” which could be used as fill on-site, including within the MPZ. The Unrestricted On-Site Reuse Scenario is modeled by two exposure scenarios, plus additional protection for ecological receptors that might be impacted

Table 3 - Screening Values for Unrestricted Off-Site Reuse

Chemical of Concern	SSRA for Residential Exposure Scenario (Appendix B)	Resulting Ecological Screening Value (Appendix C)	RWQCB ESL for Human Health: Residential, Shallow Soil, Drinking Water Resource [a]	RWQCB ESL for Groundwater Protection: Residential, Shallow Soil, Drinking Water Resource [a]	US EPA Region 9 Residential PRG [b]	Ten Times the Title 22 CCR STLC Hazardous Waste Standard (mg/kg) [c] *	Title 22 CCR TTLC Hazardous Waste Standards (mg/kg) [c]	Background Value **	Resulting Screening Value (mg/kg)
Arsenic	0.21	5.9	5.5	N/A	0.39 [1]	50	500	5.5 [d]	5.5
Lead	213	30.24	255	N/A	150 [2]	50	1,000	16.1 [d]	30.24
TPH-Gasoline	N/A	100	500	100	N/A	N/A	N/A	0.0	100
TPH-Diesel (middle distillates)	N/A	100	500	100	N/A	N/A	N/A	0.0	100
TPH-Oil (residual fuels)	N/A	1,000	500	1,000	N/A	N/A	N/A	0.0	500
DDT	1.63	0.00158	1.7	4.3	1.7	1.0	1.0	0.0	0.00158
DDE	1.63	0.00158	1.7	1,100	1.7	1.0	1.0	0.0	0.00158

Notes:

Arsenic SSRA is derived using the OEHHA oral slope factor and 20% bioavailability

All concentrations are in mg/kg unless otherwise noted.
[1] Arsenic PRG is the cancer endpoint.
[2] Lead "CAL-Modified PRG", non-standard method applied.

[a] San Francisco Bay RWQCB, 2003. *July 2003 Update to Environmental Screening Levels Technical Document*. July 21.
[b] EPA, 2002. *EPA Region 9 PRGs Table*. October 1. Edited February 2003.
[c] California Code of Regulations, Title 22, Section 66261.
[d] Christina M. Scott, 1991. *Background Metal Concentrations in Soils in Northern Santa Clara County, California*. December.

* : Includes the ten-fold dilution factor during STLC tests.
** : A screening value below the background value will cause the Resulting Screening Value to be set to background.

CCR	California Code of Regulations
DDT	Dichlorodiphenyltrichloroethane
DDE	Dichlorodiphenyldichloroethene
ESL	Environmental Screening Level
ER-L	Effects Range - Low
mg/kg	Milligrams per Kilogram
N/A	Not Applicable
PRG	Preliminary Remediation Goal
RWQCB	Regional Water Quality Control Board
SSRA	Site-Specific Risk Assessment
STLC	Soluble Threshold Limit Concentration
TPH	Total Petroleum Hydrocarbons
TTLC	Total Threshold Limit Concentration
US EPA	United States Environmental Protection Agency

by releases to the MPZ. The two exposure scenarios are a standard industrial exposure scenario to model on-site workers and passengers, and a residential scenario to model off-site residents' exposure to dust disturbed by trains passing over the reused material. SSRA values for both of these exposure scenarios will be included in the screening value selection.

Unrestricted On-Site Reuse screening values are either background levels or the most conservative of the following:

- SSRA values calculated for the standard industrial exposure scenario;
- SSRA values calculated for off-site residents' exposure to dust disturbed by trains passing over the reused material;
- RWQCB ESLs for Human Health, Commercial/Industrial land use;
- RWQCB ESLs for Groundwater Protection, Commercial/Industrial land use;
- US EPA Region 9 Industrial PRGs;
- Ten times the STLC;
- RWQCB Sediment ER-Ls; and
- NOAA SquiRT values.

Screening levels for each chemical under the Unrestricted On-site Reuse Scenario are listed in **Table 4** by source, as well as the selected resulting screening value for each chemical.

4.2.4.3 Stations and Facilities

Under the Stations and Facilities Scenario, material must meet acceptable standards for reuse in relatively high exposure frequency areas, such as stations and maintenance facilities, but not within the MPZ. The Stations and Facilities Scenario is modeled by two exposure scenarios, a standard industrial exposure scenario to model on-site workers and passengers, and a residential scenario to model off-site residents' exposure to dust disturbed by trains passing over the reused material. SSRA values for both of these exposure scenarios will be include in the screening value selection.

Stations and Facilities Scenario screening values are either background levels or the most conservative of the following:

- SSRA values calculated for the standard industrial exposure scenario;
- SSRA values calculated for off-site residents' exposure to dust disturbed by trains passing over the reused material;

Table 4 - Screening Values for Unrestricted On-Site Reuse

Chemical of Concern	SSRAs for Standard Industrial Exposure Scenario (Appendix B)	SSRAs for Off-Site Residents' Exposure to Dust (Appendix B)	Resulting Ecological Screening Value (Appendix C)	RWQCB ESLs for Human Health: Commercial/Indus-trial, Shallow Soil, and Drinking Water Resource [a]	RWQCB ESLs for Groundwater Protection: Commercial/Indus-trial, Shallow Soil, and Drinking Water Resource [a]	US EPA Region 9 Industrial PRGs [b]	Ten Times the Title 22 CCR STLC Hazardous Waste Standard (mg/kg) [c] *	Title 22 CCR TTLC Hazardous Waste Standards (mg/kg) [c]	Background Value **	Resulting Screening Value (mg/kg)
Arsenic	8.7	181	5.9	5.5	N/A	1.6 [1]	50	500	5.5 [d]	5.5
Lead	646	100,000	30.24	750	N/A	750 [2]	50	1,000	16.1 [d]	30.24
TPH-Gasoline	N/A	N/A	100	5,800	100	N/A	N/A	N/A	0.0	100
TPH-Diesel	N/A	N/A	100	5,800	100	N/A	N/A	N/A	0.0	100
TPH-Oil	N/A	N/A	1,000	5,800	1,000	N/A	N/A	N/A	0.0	1,000
DDT	77.9	5,033	0.00158	7.0	4.3	7.0	1.0	1.0	0.0	0.00158
DDE	77.9	5,033	0.00158	7.0	1,100	7.0	1.0	1.0	0.0	0.00158

Notes:

Arsenic SSRA is derived using the OEHHA oral slope factor and 20% bioavailability

All concentrations are in mg/kg unless otherwise noted.
[1] Arsenic PRG is the cancer endpoint.
[2] Lead "CAL-Modified PRG", non-standard method applied.

[a] San Francisco Bay RWQCB, 2003. *July 2003 Update to Environmental Screening Levels Technical Document*. July 21.
[b] EPA, 2002. *EPA Region 9 PRGs Table*. October 1. Edited February 2003.
[c] California Code of Regulations, Title 22, Section 66261.
[d] Christina M. Scott, 1991. *Background Metal Concentrations in Soils in Northern Santa Clara County, California*. December.

* : Includes the ten-fold dilution factor during STLC tests.

CCR	California Code of Regulations
DDT	Dichlorodiphenyltrichloroethane
DDE	Dichlorodiphenyldichloroethene
ESL	Environmental Screening Level
ER-L	Effects Range - Low
mg/kg	Milligrams per Kilogram
N/A	Not Applicable
PRG	Preliminary Remediation Goal
RWQCB	Regional Water Quality Control Board
SSRA	Site-Specific Risk Assessment
STLC	Soluble Threshold Limit Concentration
TPH	Total Petroleum Hydrocarbons
TTLC	Total Threshold Limit Concentration
US EPA	United States Environmental Protection Agency

- RWQCB ESLs for Human Health, Commercial/Industrial land use;
- RWQCB ESLs for Groundwater Protection, Commercial/Industrial land use;
- US EPA Region 9 Industrial PRGs; and
- Ten times the STLC.

Screening levels for each chemical under the Stations and Facilities Scenario are listed in **Table 5** by source, as well as the selected resulting screening value for each chemical.

4.2.4.4 Right-of-Way

Under the Right-of-Way Scenario, material must meet acceptable standards for reuse where relatively low exposure frequency is anticipated (such as maintenance of rail road right-of-ways), but not within the MPZ or areas which are part of a riparian fringe habitat. The Right-of-Way Scenario is modeled by two exposure scenarios, a reduced exposure frequency industrial exposure scenario to model on-site workers and passengers, and a residential scenario to model off-site residents' exposure to dust disturbed by trains passing over the reused material. SSRA values for both of these exposure scenarios will be included in the screening value selection.

Right-of-Way Scenario screening levels are either background levels or the most conservative of the following:

- SSRA values calculated for the reduced exposure frequency industrial exposure scenario;
- SSRA values calculated for off-site residents' exposure to dust disturbed by trains passing over the reused material;
- RWQCB ESLs for Human Health, Commercial/Industrial land use;
- RWQCB ESLs for Groundwater Protection, Commercial/Industrial land use;
- US EPA Region 9 Industrial PRGs; and
- Ten times the STLC.

Screening levels for each chemical under the Right-of-Way Scenario are listed in **Table 6** by source, as well as the selected resulting screening value.

4.2.4.5 Encapsulation

Under the Encapsulation Scenario, material may be reused on-site under barriers or other structures (and covered on all exposed sides by at least a 6-inch thickness of clean material), though these will not be placed within the MPZ or areas which are part of a riparian fringe habitat. The Encapsulation Scenario is modeled by construction exposure scenario, as post-construction exposures will be negligible due to the construction of the encapsulation.

Table 5 - Screening Values for Reuse in Stations and Facilities

Chemical of Concern	SSRAs for Standard Industrial Exposure Scenario (Appendix B)	SSRAs for Off-Site Residents' Exposure to Dust (Appendix B)	RWQCB ESLs for Human Health: Commercial/Industrial, Shallow Soil, and Drinking Water Resource [a]	RWQCB ESLs for Groundwater Protection: Commercial/Industrial, Shallow Soil, and Drinking Water Resource [a]	US EPA Region 9 Industrial PRGs [b]	Ten Times the Title 22 CCR STLC Hazardous Waste Standard (mg/kg) [c] *	Title 22 CCR TTLC Hazardous Waste Standards (mg/kg) [c]	Background Value **	Resulting Screening Value (mg/kg)
Arsenic	8.7	181	5.5	N/A	1.6 [1]	50	500	5.5 [d]	5.5
Lead	646	100,000	750	N/A	750 [2]	50	1,000	16.1 [d]	646
TPH-Gasoline	N/A	N/A	5,800	100	N/A	N/A	N/A	0.0	100
TPH-Diesel	N/A	N/A	5,800	100	N/A	N/A	N/A	0.0	100
TPH-Oil	N/A	N/A	5,800	1,000	N/A	N/A	N/A	0.0	1,000
DDT	77.9	5,033	7.0	4.3	7.0	1.0	1.0	0.0	4.3
DDE	77.9	5,033	7.0	4.3	7.0	1.0	1.0	0.0	4.3

Notes:

Arsenic SSRA is derived using the OEHHA oral slope factor and 20% bioavailability

All concentrations are in mg/kg unless otherwise noted.
[1] Arsenic PRG is the cancer endpoint.
[2] Lead "CAL-Modified PRG", non-standard method applied.

[a] San Francisco Bay RWQCB, 2003. *July 2003 Update to Environmental Screening Levels Technical Document* . July 21.
[b] EPA, 2002. *EPA Region 9 PRGs Table* . October 1. Edited February 2003.
[c] California Code of Regulations, Title 22, Section 66261.
[d] Christina M. Scott, 1991. *Background Metal Concentrations in Soils in Northern Santa Clara County, California* . December.

* : Detection of an analyte at greater than this level will result in further testing, not necessarily rejection for this reuse. Includes the ten-fold dilution factor during STLC tests.

CCR	California Code of Regulations
DDT	Dichlorodiphenyltrichloroethane
DDE	Dichlorodiphenyldichloroethene
ESL	Environmental Screening Level
mg/kg	Milligrams per Kilogram
mg/l	Milligrams per Liter
N/A	Not Applicable
PRG	Preliminary Remediation Goal
RWQCB	Regional Water Quality Control Board
SSRA	Site-Specific Risk Assessment
STLC	Soluble Threshold Limit Concentration
TPH	Total Petroleum Hydrocarbons
TTLC	Total Threshold Limit Concentration
US EPA	United States Environmental Protection Agency

Table 6 - Screening Values for Reuse in Right of Way

Chemical of Concern	SSRAs for Reduced Industrial Exposure Frequency Exposure Scenario (Appendix B)	SSRAs for Off-Site Residents' Exposure to Dust (Appendix B)	SSRAs for Construction Exposure Scenario (Appendix B)	RWQCB ESLs for Groundwater Protection: Commercial/Industrial, Shallow Soil, and Drinking Water Resource [a]	Ten Times the Title 22 CCR STLC Hazardous Waste Standard (mg/kg) [c] *	Title 22 CCR TTLC Hazardous Waste Standards (mg/kg) [c]	Background Value **	Resulting Screening Value (mg/kg)
Arsenic	21.8	181	830***	N/A	50	500	5.5 [d]	21.8
Lead	1615	100,000	262	N/A	50	1,000	16.1 [d]	262
TPH-Gasoline	N/A	N/A	N/A	100	N/A	N/A	0.0	100
TPH-Diesel	N/A	N/A	N/A	100	N/A	N/A	0.0	100
TPH-Oil	N/A	N/A	N/A	1,000	N/A	N/A	0.0	1,000
DDT	195	5,033	277***	4.3	1.0	1.0	0.0	4.3
DDE	195	5,033	277***	4.3	1.0	1.0	0.0	4.3

Notes:

Arsenic SSRA is derived using the OEHHA oral slope factor and 35% bioavailability

All concentrations are in mg/kg unless otherwise noted.
[1] Arsenic PRG is the cancer endpoint.
[2] Lead "CAL-Modified PRG", non-standard method applied.

[a] San Francisco Bay RWQCB, 2003. *July 2003 Update to Environmental Screening Levels Technical Document*. July 21.
[b] EPA, 2002. *EPA Region 9 PRGs Table*. October 1. Edited February 2003.
[c] California Code of Regulations, Title 22, Section 66261.
[d] Christina M. Scott, 1991. *Background Metal Concentrations in Soils in Northern Santa Clara County, California*. December.

* : Detection of an analyte at greater than this level will result in further testing, not necessarily rejection for this reuse. Includes the ten-fold dilution factor during STLC tests.

CCR	California Code of Regulations
DDT	Dichlorodiphenyltrichloroethane
DDE	Dichlorodiphenyldichloroethene
ESL	Environmental Screening Level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
N/A	Not Applicable
PRG	Preliminary Remediation Goal
RWQCB	Regional Water Quality Control Board
SSRA	Site-Specific Risk Assessment
STLC	Soluble Threshold Limit Concentration
TPH	Total Petroleum Hydrocarbons
TTLC	Total Threshold Limit Concentration
US EPA	United States Environmental Protection Agency

Encapsulation Scenario screening levels are either background levels or the following:

- SSRAs calculated for the construction exposure scenario.

Screening levels for each chemical under the Encapsulation Scenario are listed in **Table 7** by source, as well as the selected resulting screening value for each chemical.

4.2.5 Reuse Procedures

As noted above, soil and ballast which is classified as acceptable for a less restrictive reuse scenario will be eligible for reuse in a more restrictive reuse scenario. For instance, soil classified as acceptable for Unrestricted On-site Reuse will be considered acceptable for reuse in a Stations and Facilities setting. To facilitate implementation of the reuse procedures, a Soil Management Flow Chart has been provided as **Figure 2**.

In addition, reuse of soil will conform to accepted best management practices (BMPs) and will not be used in such a way that it may present potential ecological or human health risks. These considerations include, but are not limited to, the following:

- The potential for migration of soil, ballast or their constituent contaminants as the result of storm water runoff;
- The potential for movement of soil or ballast material off-site, either as airborne dust or by tracking the material off-site with construction equipment; and
- The potential for migration of contaminants to groundwater or surface waters.

More conservative practices based on BMPs or ecological and human health risk considerations will supercede the reuse classification criteria summarized in Table 2.

4.2.5.1 Non-Encapsulated Material

This section describes the reuse of soil and ballast material which will not be encapsulated, but will be reused under the Unrestricted On-Site Reuse, Stations and Facilities, and Right-of-Way scenarios. Procedures for reuse of these classifications of material are described below.

The reuse process will start with the project designers identifying a situation in which additional material is needed to construct the SVRT project as designed. The need for additional material might result from insufficient material or improper material characteristics, such as geotechnical parameters. Needs for additional material to achieve the design elevations may include uses such as the following:

Table 7 - Screening Values for Reuse in Encapsulation

Chemical of Concern	SSRAs for Construction Exposure Scenario (Appendix B)	Twenty Times the 40 CFR TCLP Hazardous Waste Standards (mg/kg) [a] *	Background Value **	Resulting Screening Value (mg/kg)
Arsenic	830 ***	100	5.5 [d]	830
Lead	262	100	16.1 [d]	262
TPH-Gasoline	N/A	N/A	0.0	N/A
TPH-Diesel (middle distillates)	N/A	N/A	0.0	N/A
TPH-Oil (residual fuels)	N/A	N/A	0.0	N/A
DDT	277***	N/A	0.0	277
DDE	277***	N/A	0.0	277

Notes:

All concentrations are in mg/kg unless otherwise noted.

CFR	Code of Federal Regulations
DDT	Dichlorodiphenyltrichloroethane
DDE	Dichlorodiphenyldichloroethene
mg/kg	Milligrams per Kilogram
N/A	Not Applicable
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
SSRA	Site-Specific Risk Assessment
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons

[a] : Based on 40 Code of Federal Regulations, Part 261.

* : Detection of an analyte at greater than this level will result in further testing, not necessarily rejection for this reuse. Includes the twenty-fold dilution factor during TCLP tests.

** : A screening value below the background value will cause the Resulting Screening Value to be set to background.

*** : Value is for noncancer assessment in accordance with October 1 DTSC comments.

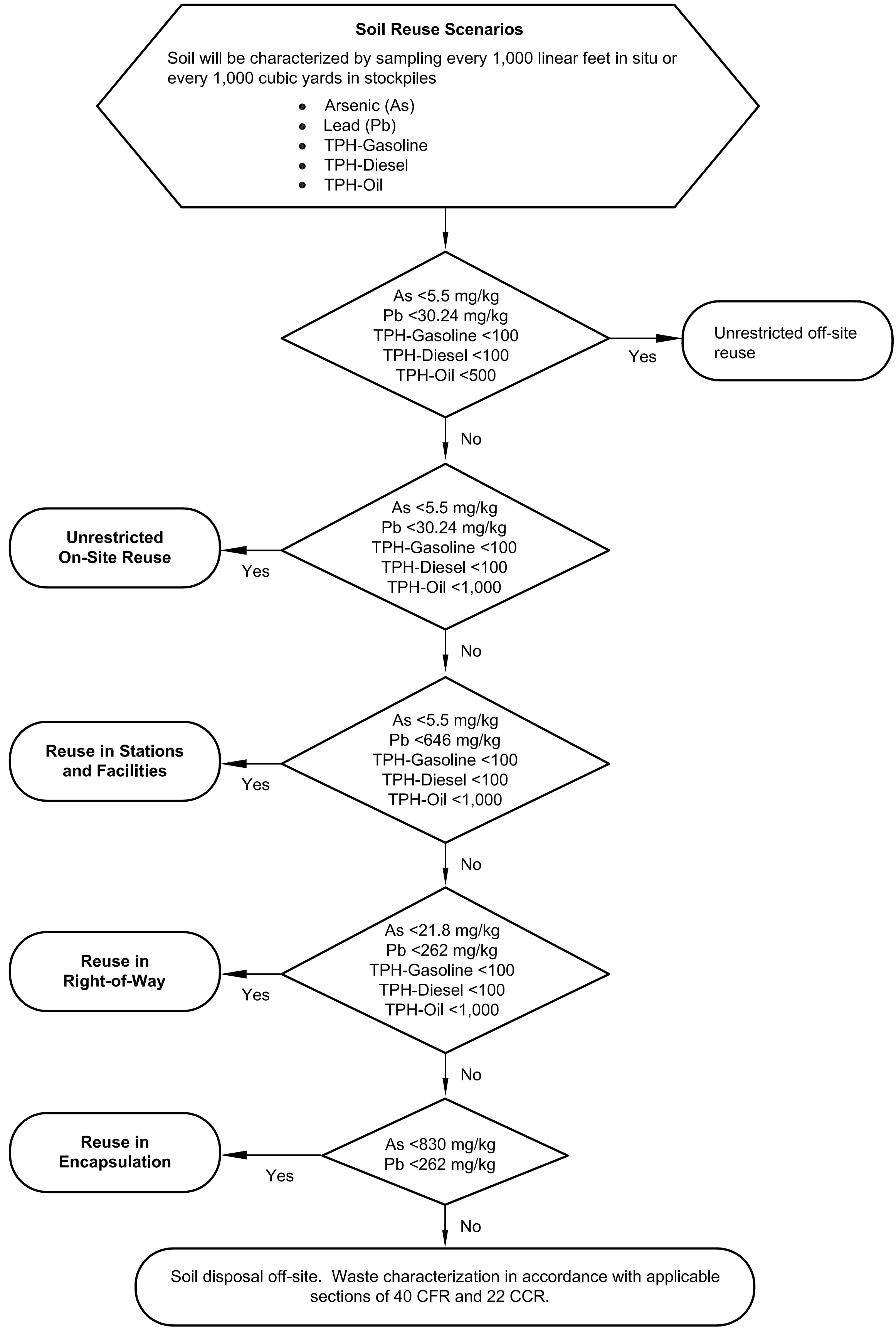

Figure 2 - **Soil Management Flow Chart**

Bart Extension to Milpitas, San Jose, and Santa Clara

- to raise the track elevations in an area, such as to meet BART grade requirements or to reduce the risks of flooding;
- to fill a depression between the two parallel sets of BART tracks,
- to construct replacement UPRR tracks;
- to provide retained fill beneath ramps at parking structures;
- to provide retained fill under approaches to an aerial structure, such as near Berryessa Station; and/or
- to serve as landscaping at stations.

A material will be considered for reuse when it has qualities, including reuse classification and geotechnical parameters, which are appropriate for the considered location and type of reuse. Where possible, material from elsewhere on the SVRT project site will be reused instead of importing new material.

If a material is selected for reuse, it will be transported to the reuse location in accordance with Section 4.3. At the reuse location, the material will be unloaded, amended as necessary such as through moisture conditioning, and placed for reuse. Placement will include air monitoring in accordance with Section 4.6 (unless reuse is unrestricted) and compaction with heavy equipment.

4.2.5.2 Encapsulated Material

Procedures are described below for reuse of appropriately classified soil and ballast material that will be encapsulated in accordance with the Encapsulation reuse scenario.

Situations in which encapsulated material could be used are almost the same as those listed in Section 4.2.5.1 for non-encapsulated material, except that it will not be used for landscaping. Where a material available for reuse has qualities, including reuse classification and geotechnical parameters, which are appropriate for encapsulation at a particular location, it will be considered for encapsulation in that situation. Where possible, material from elsewhere on the SVRT project site will be encapsulated instead of exporting that material and importing new material.

If a material is selected for encapsulation, it will be transported to the encapsulation location in accordance with Section 4.3. At the encapsulation location, the material to be reused will be unloaded and amended as necessary such as through moisture conditioning. Until it is placed in the encapsulation, the material will be stockpiled in accordance with Section 4.5. Once placed in the encapsulation, the material will be compacted with heavy equipment and covered with an impermeable layer. The encapsulation will be design and constructed so it is covered on all exposed sides by at least a 6-inch thickness of clean material. During the encapsulation, air in the area will be monitored in accordance with Section 4.6.

As-built drawings will be prepared for each encapsulation to document that the encapsulations are properly prepared.

4.2.5.3 Material Reuse in an MPZ

One element of the reuse strategy presented in this *CMP* is additional restrictions on soil reuse within 5 feet or of the groundwater table or 50 within of surface waters, as described in Section 4.2.1. If, for example, groundwater is shallower than 5 feet, then that portion of the site is designated a MPZ, and soil is not permitted to be reused if it contains chemicals of concern (COCs) at concentrations that exceed the recommended reuse concentration. This concentration will be based on the RWQCB ESLs (see Section 4.2.4) to protect either groundwater for drinking purposes or surface water to protect aquatic wildlife, as appropriate.

Material reuse will depend on the concentrations of both organic compounds and metals. Whereas the ESLs for organic compounds are available and applicable, it is important to note that the ESLs for metals differ from those for organic compounds in that no provision was made to account for the solubility of each metal and the subsequent reduction in concentration as the metal infiltrates from the soil solution into the groundwater. To account for these factors, the ESLs for metals must be modified by a site-specific dilution attenuation factor (DAF). The method used for this modification involves a site-specific and chemical-specific soil/water partition coefficient (Kd) and groundwater velocity. Although RWQCB intended on incorporating DAFs into their ESLs, this could not be done for metals because a Kd cannot be estimated for metals as it can for organic chemicals, and thus the ESLs for metals lack the DAFs to convert them to site-specific values. For this reason, a site-specific DAF will be estimated for the metal reuse values proposed for this project. Since this is laborious process, this will only be done for the metals and for the necessary situations as they arise. The methodology is presented in Appendix D and includes an example for arsenic using site-specific data from the Line Segment.

4.3 SOIL/BALLAST TRANSPORTATION

This section describes the on-site and off-site transportation modes. Also, included in this section are transportation procedures that are designed to minimize potential health, safety, and environmental risks resulting from the transportation of soil and ballast.

4.3.1 Transportation Modes

Both on-site transportation and off-site transportation may be performed using either trucks or railcars. Material to be transported by truck will be loaded into end-dump trucks or transfer trailer trucks with a capacity up to 16 cy (combined). Material to be delivered by rail will be loaded into UPRR railcars with a 100-ton capacity. All loads will be covered and contained on all sides.

4.3.2 On-Site Transportation

Much of the soil and ballast material excavated during SVRT project construction will be stockpiled or reused on a different area of the project site. Material to be stockpiled will be hauled to one of the designated stockpile locations listed in Section 4.5.1, while material to be reused will be hauled to the appropriate on-site reuse locations.

On-site transportation is defined as the shipment of material from one portion of the project site to another, without crossing the borders of the property owned by VTA, or by only crossing a road dividing property owned by VTA and/or temporary construction easements for the project. On-site transportation will be used exclusively, except under the following conditions:

- The material has been characterized sufficiently for waste classification purposes and determined not to be a hazardous waste;
- The material is a waste being properly shipped for off-site disposal; and
- The material has been sufficiently characterized for reuse and is being transported under a variance to a physically continuous portion of the project (which may be divided by a public right-of-way), as described below.

Consequently, the transportation of excavated material along public streets, highways, or freeways is prohibited unless the material has been properly characterized.

On-site transportation of material will occur primarily in two main areas where large portions of the project site are physically continuous and will be under VTA ownership; the Tunnel Segment separates these two areas. To the east of the Tunnel Segment, one area of continuous property includes:

- The Line Segment along the former UPRR alignment, currently owned by VTA;
- The Montague/Capitol and Berryessa Station campuses, because the property VTA will purchase for these stations will be physically continuous with the Line Segment; and
- Other adjacent properties which will be purchased by VTA in order to widen the ROW or to install support facilities such as traction power substations.

To the west of the Tunnel Segment, the second area of continuous property includes:

- The Maintenance Facility to be located on part of UPRR's Newhall Yard, currently owned by VTA;
- The rail line ROW connecting to the Maintenance Facility, to be purchased by VTA; and

- The Santa Clara Station campus. The property VTA will purchase to construct this station will be physically continuous with the Maintenance Facility.

On-site transportation will involve loading the material into trucks or railcars and covered with plastic, metal or other solid containment on all sides. Trucks or railcars will be appropriately sized to minimize the number of loads or trips. When trucks will be used, generally there will be a fleet of trucks making round trips. When railcars are used, a train of 5 to 9 railcars will travel along existing tracks simultaneously.

For each shipment of impacted material, documentation will include the information included in Section 4.3.7.

Specific hazardous waste transport requirements will be used only when the material would be considered to be hazardous waste, or potentially as hazardous waste. In these cases, the specific hazardous waste transport requirements will include submittal of proof of valid hauler registration, the use of appropriate vehicular placards, and related hazardous waste or hazardous materials transportation requirements detailed in federal, state or local rules and regulations.

Should off-haul of soil classified as waste be required, the material will be transported in accordance with the requirements presented in Section 4.3.3.

4.3.3 Off-Site Transportation

Off-site transportation is defined as the shipment of material in a manner which involves crossing the borders of the property owned by VTA and requires travel along a public or private right-of-way. Off-site transportation will occur when a material is being properly shipped for off-site disposal or under a variance for consolidation or reuse. In some cases, off-site transportation may also be used to transfer material from one discontinuous portion of the project area to another, if the material has been characterized sufficiently for waste classification purposes and determined not to be a hazardous waste.

Whatever the purpose, off-site transportation of waste materials will be conducted in accordance with all federal, state, and local statutes, regulations, and ordinances, including the following:

- 40 CFR Parts 261 to 265;
- 29 CFR Part 1910.120;
- 49 CFR Parts 100 to 199;
- California Health and Safety Code, Chapter 6.5, Articles 6, 6.5 and 8;
- California Vehicle Code Section 2402.1;

- CCR Title 22, Division 4.5, Chapter 12, Article 5;
- CCR Title 22, Division 4.5, Chapter 13, Articles 1-5; and
- CCR Title 8 Section 5192.

For each shipment of impacted material, documentation will include the information included in Section 4.3.7.

4.3.3.1 Potential Destinations

The destination for material being transported from one portion of the site to another via an off-site route will be an appropriate stockpile area or reuse area. To comply with federal and state law, hazardous or potentially hazardous wastes will not be transported from one portion of the site to another via an off-site route, unless done so under an appropriate variance approved by DTSC or under other special conditions granted by DTSC for transportation of such material.

Wastes being properly shipped for off-site disposal may have a variety of destinations. Most hazardous wastes (RCRA hazardous or non-RCRA hazardous), will be shipped via railcar to the RCRA-permitted East Carbon Development Corporation (ECDC) Solid Waste Disposal Facility in East Carbon City, Utah. Other hazardous wastes may be shipped via truck to facilities such as the RCRA-permitted Kettleman Hills Facility, owned by Chemical Waste Management (CWM), in Kettleman City, California. Wastes classified as non-hazardous wastes may be delivered to facilities such as:

- Altamont Landfill in Livermore (Waste Management);
- Vasco Road Facility in Livermore (Republic Services);
- Forward Landfill in Manteca (Allied Waste); and
- Newby Island Landfill in Milpitas (Allied Waste).

As long as the waste is accepted for disposal by the selected destination facilities and the requirements described in this *CMP* are met, the project construction contractors will choose the specific destination facilities, pending approval of the facility by VTA.

4.3.3.2 Transportation Routes

After railcars leave the site, railcar travel routes to the ECDC facility will be determined by rail transport provider. For the Line Segment portion of the SVRT project, UPRR will be solely responsible for the safe transport of impacted materials along their railroad tracks to the ECDC facility. For other portions of the SVRT project, such as Yard and Shops Segment that includes a planned maintenance facility at the former

UPRR Newhall Yard, there may be another rail transport provider, depending on selection by VTA and/or the earthwork contractor.

Trucks will only enter or exit the site from specified points. Based on the *Final EIR*, these locations will be at East Warren Avenue (Fremont), at Kato Road (Fremont), at Dixon Landing Road (Milpitas), at Montague Expressway (Milpitas), at Hostetter Road (San Jose), at Berryessa Road (San Jose), at East Julian Street/McKee Road (San Jose), at $3^{rd}/4^{th}$ Streets/Notre Dame Street/St. James Street (San Jose), at Autumn/Montgomery Streets (San Jose), and at Hedding Street/Coleman Avenue (San Jose). The more detailed project design in the future may expand this list of trucking starting points.

Routes for trucks carrying material between one portion of the site and another will enter or exit from the specified starting points. Permissible truck routes between the specified starting points will be detailed in the plans and specifications that will govern construction. These routes will be determined by VTA after discussion with local city officials and other interested parties, such as community organizations.

Similarly, local routes from these specified starting points to freeways will be determined by VTA after discussion with local city officials and other interested parties. Trucks will enter one of three freeways, Highway 101, Interstate 680 and/or Interstate 880, depending on their starting point within the project alignment. Once on a freeway, trucks carrying material for off-site disposal will follow one of the routes described below:

- **Transportation Route to Kettleman Hills Facility in Kettleman City, California:** Trucks entering the freeway on Interstate 880 or Interstate 680 will turn onto Highway 101 south, and follow Highway 101 until connecting to eastbound Highway 152 in Gilroy. From there, they will follow Highway 152 east to Interstate 5, then go south on Interstate 5 towards Kettleman City. In Kettleman City, the trucks will take State Route 41 westbound, turning on Old Skyline Road and finally into the CWM disposal facility.

- **Transportation Route to Altamont Facility in Livermore, California:** Trucks entering the freeway on Highway 101 will turn onto Interstate 880 north, and follow Interstate 880 to the Mission Boulevard exit. They will then take Mission Boulevard east to Interstate 680. From there, they will follow Interstate 680 north to Interstate 280, and Interstate 280 east to the Greenville Road/Altamont Pass exit. Trucks will then proceed approximately 3.5 miles up Altamont Pass Road to the disposal facility.

- **Transportation Route to Vasco Road Facility in Livermore, California:** Trucks entering the freeway on Highway 101 will turn onto Interstate 880 north, and follow Interstate 880 to the Mission

Boulevard exit. They will then take Mission Boulevard east to Interstate 680. From there, they will follow Interstate 680 north to Interstate 280, and Interstate 280 east to the Vasco Road exit. Trucks will then proceed approximately 3.5 miles up Altamont Pass Road to the disposal facility. Trucks will proceed approximately 2.5 miles north on Vasco Road to the disposal facility.

- **Transportation Route to Forward Landfill in Manteca, California:** Trucks entering the freeway on Highway 101 will turn onto Interstate 880 north, and follow Interstate 880 to the Mission Boulevard exit. They will then take Mission Boulevard east to Interstate 680. From there, they will follow Interstate 680 north to Interstate 280, Interstate 280 east to Interstate 205, and Interstate 205 east to Interstate 5. Trucks will then proceed north on Interstate 5 until reaching the Roth Road exit, take Roth Road east to Airport Way, and Airport Way north to French Camp Road. Finally, trucks will follow French Camp Road east to South Austin Road, and South Austin Road north approximately 2 miles to the disposal facility.

- **Transportation Route to Newby Island Landfill in Milpitas, California:** Trucks will make their way to the Dixon Landing Road exit of Interstate 880. Depending on the starting location of the truck, this may entail driving either north or south on Interstate 880. Trucks will exit at the Dixon Landing Road exit and proceed approximately 0.1 miles west to the disposal facility.

4.3.4 Loading and Traffic Control Procedures

Railcars: Loading of material into railcars will involve scooping into the stockpile using a front-end loader and loading the soil directly into the railcars. Only stockpiled and characterized material is expected to be loaded into railcars. Dust control measures, including spraying of water, will be performed as necessary during the loading operation. All railcars will leave the site under UPRR's proven railroad traffic control procedures, and therefore, no additional traffic control procedures will be required while shipping material by railcar.

Trucks: Loading and traffic control procedures for trucks are more detailed. Material will be loaded into transport trucks using an excavator, backhoe or front-end loader. Dust control measures, including spraying of water, will be performed as necessary during the loading operation. After loading, trucks will proceed to a truck decontamination zone where contaminated soil will be removed from the trucks by scraping and brushing the tires, and where all soil loads will be tarped. The scraped spoils will be combined with excavated contaminated soils and stored for disposal.

Traffic control while shipping material off-site via truck will depend mainly on site conditions encountered at the time of transportation. Conditions will vary with the specified departure point and the time of day. Flagmen will be utilized as necessary to ensure safe and regulated flow of disposal trucks, machinery, vehicles, and pedestrian traffic. This is expected to involve adherence to traffic control plans pre-approved by the local city governments.

4.3.5 Transportation Health and Safety

All workers transporting contaminated and hazardous materials must be properly trained in hazardous waste operations in accordance with 29 CFR Part 1910.120 and 8 CCR Section 5192. Specifically, all transporters must have 40 hours of off-site training and 8 hours of annual refresher training.

4.3.6 Transportation Contingency Plan

In the event of an emergency or situation of imminent hazard, the Site Safety Officer will dial 911. However, the following is a list of emergency service organizations in the order of notification:

- Fire Department/Police Department/Ambulance Services - 911; and
- California Highway Patrol - 911 or (510) 450-3821 or (707) 648-5550.

The following emergency response organizations may be called if necessary:

- TSCA Hotline - (800) 424-9065;
- National Response Center - (800) 424-8802;
- Poison Control Center - (800) 962-1253; and
- Cal/OSHA - (415) 557-1677.

Within 24 hours, if an unauthorized spill or discharge of contaminated soils or water occurs, the Site Safety Officer must notify the following organizations:

- RWQCB (Vince Christian) - (510) 622-2336;
- DTSC (Lynn Nakashima) - (510) 540-3839;
- VTA (Wes Toy) - (408) 321-5835; and
- The construction contractor, with contact person to be determined.

4.3.7 Transportation Record Keeping

Daily field notes will be kept by the Contractor's project manager or designee. For each shipment of impacted material, documentation in the daily log will include:

- Source location of the soil;
- Reuse classification of the soil, if characterized;
- Date and time of loading for each truck or railcar;
- Transport company and unique truck/railcar identifier (e.g., truck license plate number or railcar number);
- Approximate volume of each truck or railcar load; and
- Destination of the soil.

For each shipment to another on-site location, documentation in the daily log will also include:

- Date of unloading.

For each shipment to an off-site location, documentation retained by the contractor will also include:

- Load-specific shipping papers (e.g., bill of lading, non-hazardous waste manifest or hazardous waste manifest).

For each shipment of hazardous waste to an off-site facility, documentation retained by the contractor will include:

- A Uniform Hazardous Waste Manifest (U.S. EPA Form 8700-22 DHS 8022A), completed in full in accordance with the hazardous waste classification assigned to the material on the disposal facility's waste profile. Prior to shipment, the Uniform Hazardous Waste Manifest will be signed by a VTA representative (as the Generator) and the driver for the licensed transporter. Upon arrival at the disposal facility, the manifest for the load will be signed by a representative of the disposal facility. Each party will mail the proper copies of the form to the DTSC in order to allow proper "cradle-to-grave" tracking of the hazardous waste shipment.

4.4 SOIL/BALLAST DISPOSAL

Soil which contains chemical constituents at levels greater than acceptable for all of the reuse scenarios described in Section 4.2.3 will be disposed of off-site at an appropriate disposal facility. Some soil acceptable for reuse may also be disposed off-site after characterization, depending volume constraints to on-site reuse.

Off-site soil disposal will be in accordance with all appropriate federal, state and local regulations, including the Uniform Hazardous Waste Manifest standards detailed in Section 4.3.7.

Prior to disposal, waste will be classified for proper disposal in accordance with appropriate regulations (e.g., 22 CCR 66261). Analytical results supporting the waste classification documentation will be provided to the disposal facility, and the disposal facility will confirm that they are legally allowed to accept the specific waste through issuance of a Waste Profile.

Separate disposal facilities will be used for different types of contaminants and different classifications of waste, such as clean fill, designated waste, California (non-RCRA) hazardous waste, and RCRA hazardous waste. Appropriate disposal facilities include all appropriately licensed facilities, including those listed in Section 4.3.3.1, pending ultimate approval by VTA.

4.5 SOIL/BALLAST STOCKPILING

Due to physical space limitations, the sequencing of work, the proximity of sensitive receptors, and/or the net balance of the fill/cut of a given segment, material from a project area may be removed from and transported to a stockpile location within the project boundary while awaiting either reuse or off-site disposal. Stockpile locations are listed in Section 4.5.1. If the material has not been adequately characterized, or has been shown to contain chemicals of concern such that it is not suitable for unrestricted reuse, the material will be handled using the procedures in this section.

Limitations on stockpiling are discussed in the following subsections. These limitations are not intended to apply in the following circumstances:

- Material which has been adequately characterized and found suitable for unrestricted on-site or off-site reuse, which may be placed in any portion of the project site acceptable to VTA.
- Imported clean fill material.
- Smaller volumes of soil or ballast approved for reuse which are temporarily placed beside their reuse location. Note that this is considered part of the fill process, instead of stockpiling.
- Small, temporary windrows associated with grading or utility work within the immediate vicinity of an excavation or work area. Note that these are considered part of the grading or trenching activity, instead of stockpiling.

4.5.1 Stockpile Locations

VTA has identified a number of locations within the project site for construction staging, as identified on *Final EIR* page 4.19-33. These areas may also be used for the stockpiling of relatively large volumes of soil and ballast. Six areas linked by the former UP rail corridor, allowing on-site transportation (see Section 4.3.2) between these stockpile areas, are as follows:

- Six acres south of East Warren Avenue, east of the rail corridor.
- Two acres between Railroad Court and the rail corridor south of the Abel Street overcrossing.
- Four acres adjoining the rail corridor south of the Abel Street overcrossing.
- Eighteen acres which will house the Montague / Capitol Station campus, on either side of the rail corridor south of Montague Expressway.

- Seventeen acres which will house the Berryessa Station campus, on either side of the rail corridor north of Mabury Road.
- Nineteen acres which will house the Alum Rock Station campus, west of Highway 101 and south of East Julian Street.

VTA has also identified three potential stockpile areas along the tunnel segment in downtown San Jose, each of which might become an entrance to an underground station. As these areas are not linked by rail corridors, the distance over which on-site transportation can be conducted at these areas will be severely reduced:

- Two-plus acres northwest of 5th and East Santa Clara Streets.
- 0.72 acres northeast and southwest of the intersection of Market and East Santa Clara Streets.
- Five acres south of West Santa Clara Street, on either side of Montgomery Street.

Finally, VTA has identified two potential large-scale stockpile areas near the Maintenance Facility and the Santa Clara Station which are connected by the UPRR rail corridor. On-site transportation between these locations is feasible:

- Thirteen acres on either side of Interstate 880, east of the rail corridor.
- Nine acres on the east side of the rail corridor, north of Brokaw Road.

Furthermore, additional large-scale soil/ballast storage sites may be needed during construction. If additional storage sites prove necessary, VTA will work with the RWQCB and DTSC at that time to determine the related storage issues for these sites.

In addition, a number of smaller storage sites adjacent to reuse locations may be used temporarily to store material prior to its reuse.

4.5.2 Stockpile Location Security

The soil/ballast stockpiling locations will be fenced to discourage public access. Chain link fencing will be used along the portions of the site facing public streets, while either chain link fencing or plastic snow fencing will be used as needed along the currently open site boundaries adjacent to private properties. Fencing will not extend across the active rail safety envelope.

Signs prohibiting trespassing will be posted at public entrance points and in areas such as the rail safety envelope where fencing is not feasible. The signs will contain the name and number to contact in the event of an emergency, a representative of the construction contractor firm.

4.5.3 Unloading

As discussed in Section 4.3.2, on-site transportation of material will be via trucks or railcars.

End dump trucks with a capacity up to 16 cy (combined) will be the typical truck used to bring material to the stockpile sites. Fleets of trucks will circulate along defined haul roads between the loading site and the stockpile area. Loading and decontamination of these trucks will be as detailed in Section 4.3.4. Once in the stockpile area, the end dump trucks will drop their loads. Soil and ballast will be cleared from the operating envelope and stockpiled by bulldozers or similar equipment operated by the VTA construction contractor(s).

When railcars are used to transport material, they will be in a worktrain generally consisting of 5 to 9 railcars with 100 ton capacity operated by a UPRR employee. The railcars will be either standard gondolas or rotary-dump gondolas. Material will be unloaded directly from the worktrain at the stockpile site. A tracked excavator and/or car-topper (backhoe) will be used to unload standard gondolas, while the rotary-dump gondolas will unload using their built-in rotary mechanism. Soil and ballast will be cleared from the operating envelope and stockpiled by bulldozers or similar equipment operated by UPRR and/or the VTA construction contractor.

4.5.4 Stockpiling Procedures

One key procedure during stockpiling is that material from separate data populations not be mixed unless the material has been fully characterized and shown to be equivalent for the purposes of reuse or disposal.

A second key procedure is that a stockpile record keeping system will be used for all stockpiled material. The stockpile record keeping system will include:

- the designated data population for the material;
- the reuse classification of that data population;
- the approximate quantity (volume) of the material;
- documentation that the material belongs to the stated data population, in the form of material transport records (from the transportation record keeping system described in Section 4.3.7) for all shipments placed in the stockpile;
- any possible previous temporary stockpile locations for the material; and
- the ultimate reuse or disposal location, based on the characterization results.

For stockpiled material intended for off-site disposal, the stockpile record keeping system will also include the sampling and analytical results for samples used to profile the material for off-site disposal.

Additional stockpiling procedures include the following:

- Stockpile erosion and run-on/runoff will be managed using standard BMPs to avoid migration of sediment into the storm drains or surface waters.
- The soil will be stockpiled in a manner that facilitates the segregation of 1,000 cy subsections.
- A silt fence will be constructed around the perimeter of the stockpile area to mitigate migration of sediment into the storm drains or surface waters.
- Saturated soils, if any, will first be placed on 10-mil plastic sheeting.
- A commercial, non-petroleum-based dust palliative or hydroseeding will be applied to stockpiles within 30 days of placement to minimize the migration of airborne dust.
- Soils classified as appropriate for the Right-of-Way Reuse Scenario or the Encapsulation Reuse Scenario or classified as waste for disposal will be covered with 10-mil plastic sheeting. Sheeting will be anchored to prevent removal by the wind.
- After receipt of sample results, separate stockpiles may be consolidated into larger piles consistent with potential reuse criteria and space constraints.
- The dimensions of any single soil stockpile will be not greater than 1,000 feet long by 50 feet wide and 15 feet high.

Waste soil containing constituents at levels that would classify it as a California (non--RCRA) hazardous waste shall be stored in accordance with California Health and Safety Code section 25123.3(b)(4)(B) as follows:

1. The stockpiled soil will not contain free liquids.
2. The soil will be placed on 20-mil high-density polyethylene (HDPE) that is supported by a foundation.
3. VTA and its earthwork contractor(s) will provide controls for windblown dispersion and precipitation runoff and run-on, consistent with BMPs and any RWQCB storm water permit requirements.
4. The stockpile site will be inspected weekly and after storms to ensure that the controls for windblown dispersion and precipitation runoff and run-on are functioning properly.
5. Following final stockpile removal, VTA will inspect the non-RCRA hazardous soil stockpile sites for residual contamination and remediate as necessary.
6. The non-RCRA hazardous soil will be removed from the site within 90 days of stockpile completion and disposed of at an appropriate disposal facility.

Waste soil containing constituents at levels that would classify it as a RCRA hazardous waste shall be stored in accordance with the CFR. The DTSC and RWQCB will be notified and the waste will be managed in accordance with CFR requirements.

4.6 AIR MONITORING

Track realignment, station construction, retained cut construction and related construction activities at the site have the potential to expose site workers and the public within the surrounding community to chemicals of concern (COCs) via airborne contamination. Exposures are possible via two pathways, the volatilization of contaminants into ambient air and the movement of airborne dust containing contaminants. An air quality monitoring program will be implemented during the excavation activities, particularly in the areas where potential elevated concentrations of COCs have been detected to ensure that work practices are not creating an unacceptable health risk to construction workers and public. The air monitoring program details action levels for total particulates that require respiratory protection, implementation of engineering controls, and ultimately work stoppage. The air monitoring program will include collecting the following information:

- Real-time air data to determine if modifications to engineering control practices and/or personal protective equipment (PPE) are necessary for a safe on-site working environment, and to prevent potential off-site migration of COCs;
- Personal monitoring data and ambient concentrations of potential lead (Pb) and arsenic (As) contaminated particulates prior to and concurrent with site excavation activities. Measured pollutant concentrations will be compared to established action levels (in Section 4.6.1) to verify that site workers will not be exposed to these COCs at unacceptable levels. These data can also be used to adjust PPE, as appropriate; and
- Air samples at site fence-line ambient air quality monitoring stations to verify that COCs will not migrate off-site during the excavation activities.

In the areas of potential presence of hazardous waste, site workers will wear Level C PPE during the initial phases of the excavation activities, including coveralls, boots, gloves, and respiratory protection with cartridges that filter those COCs detected in the soil in specific excavation areas. The respiratory protection will continue until sufficient personal air monitoring data is available to verify that the applied engineering controls are providing adequate protection.

4.6.1 Action Levels

This section summarizes the air action levels for the project, and provides a comparison of these levels against levels of COCs that are anticipated to occur in the air during the excavation activities.

4.6.1.1 Determination of Action Levels

Permissible exposure limits (PELs) for arsenic and lead for site workers have been provided in **Table 8** below in terms of particulates for comparison against the mini-RAM data, as well as chemical concentrations for comparison against the personal air monitoring and perimeter air monitoring data.

Table 8 - Permissible Exposure Limits (PELs) for COCs

Analyte	Permissible Exposure Limit (mg/m^3)
Arsenic	0.01
Lead	0.05

TPH does not have a published PEL. Air monitoring for TPH will be using mini-RAM particulate monitoring for nuisance dust.

4.6.1.2 Estimation of Maximum Air Concentrations

The following discusses maximum air concentrations of COCs expected at the site, and action levels for real-time particulate monitoring and chemical specific laboratory analysis.

Real-Time Particulate Monitoring

The California Department of Occupational Safety and Hazard Assessment (Cal-OSHA) has set a limit of 10 milligrams per cubic meter (mg/m^3) for nuisance particulate dust in areas where workers may be exposed. At levels above this limit, PPE is necessary to prevent unacceptable exposure. If this concentration of particulates is detected, engineering controls (dust suppression using water or soil stabilizers or delayed work) will be implemented to reduce particulate concentrations and site workers will be required to use PPE until dust levels can be reduced. Note that work may continue in the work areas with levels above 10 mg/m^3 if appropriate PPE can prevent unacceptable exposures.

The DTSC has established a limit of 50 micrograms per cubic meter ($\mu g/m^3$) above background concentrations for off-site dust emissions during excavation-type activities in the San Francisco Bay Area. No site work can continue if this limit is exceeded regardless of the PPE used by the on-site workers. If particulate concentrations are detected at 50 $\mu g/m^3$ (or more) above background concentrations at the property boundaries, additional engineering controls will be implemented to further reduce dust concentrations (e.g., increasing dust control water usage). Work will stop if engineering controls cannot suppress dust emissions below the limit set by DTSC.

Maximum Anticipated Concentration of COCs in Air

In addition to overall particulate concentrations, a second factor to be considered is the individual concentrations of COCs that may be present in the particulates. The equation below was used to estimate the maximum potential concentrations of COCs in air that may occur at the site during excavation activities. This equation was taken from the Preliminary Endangerment Assessment Guidance Manual, State of California Environmental Protection Agency, Department of Toxic Substances Control, June 1999, Figure 2.8.

Equation 1: $C_A = (C_S \times F)$

Where:

C_A = Estimated Concentration in the Air (mg/m^3)
C_S = Concentration in the Soil (mg/kg)
F = $5x10^{-8}$ – DTSC Factor (kg/m^3)

The DTSC factor combines two simplifying and conservative assumptions;

- Ambient air particulates are equal to the National Ambient Air Quality Standard for the annual average respirable portion (PM_{10}) of suspended particulate matter present at a concentration of 50 $\mu g/m^3$ (0.05 mg/m^3)
- 100% of the particulates have the same contaminant concentration (non-VOC only) as the maximum soil value.

Table 9 lists the maximum concentrations of each COC expected to occur in the air during excavation activities. The maximum anticipated air concentrations are calculated for both the site perimeter areas (F=50 $\mu g/m^3$ in Equation 1) and for work areas (F=10 mg/m^3 in Equation 1).

Table 9: Estimation of Expected Maximum Concentrations of COCs in Air

Constituent	C_S Maximum Concentration in Soil (mg/kg)	C_A Estimated Maximum Concentration in Air at Dust Level of 50 $\mu g/m^3$ (mg/m^3)	C_A Estimated Maximum Concentration in Air at Dust Level of 10 mg/m^3 (mg/m^3)
Arsenic	730	3.7E-05	7.3E-03
Lead	2900	1.5E-04	2.94E-02

Real-Time Particulate Monitoring Action Levels

The real-time monitoring action levels (ALc) are presented in **Table 10** and are based on Equation 2 below. The ALc estimates the COC concentrations in the air at which PELs will be reached or exceeded. As discussed earlier, characterization of the COC concentrations in the soil at the site has been extensive. Therefore, it is assumed that the maximum concentrations in the soil at the site are known and it is conservative to use the maximum concentration detected in soil to represent average site concentrations for the health and safety purposes.

Table 10: Action Levels

Constituent	C_A Estimated Maximum Concentration in Air at Dust Level of 10 m^3 (mg/m^3)	Permissible Exposure Levels (mg/m^3)	AL_C Real-Time Monitoring Action Level for Total Particulates in Air (mg/m^3)
Arsenic	730	0.01	274
Lead	2900	0.05	17.2

Equation 2: $$AL_c = \left(\frac{PEL}{\left(\frac{C_S}{1{,}000{,}000} \right)} \right)$$

Where:

AL_C = Calculated Action Level (mg/m^3)
PEL = Permissible Exposure Limit (mg/m^3)
C_S = Estimated Maximum Concentration in Soil (mg/kg)

Maximum expected air concentrations that are based on the 10 mg/m^3 concentration for on-site nuisance dust will be used for comparison against permissible exposure levels (PELs). The PELs are taken from Table AC-1, Permissible Exposure Limits For Chemical Contaminants, California OSHA.

The estimated AL_C levels presented in Table 10 indicate that the safe levels for individual site COCs are greater than the OSHA nuisance limit of 10 mg/m^3. These data suggest that, provided the real-time particulate levels remain below the OSHA nuisance limit, individual chemical action levels in air will not be exceeded. In each case, the estimated maximum concentrations of COCs in the air (C_A in Table 9) are below the individual constituent PELs under the 10 mg/m^3 particulate concentration conditions for both work areas and site perimeter areas. This calculation indicates that estimated maximum concentrations of COCs are not expected to exceed safe levels in the work areas or at the site perimeter during the excavation activities. Both site perimeter and personal air monitoring are included in this plan as conservative measures to document site conditions during the excavation activities, and to ensure no unacceptable exposures occur.

Table 11 below summarizes the action levels that will be used during the excavation project that will be monitored with real time measuring equipment (such as a mini-RAM) and the subsequent actions to be taken.

Table 11: Action Level Summary

Analyte	Action Level	Action
Particulate at site worker breathing zone (as measured by a mini-Ram or other direct read instrument)	10 mg/m^3	PPE (including respirators) will be required and engineering controls will be increased
Total particulate perimeter concentrations 50μg/m^3 above background concentrations (as measured by a mini-Ram or other direct read instrument and calculated as the difference between the downwind reading and the upwind reading)	50 μg/m^3	Work will stop until engineering controls are sufficient to bring the measured concentration below the action level.

4.6.2 Meteorological Monitoring

Meteorological data will be collected on-site starting one week before excavation activities commence. The parameters that will be collected include wind speed and wind direction. These data will be collected through the use of a meteorological tower and data logger that will be erected at a height that is suitable for the excavation at the site. Measurements will be taken hourly and logged to the data logger. These data will be used to refine the present understanding of wind direction at the site. Wind speeds will be periodically reviewed during the day to assess whether the wind is blowing greater than 25 miles per hour (mph). Wind speed in excess of 25 mph may trigger immediate modification of work practices if there is a potential to release dust into the air.

Wind roses generated from the collected meteorological data will allow the determination of "downwind" and "upwind" samples. Upwind samples will be assumed to represent background conditions, and downwind samples will be assumed to identify and quantify the migration of COCs at the site.

4.6.3 Real-Time and Personal Air Monitoring

The primary purpose of the real-time and personal air monitoring is to ensure worker health and safety. During excavation, personal air monitoring will be conducted on a minimum of two personnel. Air sampling and analysis will be completed for the specific COCs detected in the soil in each remedial area.

4.6.3.1 Real-Time Air Monitoring

The mini-RAM data will be used to verify in real-time that particulate levels remain below particulate chemical action levels (AL_C) in worker areas. Real-time air measurements will be collected every one-half hour in active work areas. The ceiling limit for donning PPE prior to continuing work is 10 mg/m^3.

The mini-RAM will also be used to collect real-time data at the site perimeter on a regular basis to determine particulate levels. At a minimum, mini-RAM measurements will be collected at one-hour increments along the site perimeter in the areas of active soil disturbance. If the 50 $\mu g/m^3$ ceiling limit is exceeded at the site perimeter, work will be stopped immediately and additional engineering controls will be implemented to control off-site dust emissions. If engineering controls are not capable of controlling emissions to acceptable levels, work will stop in these areas until conditions are favorable to resume excavation activities.

In some cases, engineering controls such as water spray may not be capable of maintaining dust levels below action levels in all work areas, but may be able to maintain perimeter dust levels below the 50 $\mu g/m^3$ limit for off-site emissions due to sufficient dispersion and dilution between excavation areas and the site perimeter. In this case, excavation work may continue, as long as proper PPE (such as full-face respirators and particulate filters) will be used to prevent unacceptable exposures. Modifications to PPE will be used as a last resort after all engineering control methods have been implemented. In addition, prior to implementing additional PPE requirements, VTA and its contractor(s) will evaluate whether stopping work in these areas is appropriate.

4.6.3.2 Personal Air Sampling Equipment and Methods

Personal air sampling will be performed through the use of personal air sampling pumps used in conjunction with various sampling media. A calibrated personal sample pump of a known flow rate is usually worn on the belt. The pump is connected to the sampling media by plastic tubing. The media (filter cassettes, adsorbent tubes, etc.) is usually placed on the lapel of the shirt or in the shirt pocket, and should be six to nine inches away from the nose and mouth. This arrangement can then draw samples from the individuals breathing zone.

Sampling for arsenic and lead will be performed using one SKC Filter Cassette (part no. 225-3-01 or equivalent). This is a Mixed Cellulose Ester (MCE) filter that can be used to simultaneously sample the two different metals.

Table 12 below summarizes the personal air sampling to be performed at the site. The laboratory analyses will be performed a California-certified laboratory. These analyses are expected to take no longer than five working days (rush analysis).

Table 12: Personal Sampling

Analyte	Sampling Equipment	Analytical Methods	Method Detection Limits
Arsenic and Lead	MCE Filter Cassette	NMAM 7300	0.005 mg/m^3

Table 12 also presents the minimum detection limit for the proposed analytical method. The detection limit is well below the action levels listed in Table 9, and will provide sufficiently accurate information for comparison against the action levels.

4.6.4 Site Perimeter Air Monitoring

The purpose of the site perimeter air monitoring is to monitor and record the levels of COCs in dust at the site perimeter, and to prevent the off-site migration of significant levels of COCs. There will be three ambient air monitoring locations around the boundary of the specific excavation area. Each monitoring site will include a high volume Polyurethane Foam (PUF) sampler with a quartz filter.

4.6.4.1 Station Location Selection

Ambient air monitors will be placed at three locations at the site boundary. Locations of monitoring station will be determined by assessing where the most sensitive receptors are relative to the site, and where site excavation activities are expected to occur, as well as the probable prevailing wind direction.

The following summarizes the rationale for each perimeter air sampling location:

- Sampler No. 1 – Provides monitoring in anticipated up-wind direction.
- Sampler No. 2 and No.3- Provides monitoring in anticipated down-wind direction from the excavation area, and data between areas of excavation activities and potential off-site receptors.

4.6.4.2 Ambient Air Monitoring Equipment and Methods

Daily ambient air sampling will be performed for arsenic and lead using a high volume Polyurethane Foam (PUF) sampler. The PUF sampler is a High Volume Polyurethane Foam (PUF) Sampling, and consists primarily of a particulate filter, and a PUF cartridge mounted in the sampler head. The head sits on a high volume air pump that can draw air through the sample head, filter and PUF sample, at a rate of 100 to 250 liters per minute (L/min). The following equipment will be used:

- Quartz filter – SKC product number 225-1821 or equivalent. Diameter is 102 mm and can be used in temperatures up to 1000 C.
- High Volume PUF Tube – SKC product number 226-131 or equivalent, 75 mm.
- Sample Head – SKC product number 228-510 or equivalent.
- High Volume Air Sampler – SKC product number 228-250 or equivalent, 120 V, 60 Hz, capable of flows between 100 and 250 L/min.

The PUF sampler draws the ambient air through a filter that collects the airborne particulate matter. The air stream then passes through the quartz filter, where arsenic and lead in particulate form will be collected. Analysis for these metals will be performed using Inductive Coupled Plasma (ICP) Spectrography or equivalent method performed by a California-certified laboratory. The laboratory will receive the entire PUF sample from the field. A small "punch" approximately 38 mm in diameter will be taken out of the quartz filter for use in the ICP analysis. The lab will use NIOSH Manual of Analytical Methods (NMAM) Test Method 7300, "Elements by ICP," or an equivalent method to analyze the metals (with detection limits on the order of nanograms per m^3).

4.6.4.3 Background Determination

During the week prior to work beginning at the site, air sampling will be conducted to establish baseline conditions. The baseline sampling will be performed for 3 days prior to the commencing of excavation. On each day of baseline sampling, the upwind PUF sampler will be operated for a minimum of 8 hours. A reasonable average of the results of the baseline sampling will be assumed to represent background levels of COCs in ambient air. Any concentrations measured in excess of the upwind background concentrations will be assumed to have resulted from the soil excavation activities. Due to variability in weekly ambient concentrations, baseline data will be used in cases where upwind concentrations are not adequate due to anomalous conditions at the site or for additional characterization of the measured upwind concentrations.

4.6.4.4 Monitoring Schedule

Site perimeter air monitoring will commence the week prior to the start of excavation activities. After excavation activities commence, site perimeter air monitoring will be conducted every day during the first week of soil excavation and grading. Once the analytical data has been received and reviewed, the monitoring schedule may be altered to a less frequent period if the analytical results show that all measured concentrations of COCs are reasonably below PELs (ie, less than 50% of the PELs). Daily ambient sampling times will coincide with excavation activities, which are presently estimated to occur between 7:00 A.M. and 8:00 P.M. If excavation activities cease for the remainder of the day at times earlier that 8:00 P.M., then ambient sampling may also be stopped for that day.

5.0 GROUNDWATER MITIGATION MEASURES

Dewatering of the shallow groundwater zone (approximately 20 and 30 feet bgs) will be required during excavation activities, but not limited to the following: along retained cuts, at below grade stations, and at support structures for aerial sections. The earthwork contractor will conduct dewatering activities within the excavation limits either by utilizing a well-based dewatering system and/or by pumping from the excavation using trash pumps in low spots. Before initiating construction activities, the earthwork contractor will conduct a preliminary estimate of the volume of groundwater that needs to be extracted for a specific construction activity and will determine the appropriate dewatering method.

It is anticipated that the groundwater encountered during excavation activities will contain contaminants that will require remediation prior to discharge in order to meet requirements of relevant discharge permits. Based on available analytical data for the project corridor, groundwater containing metals (arsenic, lead, selenium, and chromium), chlorinated solvents (including PCE and TCE), and/or total petroleum hydrocarbons may be present in planned excavation areas along the project corridor, as described in Section 2.4.2.

Additional details on groundwater characterization and groundwater treatment and discharge, including relevant requirements, are provided below.

5.1 GROUNDWATER CHARACTERIZATION

The mobility and lateral variation of groundwater contamination will not allow the anticipated dewatering mechanisms to adequately segregate clean groundwater from contaminated groundwater. Therefore, all extracted groundwater should be considered as potentially impacted and thus will require characterization to determine the appropriate treatment requirements for discharge/disposal. Groundwater characterization will be performed in accordance with the discharge permit requirements or off-site facility acceptance requirements, depending on the method selected for discharge (see Section 5.2 below).

5.2 GROUNDWATER TREATMENT AND DISCHARGE

All water removed during dewatering activities will be collected and managed for disposal in compliance with requirements of governmental permits when required. The earthwork contractor, with all the necessary permits, will manage water removed from on-site work areas. Typically, groundwater extracted during dewatering is handled as follows:

- Discharge to the local sanitary sewer system;
- Discharge to the storm drain system; and/or
- Contained and disposed at an appropriately permitted off-site facility.

Aboveground treatment of the extracted groundwater, such as by gravity sedimentation followed with activated carbon adsorption using granular activated carbon (GAC) vessels will be performed prior to discharge. Removal of metals may be required based on permit conditions, dewatering rates, and concentrations of metals encountered during the dewatering.

Discharge of treated dewatering groundwater to the local sanitary sewer system will be regulated either by the Union Sanitary District in the City of Fremont or by the San Jose/Santa Clara Water Pollution Control Plant for the Cities of Milpitas, San Jose, and Santa Clara.

Discharge of treated dewatering groundwater to the storm drain system is regulated by the RWQCB, under a National Pollutant Discharge Elimination System (NPDES) general permit. VTA anticipates discharge under Order No. R2-2004-0055, for the discharge of extracted and treated groundwater. The Contractor will apply for the NPDES permit from the RWQCB. The earthwork contractor will also meet the substantive requirements for discharge of storm water runoff associated with construction activity. This includes the preparation of a Storm Water Pollution Prevention Plan with associated BMPs, as described in Section 7 of the Standard Specifications, City of San Jose Department of Public Works, July 1992, and substantive requirements of NPDES permit Order No. R2-2004-0055. Regular system sampling and reporting is required under any NPDES permit. Solids and spent carbon generated from the dewatering system must be handled and disposed of in accordance with appropriate and relevant state and federal regulations. The earthwork contractor will be responsible for system operation, maintenance, sampling and reporting as required by the NPDES permit.

6.0 BUILDING MATERIAL MITIGATION MEASURES

During the demolition of buildings and structures on the SVRT project property in preparation for construction activities, the demolition debris may contain hazardous materials, such as asbestos-containing materials, lead-based paints, PCB-containing light ballasts, mercury vapor lamps, and/or wood, concrete, or sheetrock contaminated from chemical use, storage, and/or handling. Additionally, chemicals from prior use, such as pesticides, may be present during demolition of buildings.

6.1 BUILDING MATERIAL CHARACTERIZATION

Prior to demolition, a hazardous materials building survey shall be conducted by the demolition contractor to identify the presence of hazardous and contaminated materials to be disturbed and/or removed during demolition activities. Only qualified demolition contractor(s) or subcontractor personnel shall perform the survey. Inspection for asbestos-containing materials will be performed by a Cal/OSHA Certified Asbestos Consultant, while inspection for lead hazards will be conducted by personnel certified and licensed by the State of California under lead certification requirements (as defined by Title 17, California Code of Regulations Section 35001 et seq.).

If hazardous materials are identified during the building survey, sampling and profiling analyses will be required for waste disposal. California state-certified laboratories shall perform all the analyses.

6.2 BUILDING MATERIAL ABATEMENT AND DISPOSAL

If hazardous building materials (including remaining chemicals that will be removed during demolition) are identified during the hazardous building materials survey, a site-specific Hazardous Materials Management Plan (HMMP) shall be prepared. The HMMP shall include the following items:

1. Overall scope and schedule of all hazardous materials management, including but not limited to:
    a. Description of all hazardous materials work to be performed or managed, as well as intended control procedures.
    b. Schedule of all hazardous materials work.
    c. Description of personal protective equipment and methods as well as intended compliance monitoring.
2. Name, phone number, pager number of demolition contractor(s)'s designated Hazardous Materials Supervisor, who shall be a qualified person directly responsible under the contractor(s) having the

necessary training to be knowledgeable in the identification, control, and management of the hazardous materials on-site.

3. Name, address, and phone number of the demolition contractor’s landfill.

Hazardous and contaminated materials and hazardous waste shall be handled according to the applicable laws and regulations in effect at the time of disturbance, transport or disposal of said hazardous materials or waste and requirements of the Contract Documents. In the event of conflict, the more stringent requirement shall apply.

7.0 REPORTING

Proper recordkeeping and reporting will be used throughout the project. Reports will be required or prepared from the three major aspects described.

7.1 CHARACTERIZATION REPORTS

All of the characterization data generated during the project, such as from the soil/ballast characterization described in Section 4.1, will be documented. A characterization summary report will be prepared for each phase of hazardous materials characterization.

7.2 SEGMENT-SPECIFIC PLANS

For each of the project segments described in Section 1.2, the segment-specific design team will prepare a SVRT project design integrating the specific soil/ballast reuse plans or mitigation measures, building materials mitigation measures, and groundwater mitigation measures. Each of these designs will include specific requirements regarding what data populations of soil/ballast are acceptable for reuse for which purposes in what locations. The reuse design will be based on the methodology described in this *CMP*.

7.3 CONTAMINANT MANAGEMENT DOCUMENTATION

Upon completion of the mitigation measures integrated into the SVRT design, each of the segment-specific teams will prepare a report documenting the construction process. The documentation is expected to provide regulatory agencies with sufficient detail to confirm that the mitigation measures detailed in the segment-specific plans were completed.

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APPENDIX A

LIST OF TABLES

Table A-1 Quality Control Review for Samples Collected by Geomatrix for Union Pacific Railroad - Metals

Sample Information				Laboratory Analyses and Qualifiers								Evaluation of QC Data Acceptability							
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-042	0.5	07/23/01	48+35	21	J-[5]	18						Entech SM8033	OK	OK	OK	OK	As:MSD=48.2%vs55%(biased low)	na	na
SS-042	1.5	07/23/01	48+35	6.9		9.7						Entech SM8034	OK	OK	OK	OK	OK	na	na
SS-043	0.5	07/23/01	52+95	22		3						Entech SM8034	OK	OK	OK	OK	OK	na	na
SS-043	1.5	07/23/01	52+95	51		17						Entech SM8034	OK	OK	OK	OK	OK	na	na
SS-044	0.5	07/23/01	62+60	9.6		28						Entech SM8034	OK	OK	OK	OK	OK	na	na
SS-044	1.5	07/23/01	62+60	25		8.8						Entech SM8034	OK	OK	OK	OK	OK	na	na
SS-045	0.5	07/23/01	66+20	260		55						Entech SM8034	OK	OK	OK	OK	OK	na	na
SS-045	1.5	07/23/01	66+20	220		8.7						Entech SM8034	OK	OK	OK	OK	OK	na	na
SS-045	3.0	07/23/01	66+20	48		na[4]						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-046	0.5	07/24/01	73+05	31		52	J+[6]					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-046	1.5	07/24/01	73+05	46		6.9	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-047	0.5	07/24/01	83+25	69		48	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-047	1.5	07/24/01	83+25	170		10	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-047	3.0	07/24/01	83+25	66		na						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-048	0.5	07/24/01	88+25	47		59	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-048	1.5	07/24/01	88+25	78		8.4	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-049	0.5	07/24/01	93+15	31		13	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-049	1.5	07/24/01	93+15	120		9.4	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-049	3.0	07/24/01	93+15	14		na						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-050	0.5	07/24/01	97+80	45		32	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-050	1.5	07/24/01	97+80	15		4	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-051	0.5	07/24/01	103+05	110		51	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-051	1.5	07/24/01	103+05	120		14	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na

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Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-051	3.0	07/24/01	103+05	82		na						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-051	3.0	07/24/01	103+05	---		---		As=4.0				EntechWM8046C	OK	OK	OK	OK	OK	na	na
SS-052	0.5	07/24/01	107+80	80		36	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-052	1.5	07/24/01	107+80	120		6.1	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-052	3.0	07/24/01	107+80	3.3		na						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-054	0.5	07/24/01	113+10	94		30	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-054	1.5	07/24/01	113+10	71		13	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-055	0.5	07/24/01	117+95	77		61	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-055	1.5	07/24/01	117+95	190		6.9	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-055	3.0	07/24/01	117+95	37		na						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-056	0.5	07/24/01	122+65	12		40	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-056	1.5	07/24/01	122+65	230		10	J+					Entech SM8035	OK	OK	OK	OK	Pb:MSD=187.6%vs118%(biased high) Pb:RPD=48.53%vs30%	na	na
SS-056	3.0	07/24/01	122+65	5.9		na						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-057	0.5	07/24/01	128+05	62		44	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-057	1.5	07/24/01	128+05	59		7.9	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-058	0.5	07/24/01	131+95	2.4		28	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-058	1.5	07/24/01	131+95	7		16	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-059	0.5	07/24/01	137+60	3.7		14.0	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-059	1.5	07/24/01	137+60	290		6.8	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-059	3.0	07/24/01	137+60	310		na						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-060	0.5	07/24/01	143+55	1.5		18	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-060	1.5	07/24/01	143+55	47		6.7	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na

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Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-061	0.5	07/24/01	148+20	3.2		8.7				x	R: Sb J-: Ag J+: Ba, Cr, Ni, Zn	Entech SM8037	OK	OK	OK	OK	OK	OK	Ba:MS=332.6%vs113.0%(biasedhigh) Ba:MSD=223.2%vs113.0%(biasedhigh) Cr:MSD=137.6%vs127.3%(biasedhigh) Ni:MSD=153.8%vs124.8%(biasedhigh) Ag:MS=57.4%vs65.0%(biasedlow) Zn:MSD=134.4%vs119%(biasedhigh) Sb:RPD=52.72%vs30%(biased high)
SS-061	1.5	07/24/01	148+20	1.8		8.2	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-062	0.5	07/24/01	153+30	4.8		24	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-062	1.5	07/24/01	153+30	2.1		9.3	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-063	0.5	07/24/01	157+90	<1		4.3	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-063	1.5	07/24/01	157+90	<1		4.3	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-064	0.5	07/24/01	162+70	2		99	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-064	0.5	07/24/01	162+70	---		---		Pb=5.0				EntechWM8046C	OK	OK	OK	OK	OK	na	na
SS-064	1.5	07/24/01	162+70	2.2		83	J+					Entech SM8036	OK	OK	OK	Pb:LCS=119.5%vs111%(biased high)	OK	na	na
SS-065	0.5	07/25/01	166+80	<5		48						Entech SM8037B	OK	OK	OK	OK	OK	na	na
SS-065	1.5	07/25/01	166+80	3.4		8						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-066	1.5	07/25/01	171+90	12		5.7						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-067	0.5	07/25/01	173+55	24		330						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-068	0.5	07/25/01	176+70	11		30						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-068	1.5	07/25/01	176+70	10		6.1						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-069	1.5	07/25/01	181+40	65		12						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-070	0.5	07/25/01	186+10	41		56						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-071	0.5	07/25/01	192+20	5.2		19						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-071	1.5	07/25/01	192+20	6.4		41						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-072	0.5	07/25/01	197+30	20		42						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-072	1.5	07/25/01	197+30	36		6.8						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-073	0.5	07/25/01	202+00	1.2		14						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-073	1.5	07/25/01	202+00	56		5.7						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-074	0.5	07/25/01	206+85	<1		15						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-074	1.5	07/25/01	206+85	<1		6						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-075	0.5	07/25/01	212+30	1.6		11						Entech SM8038	OK	OK	OK	OK	OK	na	na
SS-075	1.5	07/25/01	212+30	6.9		6.8						Entech SM8039	OK	OK	OK	OK	OK	na	na

Table A-1 Quality Control Review for Samples Collected by Geomatrix for Union Pacific Railroad - Metals

Sample Information				Laboratory Analyses and Qualifiers								Evaluation of QC Data Acceptability							
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-076	0.5	07/25/01	216+90	1.5		22						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-076	1.5	07/25/01	216+90	<1		14						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-077	0.5	07/25/01	221+50	24		22						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-077	1.5	07/25/01	221+50	4.5		8.3						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-078	0.5	07/25/01	226+45	7.1		270						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-078	1.5	07/25/01	226+45	8.3		300						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-078	3.0	07/25/01	226+45	na		7.4						Entech SM8052C	OK	OK	OK	OK	OK	na	na
SS-079	0.5	07/25/01	231+35	<1		31						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-079	1.5	07/25/01	231+35	3.5		13						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-080	0.5	07/25/01	236+55	9.6		1.2						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-080	1.5	07/25/01	236+55	14		34						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-081	0.5	07/25/01	241+05	<5		<5				x		Entech SM8037B	OK	OK	OK	OK	OK	OK	OK
SS-081	1.5	07/25/01	241+05	<1		6.5						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-082	0.5	07/25/01	247+80	6.5		28						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-082	1.5	07/25/01	247+80	10		52						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-083	0.5	07/25/01	251+30	<1		9.7						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-083	1.5	07/25/01	251+30	1.4		8						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-084	0.5	07/25/01	255+90	2		8.1						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-084	1.5	07/25/01	255+90	<1		6.2						Entech SM8039	OK	OK	OK	OK	OK	na	na
SS-085	0.5	07/26/01	260+80	63		24						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-085	1.5	07/26/01	260+80	180		11						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-085	3.0	07/26/01	260+80	30		na						Entech SM8055B	OK	OK	OK	OK	OK	na	na
SS-086	0.5	07/26/01	266+00	28		13						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-086	1.5	07/26/01	266+00	160		8.4						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-086	3.0	07/26/01	266+00	49		na						Entech SM8055B	OK	OK	OK	OK	OK	na	na
SS-087	0.5	07/26/01	275+50	7.7		24						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-087	1.5	07/26/01	275+50	6.5		8.1						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-088	0.5	07/26/01	281+65	8.3		14						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-088	1.5	07/26/01	281+65	7.7		8.8						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-089	0.5	07/26/01	288+00	1.6		31						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-089	1.5	07/26/01	288+00	4.6		9.8						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-090	0.5	07/26/01	293+00	<5		<1						Entech SM8040	OK	OK	OK	OK	OK	na	na

Table A-1 Quality Control Review for Samples Collected by Geomatrix for Union Pacific Railroad - Metals

Sample Information				Laboratory Analyses and Qualifiers								Evaluation of QC Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-090	1.5	07/26/01	293+00	220		19						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-090	3.0	07/26/01	293+00	120		na						Entech SM8055B	OK	OK	OK	OK	OK	na	na
SS-091	0.5	07/26/01	298+80	80		29						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-091	1.5	07/26/01	298+80	280		9.8						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-091	3.0	07/26/01	298+80	100		na						Entech SM8055B	OK	OK	OK	OK	OK	na	na
SS-092	0.5	07/26/01	303+75	8.8		24						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-092	1.5	07/26/01	303+75	34		19						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-093	0.5	07/26/01	308+90	8.6		8.9						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-093	1.5	07/26/01	308+90	7.2		9.5						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-094	0.5	07/26/01	313+60	29		170						Entech SM8040	OK	OK	OK	OK	OK	na	na
SS-094	1.5	07/26/01	313+60	2.3		7.2						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-095	0.5	07/26/01	318+45	3.1		12						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-095	1.5	07/26/01	318+45	1.6		7.5						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-097	0.5	07/26/01	323+45	52		22						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-097	1.5	07/26/01	323+45	52		19						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-098	0.5	07/26/01	328+85	65		72						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-098	1.5	07/26/01	328+85	6.4		11						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-099	0.5	07/26/01	333+70	5.7		20						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-099	1.5	07/26/01	333+70	45		120						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-099	3.0	07/26/01	333+70	na		8.9						Entech SM8055B	OK	OK	OK	OK	OK	na	na
SS-100	0.5	07/26/01	343+30	6.9		20						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-100	1.5	07/26/01	343+30	4.5		11						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-101	0.5	07/26/01	353+35	8		17						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-101	1.5	07/26/01	353+35	1.5		6.2						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-102	0.5	07/26/01	363+20	9.1		32						Entech SM8041	OK	OK	OK	OK	OK	na	na
SS-102	1.5	07/26/01	363+20	33		12						Entech SM8040	OK	OK	OK	OK	OK	na	na

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Sample Information				Laboratory Analyses and Qualifiers								Evaluation of QC Data Acceptability							
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-103	0.5	07/27/01	371+40	64	J+	52				x	J-: Sb, Ba, Se, Hg J+: Tl	SM8044/SHG9024	OK	OK	OK	OK	As:MS=161.5%vs154.6%(biased high) As:MSD=165.1%vs154.6%(biased high)	OK	Sb:MS=36.8%vs39.3%(biasedlow) Ba:MS=45.2%vs75%(biasedlow) Se:MSD=51.6%vs56.3%(biasedlow) Tl:MS=136.6%vs131%(biasedhigh) Sb:MSD=37.9%vs39.3%(biasedlow) Ba:MSD=39.2%vs75%(biasedlow) Hg:MS=31.9%vs44.7%(biasedlow) Hg:MSD=35.1%vs44.7%(biased low)
SS-103	1.5	07/27/01	371+40	51		18						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-104	0.5	07/27/01	375+85	71		39						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-104	1.5	07/27/01	375+85	100		38						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-105	0.5	07/27/01	380+05	260		37						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-105	1.5	07/27/01	380+05	170		11						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-106	0.5	07/27/01	385+50	17		23						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-106	1.5	07/27/01	385+50	190		10						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-107	0.5	07/27/01	390+40	59		88						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-107	1.5	07/27/01	390+40	130		22						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-108	0.5	07/27/01	395+30	100		15						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-108	1.5	07/27/01	395+30	70		13						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-109	0.5	07/27/01	400+40	5.3		12						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-109	1.5	07/27/01	400+40	60		30						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-110	0.5	07/27/01	405+25	57		14						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-110	1.5	07/27/01	405+25	120		16						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-111	1.5	07/27/01	410+10	58		15						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-112	0.5	07/27/01	415+20	3.6		14						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-113	0.5	07/27/01	420+05	40		19						Entech SM8042	OK	OK	OK	OK	OK	na	na
SS-113	1.5	07/27/01	420+05	6.4		7.2						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-114	1.5	07/27/01	424+50	78		11						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-115	0.5	07/27/01	429+75	31		14						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-116	0.5	07/27/01	434+50	7.6		24						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-116	1.5	07/27/01	434+50	1.9		8.7						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-117	0.5	07/27/01	439+65	33		31						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-117	1.5	07/27/01	439+65	11		9.7						Entech SM8043	OK	OK	OK	OK	OK	na	na

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Sample Information				Laboratory Analyses and Qualifiers								Evaluation of QC Data Acceptability							
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-118	0.5	07/27/01	444+05	3.9		9.2						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-118	1.5	07/27/01	444+05	60		10						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-119	0.5	07/27/01	449+50	45		35						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-119	1.5	07/27/01	449+50	37		21						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-120	0.5	07/27/01	454+85	22		17						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-120	1.5	07/27/01	454+85	230		9.9						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-121	0.5	07/27/01	460+30	120		60						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-121	1.5	07/27/01	460+30	190		9.1						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-122	0.5	07/27/01	465+20	27		18						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-122	1.5	07/27/01	465+20	5.1		8.6						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-123	0.5	07/27/01	469+85	67	J+	20				x	J-: Sb, Ba, Se, Hg J+: Tl	SM8044/SHG9025	OK	OK	OK	OK	As: MS=161.5% vs 154.6% MSD=165.1% vs 154.6%	OK	SM8044:Sb,MS=36.8%vs39.3% MSD=37.9%vs39.3% Ba,MS=45.2%vs75.0% MSD=39.3%vs75.0% Se,MS=51.6%vs56.3% Tl,MS=136.6%vs131.0% Hg, (SHG9025):MSD=43.2% (biased low)
SS-123	1.5	07/27/01	469+85	18		13						Entech SM8043	OK	OK	OK	OK	OK	na	na
SS-124	0.5	07/30/01	474+55	100		21						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-124	1.5	07/30/01	474+55	120		9.5						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-125	0.5	07/30/01	479+70	70		25						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-125	1.5	07/30/01	479+70	69		7						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-126	0.5	07/30/01	484+65	110		8						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-126	1.5	07/30/01	484+65	96		13						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-126A	0.5	07/31/01	491+70	38		16				x	J-: Zn	Entech SM8044B	OK	OK	OK	OK	OK	Zn,LCS =79.3%vs79.7%	OK
SS-126A	0.5	07/31/01	491+70	---		---		As=6.4				EntechWM8046C	OK	OK	OK	OK	OK	na	na
SS-126A	1.5	07/31/01	491+70	170		12						Entech SM8048	OK	OK	OK	OK	OK	na	na
SS-127	0.5	07/30/01	495+65	130		18						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-127	1.5	07/30/01	495+65	120		10						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-128	0.5	07/30/01	500+90	41		18						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-128	1.5	07/30/01	500+90	3.3		8.4						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-129	0.5	07/30/01	505+75	91		23						Entech SM8045	OK	OK	OK	OK	OK	na	na

Table A-1 Quality Control Review for Samples Collected by Geomatrix for Union Pacific Railroad - Metals

Sample Information				Laboratory Analyses and Qualifiers								Evaluation of QC Data Acceptability							
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	TCLP for As and/or Pb (mg/L)	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range
Data from Investigation Along SJX/Line Segment																			
SS-129	1.5	07/30/01	505+75	36		9.9						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-130	0.5	07/30/01	510+35	90		23						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-130	0.5	07/30/01	510+35	---		---		As=6.7				EntechWM8046C	OK	OK	OK	OK	OK	na	na
SS-130	1.5	07/30/01	510+35	5.7		6.7						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-131	0.5	07/30/01	515+25	130		20						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-131	1.5	07/30/01	515+25	130		10						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-132	0.5	07/30/01	521+70	30		27						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-132	1.5	07/30/01	521+70	64		9.6						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-133	0.5	07/30/01	525+40	9.2		30						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-133	1.5	07/30/01	525+40	36		16						Entech SM8045	OK	OK	OK	OK	OK	na	na
SS-134	0.5	07/30/01	530+10	28		29						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-134	1.5	07/30/01	530+10	28		21						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-135	0.5	07/30/01	535+05	130		19						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-135	1.5	07/30/01	535+05	230		12						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-136	0.5	07/30/01	541+45	<1		23						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-136	1.5	07/30/01	541+45	41		13						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-137	0.5	07/30/01	546+25	62		280						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-137	1.5	07/30/01	546+25	250		150						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-138	0.5	07/30/01	551+70	9.4		18						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-138	1.5	07/30/01	551+70	7.4		29						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-139	0.5	07/30/01	557+00	3.5		21						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-139	1.5	07/30/01	557+00	<1		17						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-140	0.5	07/30/01	561+65	<1		16						Entech SM8046	OK	OK	OK	OK	OK	na	na
SS-140	1.5	07/30/01	561+65	3.3		14						Entech SM8046	OK	OK	OK	OK	OK	na	na

Notes:

[1]LCS/LCSD = laboratory control spike/LCS duplicate
[2]RPD = Relative Percent Difference
[3]MS/MSD = matrix spike/MS duplicate
[4]na = Not analyzed
[5]J- = Estimated, biased low
[6]J+ = Estimated, biased high

TABLE A-2 Quality Control Review for Samples collected by Geomatrix for Union Pacific Railroad - Organics

Sample Information				Laboratory Analyses and Qualifiers							Evaluation of QC Data Acceptability																									
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Qualifiers	Quality Control Batch Number (Sample Daily Group)	VOCs Holding Time	VOCs Surrogate Spikes	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TEPH MS/MSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	TPH-G MS/MSD/RPD	TPH-D Holding Time	TPH-D Surrogate Spike	TPH-D Method Blank	TPH-D LCS/LCSD/RPD	TPH-D MS/MSD/RPD	SVOCs Holding Time	SVOCs Surrogate Spike	SVOCs Method Blank	SVOCs LCS/LCSD/RPD	SVOCs MS/MSD/RPD
SS-053	0.50	07/24/01	108+30	na[4]	na	na	na	2.6	16		Entech DS4035A	--	--	--	--	--	OK	OK	OK	OK	OK	--	--	--	--	--	OK	OK	OK	OK	OK	--	--	--	--	--
SS-053	0.50	07/24/01	108+30	na	ND[5]	na	na	na	na		Entech BS5025D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	OK	OK	OK	OK	OK
SS-053	1.50	07/24/01	108+30	na	na	na	na	1.8	14		Entech DS4035A	--	--	--	--	--	OK	OK	OK	OK	OK	--	--	--	--	--	OK	OK	OK	OK	OK	--	--	--	--	--
SS-053	1.50	07/24/01	108+30	ND	na	na	na	na	na		Entech SMS21097B	OK	OK	OK	OK	OK	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SS-053	1.50	07/24/01	108+30	na	ND	na	na	na	na		Entech BS5025D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	OK	OK	OK	OK	OK
SS-096	0.50	07/26/01	319+50	na	na	na	na	ND	ND		Entech DS4035C	--	--	--	--	--	OK	OK	OK	OK	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SS-096	0.50	07/26/01	319+50	na	ND	na	na	na	na		Entech BS5025D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	OK	OK	OK	OK	na
SS-096	1.50	07/26/01	319+50	na	na	na	na	ND	16		Entech DS4035C	--	--	--	--	--	OK	OK	OK	OK	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SS-096	1.50	07/26/01	319+50	na	ND	na	na	na	na		Entech BS5025D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	OK	OK	OK	OK	na

Notes:

[1]LCS/LCSD = laboratory control spike/LCS duplicate

[2]RPD = Relative Percent Difference

[3]MS/MSD = matrix spike/MS duplicate

[4]na = Not analyzed

[5]ND = Not detected above laboratory limits

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
Investigation of Warm Springs Extension																						
ETAN-01-1	1.5-2	2/17/02		22.08		14.79								Torrent ICP020213A1/15B1	OK	OK	OK	OK	OK	OK	OK	
ETAN-02-1	0.0-0.5	2/17/02												Torrent 020207007	OK	na	na	na	na	na	na	
ETAN-02-2	1.5-2	2/17/02		17.24		66.24								Torrent ICP020213A1/15B1	OK	OK	OK	OK	OK	OK	OK	
ETSS-01-1	0.5-1	1//08/02		ND		4.450		As: ND Pb: 0.112 Crushed Gravel- As: 0.176 Pb: ND	J-: Pb					Torrent ICP020123A1/B1 ICP020128A1 ICP020204A1	OK	OK	OK	OK	OK	na	na	
ETSS-01-2	1-1.5	1//08/02		323		8.64		As: 14.07 Pb: 0.289						Torrent ICP020121A1/B1 ICP020128A1	OK	OK	OK	OK	OK	na	na	
ETSS-01-3	2-2.5	1//08/02		24.0		1.19								Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-02-1	1-1.5	1//08/02		97.5		27.4		As: 2.417 Pb: 1.419						Torrent ICP020121A1/B1 ICP020128A1	OK	OK	OK	OK	OK	na	na	
ETSS-02-2	2-2.5	1//08/02		4.07		4.99								Torrent ICP020109A2/B2	OK	OK	na	na	na	na	na	
ETSS-03-1	1-1.5	1/10/02		25.1		11.1		As: 0.444 Pb: ND	J-: Pb					Torrent ICP020123A1/B1 ICP020204A1	OK	OK	OK	OK	OK	na	na	
ETSS-03-2	1.5-2	1/10/02		99.5		6.19								Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-04-1	1-1.5	1/10/02		87.7		26.5		As: 2.682 Pb: ND	J-: Pb					Torrent ICP020121A1/B1 ICP020204A1	OK	OK	OK	OK	OK	na	na	
ETSS-04-2	1.67-2	1/10/02		73.9		16.1								Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
SB-01-1	1.5-2	12/26/01	280+50	7.45		0.582								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na[4]	na	
SB-03-1	1.5-2	12/26/01	348+00	0.779		19.0								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-03-2	10-10.5	12/26/01	348+00	104		5.24								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-03-2 (WET)	10-10.5	12/26/01	348+00					As: ND[5]	Pb: J-[6]					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-03-3	20.5-21.5	12/26/01	348+00	ND		5.41								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-04-1	1.5-2	12/27/01	351+60	8.07		34.1								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-04-2	9.5-10	12/27/01	351+60	43.9		1.69								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-04-3	19.5-20	12/27/01	351+60	69.7		4.99								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-05-1	1.5-2	12/26/01	355+00	91.8		18.4						x		Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	OK	OK	
SB-05-2	15.5-16	12/26/01	355+00	88.6		10.0						x		Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	OK	OK	
SB-05-2 (WET)	15.5-16	12/26/01	355+00					As: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
SB-06-1	1.5-2	12/27/01	357+55	92.8		5.58								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-06-2	10-10.5	12/27/01	357+55	ND		5.08								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-06-3	14-14.5	12/27/01	357+55	75.4		6.39								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-07-1	1.5-2	12/27/01	360+00	131		4.31								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-07-2	14.5-15	12/27/01	360+00	ND		3.91								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
BAL-08-1	1-1.5	12/27/01		86.5		599								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
BAL-08-1 (WET)	1-1.5	12/27/01						As: 0.447 Pb: 3.86	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
BAL-08-1 (TCLP)	1-1.5	12/27/01								As: ND Pb: 0.972	Pb: J-			Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-08-1	1.5-2	12/27/01	364+10	113		4.81								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-08-2	13.5-14	12/27/01	364+10	ND		6.10								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-08-3	16-16.5	12/27/01	364+10	ND		3.77								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-09-1	1.5-2	12/27/01	373+75	ND		6.28								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-09-2	17-17.5	12/27/01	373+75	ND		3.70								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-10-1	1.5-2	12/26/01	376+10	223		6.77								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-10-2	15.5-16	12/26/01	376+10	2.77		4.90								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-11-2	1.5-2	01/02/02	386+20	118		8.70						x		Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	OK	OK	
SB-11-3	5-5.5	01/02/02	386+20	141		6.77								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-11-3 (WET)	5-5.5	01/02/02	386+20					As: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-11-4	18-18.5	01/02/02	386+20	173		5.95								Torrent ICP020116A1/B1	OK	OK	OK	OK	OK	na	na	
SB-11-4 (WET)	18-18.5	01/02/02	386+20					As: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-11-4 (TCLP)	18-18.5	01/02/02	386+20							As: ND	Pb: J-			Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-12-1	1.5-2	12/28/01	404+95	104		29.10								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-12-2	10.5-11.5	12/28/01	404+95	112		4.85								Torrent ICP020116A1	OK	OK	OK	OK	OK	na	na	
SB-12-2 (WET)	10.5-11.5	12/28/01	404+95					As: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-13-1	1.5-2	12/28/01	414+80	22.5		16.3								Torrent ICP020103A1/B1	OK	OK	OK	OK	OK	na	na	
SB-13-2	18-19	12/28/01	414+80	430		17.9								Torrent ICP020116A1/B1	OK	OK	OK	OK	OK	na	na	
SB-13-2 (WET)	18-19	12/28/01	414+80					As: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
SB-13-2 (TCLP)	18-19	12/28/01	414+80							As: ND	Pb: J-			Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-14-2	1.5-2	01/02/02	422+75	80.6		6.16						x		Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	OK	OK	
SB-14-3	5-5.5	01/02/02	422+75	89.6		7.70								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-14-3 (WET)	5-5.5	01/02/02	422+75					As: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-14-4	18-18.5	01/02/02	422+75	ND	NV[7]	5.86	NV		NV		NV		NV	Not Available	NV	NV	NV	NV	NV	NV	NV	Lab QC not available.
SB-15-1	1.5-2	01/02/02	453+90	220		5.97								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-15-2	5-5.5	01/02/02	453+90	ND		6.61								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-16-1	1.5-2	01/02/02	466+30	ND		7.81								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-16-2	5-5.5	01/02/02	466+30	ND		2.31								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-17-1	1.5-2	01/03/02	476+15	ND		11.1						x		Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	OK	OK	
SB-17-2	5-5.5	01/03/02	476+15	ND		3.52								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-17-W01	--	01/03/02	476+15									x		Torrent ICP020109A2/B2	OK	OK	OK	OK	OK	OK	OK	
SB-18-1	1.5-2	01/03/02	485+90	ND		7.99								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-18-2	5-5.5	01/03/02	485+90	ND		6.16								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-19-1	1.5-2	01/03/02	493+40	31.5		6.70								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-19-2	5-5.5	01/03/02	493+40	151		10.7								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-19-2 (TCLP)	5-5.5	01/03/02	493+40							As: ND	Pb: J-			Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-20-1	1.5-2	01/03/02	498+55	129		6.57								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-20-2	5-5.5	01/03/02	498+55	116		6.55								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-20-2 (WET)	5-5.5	01/03/02	498+55					As: 0.311	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
SB-21-1	1.5-2	01/03/02	503+45	191		2.39								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-21-1 (TCLP)	1.5-2	01/03/02	503+45							As: 0.788				Torrent ICP020207 B1	OK	OK	OK	OK	OK	na	na	
SB-21-2	5-5.5	01/03/02	503+45	98.6		6.33								Torrent ICP020109A1/B1	OK	OK	OK	OK	OK	na	na	
SB-29-S1	4.5-5	01/31/02	364+10	56	NV	18	NV							Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-29-S1 (WET)	4.5-5	01/31/02	364+10					As: 1.8 Pb: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-29-S2	8.5-9	01/31/02	364+10	ND	NV	9.4	NV							Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-29-S2 (WET)	8.5-9	01/31/02	364+10					As: 0.38 Pb: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
SB-29-S3	14-14.5	01/31/02	364+10	ND	NV	6.1	NV							Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-29-S3 (WET)	14-14.5	01/31/02	364+10					As: ND Pb: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-29-S4	18-18.5	01/31/02	364+10	ND	NV	6.7	NV							Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-29-S4 (WET)	18-18.5	01/31/02	364+10					As: ND Pb: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-29-W01	--	01/31/02	364+10	0.23 mg/L		0.25 mg/L								Entech WM8158	OK	OK	OK	OK	OK	N/A[8]	N/A	
SB-29E	1.5-2	01/31/02	364+10	6.0	NV	68	NV							Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-30-S1	1.5-2	01/31/02	393+90	40	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-30-S1 (WET)	1.5-2	01/31/02	393+90					As: 4.4 Pb: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-30-S2	5-5.5	01/31/02	393+90	ND	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-30-S3	10-10.5	01/31/02	393+90	11	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-30-S3 (WET)	10-10.5	01/31/02	393+90					As: 0.25 Pb: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-30-S4	15-15.5	01/31/02	393+90	9.3	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-30-S5	21-21.5	01/31/02	393+90	ND	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-30-S5 (WET)	21-21.5	01/31/02	393+90					As: ND Pb: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-30-S5 (TCLP)	21-21.5	01/31/02	393+90							As: ND Pb: ND	NV			Entech WM8153B			NV	NV	NV	NV	NV	Lab QC not available.
SB-30-W01	--	01/31/02	393+90	0.032 mg/L										Entech WM8158	OK	OK	OK	OK	OK	N/A	N/A	
SB-30E	1.5-2	01/31/02	393+90	ND	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-30W	1.5-2	01/31/02	393+90	ND	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-31-S1	1.5-2	01/31/02	409+80	86.0	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-31-S1 (WET)	1.5-2	01/31/02	409+80					As: 2.3						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-31-S2	5-5.5	01/31/02	409+80	ND	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-31-S3	10-10.5	01/31/02	409+80	6.0	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-31-S3 (WET)	10-10.5	01/31/02	409+80					As: 0.29						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-31-S4	14-14.5	01/31/02	409+80	ND	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-31-S5	17-17.5	01/31/02	409+80	ND	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
SB-31-S5 (WET)	17-17.5	01/31/02	409+80					As: 0.250						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-31-S5 (TCLP)	17-17.5	01/31/02	409+80							As: ND	NV			Entech WM8153B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-31-W01	--	01/31/02	409+80	0.28 mg/L										Entech WM8158	OK	OK	OK	OK	OK	N/A	N/A	
SB-31E	1.5-2	01/31/02	409+80	6.5	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-31W	1.5-2	01/31/02	409+80	5.4	NV									Entech SM8148	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-32-S1	0.5-1	02/01/02	493+40	na	NV	na	NV	na	NV	na	NV			Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Only copper analyzed.
SB-32-S2	4.5-5	02/01/02	493+40	na	NV	na	NV	na	NV	na	NV			Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Only copper analyzed.
SB-32-S3	10-10.5	02/01/02	493+40	ND	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-32-S3 (WET)	10-10.5	02/01/02	493+40					As: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-32-S3 (TCLP)	10-10.5	02/01/02	493+40							As: ND	NV			Entech WM8153B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-32-S4	15-15.5	02/01/02	493+40	ND	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-32-S4 (WET)	15-15.5	02/01/02	493+40					As: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-32-S5	20-20.5	02/01/02	493+40	ND	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-32-S5 (WET)	20-20.5	02/01/02	493+40					As: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-32-W01	--	02/01/02	493+40	0.49 mg/L										Entech WM8158	OK	OK	OK	OK	OK	N/A	N/A	
SB-32E	1.5-2	02/01/02	493+40	5.1	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-32W	1.5-2	02/01/02	493+40	5.0	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-33-S1	1.5-2	02/01/02	503+45	na	NV	na	NV	na	NV	na	NV			Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Only copper analyzed.
SB-33-S2	4.5-5	02/01/02	503+45	na	NV	na	NV	na	NV	na	NV			Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Only copper analyzed.
SB-33-S3	10-10.5	02/01/02	503+45	ND	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-33-S3 (WET)	10-10.5	02/01/02	503+45					As: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-33-S4	15-15.5	02/01/02	503+45	ND	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-33-S4 (WET)	15-15.5	02/01/02	503+45					As: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-33-S4 (TCLP)	15-15.5	02/01/02	503+45							As: ND	NV			Entech WM8153B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-33-S5	19-19.5	02/01/02	503+45	6.6	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
SB-33-S5 (WET)	19-19.5	02/01/02	503+45					As: ND						Entech WM8159B	OK	OK	OK	OK	OK	na	na	
SB-33-W01	--	02/01/02	503+45	0.29 mg/L										Entech WM8158	OK	OK	OK	OK	OK	N/A	N/A	
SB-33E	1.5-2	02/01/02	503+45	ND	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
SB-33W	1.5-2	02/01/02	503+45	ND	NV									Entech SM8147B	OK	OK	NV	NV	NV	NV	NV	Lab QC not available.
Investigation of Off-Ballast Concerns in Alameda County																						
ETAN-03-S1	1.5-2	02/07/02	138+30	84.3		80.2								Torrent ICP0202 13A1/15B1	OK	OK	OK	OK	OK	OK	OK	Pb: QC Bath # ICP 020219
Investigation of Aerially Deposited Lead Concerns																						
ETAL-01-S1	0-0.5	01/23/02	167+00			15							Sb: J- Ba: J-	Entech SM8144	OK	OK	OK	OK	OK	OK	Sb: MS=59.3% vs. 64.0% MSD=53.0% vs. 64.0% (biased low) Ba: MS=59.8% vs. 75.0% MSD=60.2% vs. 75.0% (biased low)	
ETAL-01-S2	1-1.5	01/23/02	167+00			17							Sb: J- Ba: J-	Entech SM8144	OK	OK	OK	OK	OK	OK	Sb: MS=59.3% vs. 64.0% MSD=53.0% vs. 64.0% (biased low) Ba: MS=59.8% vs. 75.0% MSD=60.2% vs. 75.0% (biased low)	
ETAL-02-S1	0-0.5	01/23/02	168+00			26							Sb: J- Ba: J-	Entech SM8144	OK	OK	OK	OK	OK	OK	Sb: MS=59.3% vs. 64.0% MSD=53.0% vs. 64.0% (biased low) Ba: MS=59.8% vs. 75.0% MSD=60.2% vs. 75.0% (biased low)	
ETAL-02-S2	1-1.5	01/23/02	168+00			15							Sb: J- Ba: J-	Entech SM8144	OK	OK	OK	OK	OK	OK	Sb: MS=59.3% vs. 64.0% MSD=53.0% vs. 64.0% (biased low) Ba: MS=59.8% vs. 75.0% MSD=60.2% vs. 75.0% (biased low)	
ETAL-03-S1	0-0.5	01/23/02	519+50			55							Sb: J- Ba: J-	Entech SM8144	OK	OK	OK	OK	OK	OK	Sb: MS=59.3% vs. 64.0% MSD=53.0% vs. 64.0% (biased low) Ba: MS=59.8% vs. 75.0% MSD=60.2% vs. 75.0% (biased low)	

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
ETAL-03-S2	1-1.5	01/23/02	519+50			56							Sb: J- Ba: J-	Entech SM8144	OK	OK	OK	OK	OK	OK	Sb: MS=59.3% vs. 64.0% MSD=53.0% vs. 64.0% (biased low) Ba: MS=59.8% vs. 75.0% MSD=60.2% vs. 75.0% (biased low)	
ETSS-05-1	1-1.5	01/10/02	65+80	57.1		33.3								Torrent ICP020109A2/B2	OK	OK	OK	OK	OK	OK	OK	
ETSS-05-1 (WET)	1-1.5	01/10/02	65+80					As: 2.35 Pb: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-05-1 (TCLP)	1-1.5	01/10/02	65+80							As: ND Pb: ND	Pb: J-			Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-05-2	2-2.5	01/10/02	65+80	ND		ND								Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-06-1	1-1.5	01/10/02	105+70	47.1		200								Torrent ICP020123 A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-06-1 (WET)	1-1.5	01/10/02	105+70					As: 1.42 Pb: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-06-2	2-2.5	01/10/02	105+70	ND		4.72								Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-07-1	1-1.5	01/10/02	138+00	150		518								Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-07-1 (WET)	1-1.5	01/10/02	138+00					As: 0.276 Pb: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-07-2	2.5-3	01/10/02	138+00	212		15.8								Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-07-2 (WET)	2.5-3	01/10/02	138+00					As: 0.389	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-07-2 (TCLP)	2.5-3	01/10/02	138+00							As: 0.572	Pb: J-			Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-08-1	0-0.5	01/11/02	228+65	50.3		206								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-08-1 (WET)	0-0.5	01/11/02	228+65					As: 0.522 Pb: 0.133	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-08-2	1-1.5	01/11/02	228+65	11.0		69.4								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-08-3	2-2.5	01/11/02	228+65	5.02		32.5								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
ETSS-09-1	0-0.5	01/11/02	266+50	4.00		14.9								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-09-2	1-1.5	01/11/02	266+50	8.72		54.1								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-09-2 (WET)	1-1.5	01/11/02	266+50					As: 0.740 Pb: 2.09	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-09-3	2-2.5	01/11/02	266+50	91.3		27.9								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-10-1	0-0.5	01/11/02	311+20	86.2		288								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-10-1 (WET)	0-0.5	01/11/02	311+20					As: 0.309 Pb: 0.171	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-10-1 (TCLP)	0-0.5	01/11/02	311+20							As: ND Pb: 1.34	Pb: J-			Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-10-2	1-1.5	01/11/02	311+20	34		31.8								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-10-2 (WET)	1-1.5	01/11/02	311+20					As: 0.4 Pb: ND	Pb: J-					Torrent ICP020204 A1	OK	OK	OK	OK	Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-10-3	2-2.5	01/11/02	311+20	122		17.1								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	As: QC Batch # listed in footnote as ICP020127 B1 (Quality Control OK)
ETSS-11-1 (g[9]+ s[10])	1-1.5	01/07/02	458+60	168		10.1						x		Torrent ICP020117A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-11-1 (g)	1-1.5	01/07/02	458+60	76.7		66.9								Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	
ETSS-11-1 (g) (WET)	1-1.5	01/07/02	458+60					As: 4.26 Pb: 0.171	Pb: J-					Torrent ICP020204 A1					Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-11-1 (g crushed)	1-1.5	01/07/02	458+60											Torrent ICP020125 A1	OK	OK	OK	OK	OK	na	na	
ETSS-11-1 (g crushed) (WET)	1-1.5	01/07/02	458+60					As: 4.83 Pb: 0.058	Pb: J-					Torrent ICP020204 A1					Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-11-1 (s)	1-1.5	01/07/02	458+60	195		11.9								Torrent ICP020123 A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-11-1 (s) (WET)	1-1.5	01/07/02	458+60					As: 8.16 Pb: 0.132	Pb: J-					Torrent ICP020204 A1					Pb: MS=56% vs. 85%, biased low	na	na	

Table A-3 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Metals

Sample Information				Laboratory Analyses and Qualifiers										Evaluation of Quality Control (QC) Data Acceptability								
Location	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	Total Arsenic (mg/kg)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Qualifier for Total Lead	WET for As, Pb, and/or Cu (mg/L)	Qualifier for WET As, Pb, and/or Cu	TCLP for As and/or Pb (mg/L)	Qualifier for TCLP As and/or Pb	CAM 17 Metals (mg/kg)	Qualifier for Other Than Total Arsenic or Total Lead	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD[3]/RPD Recoveries in Range	Other Metals LCS/LCSD/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	Notes
ETSS-11-1 (s) (TCLP)	1-1.5	01/07/02	458+60							As: 0.511 Pb: 1.36	Pb: J-			Torrent ICP020204 A1					Pb: MS=56% vs. 85%, biased low	na	na	
ETSS-11-2	2-2.5	01/07/02	458+60	ND		6.11						x		Torrent ICP020117A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-12-1	1-1.5	01/08/02	545+55	258		30.0						x		Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	
ETSS-12-1 (WET)	1-1.5	01/08/02	545+55					As: 5.14 Pb: 0.828						Torrent ICP020128 A1	OK	OK	OK	OK	OK	na	na	
ETSS-12-2	2-2.5	01/08/02	545+55	ND		4.91						x		Torrent ICP020121A1/B1	OK	OK	OK	OK	OK	na	na	

Notes:

[1]LCS/LCSD = laboratory control spike/LCS duplicate

[2]RPD = Relative Percent Difference

[3]MS/MSD = matrix spike/MS duplicate

[4]na = Not analyzed

[5]ND = Not detected above laboratory limits

[6]J- = Estimated, biased low

[7]NV= Data not validated due to unrecoverable laboratory QC information. Data considered screening level for the purposes of this report.

[8]N/A = not applicable

[9]g = gravel

[10]s = sand

Table A-4 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Organics

Sample Information				Laboratory Analyses & Qualifiers											Evaluation of Quality Control Data Acceptability																													
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Organochlorine pesticides (mg/kg)	PCBs (mg/kg)	Organic Lead (mg/kg)	TOC (mg/kg)	Qualifiers	Laboratory Project No./ Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	TOC Holding Time	TOC Surrogate Spike	TOC Method Blank	TOC LCS/LCSD/RPD
Investigation of Warm Springs Extension																																												
ETAN-01-1	1.5-2	2/17/02													Torrent 020207007	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETAN-02-1	0.0-0.5	2/17/02								x	x			J+: Pesticides	Torrent 020207007 1297	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	LCSD: Dieldrin 153% vs 130%	OK	OK	OK	na	na	na	na	na
ETAN-02-2	1.5-2	2/17/02													Torrent 020207007	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-01-1	0.5-1	1//08/02													Torrent 020109017	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-01-2	1-1.5	1//08/02							x						Torrent 020109017	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-01-3	2-2.5	1//08/02													Torrent 020109017	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-02-1	1-1.5	1//08/02													Torrent 020109017	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-02-2	2-2.5	1//08/02													Torrent 020109017	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-03-1	1-1.5	1/10/02													Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-03-2	1.5-2	1/10/02													Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-04-1	1-1.5	1/10/02													Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-04-2	1.67-2	1/10/02													Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Investigation of BART-Specific Concerns																																												
SB-01-1	1.5-2	12/26/01	280+50	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na[4]	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-03-1	1.5-2	12/26/01	348+00	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-03-2	10-10.5	12/26/01	348+00	x											Torrent 011227085	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-03-3	20.5-21.5	12/26/01	348+00	x											Torrent 011227085	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-04-1	1.5-2	12/27/01	351+60	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-04-2	9.5-10	12/27/01	351+60	x											Torrent 011227085	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-04-3	19.5-20	12/27/01	351+60	x											Torrent 011227085	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Table A-4 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Organics

Sample Information				Laboratory Analyses & Qualifiers											Evaluation of Quality Control Data Acceptability																													
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Organochlorine pesticides (mg/kg)	PCBs (mg/kg)	Organic Lead (mg/kg)	TOC (mg/kg)	Qualifiers	Laboratory Project No./ Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	TOC Holding Time	TOC Surrogate Spike	TOC Method Blank	TOC LCS/LCSD/RPD
SB-05-1	1.5-2	12/26/01	355+00	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-05-2	15.5-16	12/26/01	355+00	x									x	J[5]: TOC J-[6]: VOCs	Torrent 011227085 /-R1	OK	4-BFB =55% vs. 65% (biased low)	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	OK	un-known	OK	OK
SB-06-1	1.5-2	12/27/01	357+55	x					x					J-: VOCs	Torrent 011227085	OK	4-BFB =59% vs. 65% (biased low)	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-06-2	10-10.5	12/27/01	357+55												Torrent 011227085	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-06-3	14-14.5	12/27/01	357+55	x										J+[7]: VOCs	Torrent 011227085	OK	Dibromofluoromethane =139% vs. 135% (biased high)	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-07-1	1.5-2	12/27/01	360+00	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-07-2	14.5-15	12/27/01	360+00	x											Torrent 011227085	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
BAL-08-1	1-1.5	12/27/01	364+10												Torrent 011227085	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-08-1	1.5-2	12/27/01	364+10	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-08-2	13.5-14	12/27/01	364+10	x											Torrent 011227085	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-08-3	16-16.5	12/27/01	364+10	x									x		Torrent 01122708 /-R1	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	OK	un-known	OK	OK
SB-09-1	1.5-2	12/27/01	373+75	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-09-2	17-17.5	12/27/01	373+75												Torrent 011227085	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-10-1	1.5-2	12/26/01	376+10	x					x						Torrent 011227085	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-10-2	15.5-16	12/26/01	376+10												Torrent 011227085	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-11-2	1.5-2	01/02/02	386+20	x					x					J-: VOCs	Torrent 020103003	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-11-3	5-5.5	01/02/02	386+20												Torrent 020103003	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-11-4	18-18.5	01/02/02	386+20	x		x			x					J-: TPH-G	Torrent 020103003R1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	TFT =64% vs. 65% (biased low)	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-12-1	1.5-2	12/28/01	404+95	x					x					J-: VOCs	Torrent 020102001	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Table A-4 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Organics

Sample Information				Laboratory Analyses & Qualifiers												Evaluation of Quality Control Data Acceptability																												
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Organochlorine pesticides (mg/kg)	PCBs (mg/kg)	Organic Lead (mg/kg)	TOC (mg/kg)	Qualifiers	Laboratory Project No./ Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	TOC Holding Time	TOC Surrogate Spike	TOC Method Blank	TOC LCS/LCSD/RPD
SB-12-2	10.5-11.5	12/28/01	404+95	x		x			x					J-: VOCs, TEPH	Torrent 020102001R1	16 day (12/28 - 1/13) vs. 14 day	OK	OK	OK	OK	15 day (12/28/01 -1/11/02) vs. 14 day	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-13-1	1.5-2	12/28/01	414+80	x					x	x	x			J-: Organo-chlorine Pesticides PCBs	Torrent 020102001	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	16 day (12/28/01-1/12/02) vs. 14 day	tetrachloro-m-xylene =48% vs. 60% (biased low)	OK	OK	16 day (12/28/01-1/12/02) vs. 14 day	tetrachloro-m-xylene =48% vs. 60% (biased low)	OK	OK	na	na	na	na
SB-13-2	18-19	12/28/01	414+80	x		x			x					J: VOCs J-: TEPH, TPH-G	Torrent 020102001R1	16 day (12/28 -> 1/13) vs. 14 day	Dibromofluoromethane = 161% vs. 135% (biased high)	OK	OK	OK	15 day (12/28/01 -1/11/02) vs. 14 day	OK	OK	OK	OK	TFT =60% vs. 65% (biased low)	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-14-2	1.5-2	01/02/02	422+75	x					x					J-: VOCs	Torrent 020103003	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-14-3	5-5.5	01/02/02	422+75												Torrent 020103003	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-14-4	18-18.5	01/02/02	422+75	x		x			x					J+: VOCs J-: TPH-G	Torrent 020103003R1	OK	Dibromofluoromethane = 175% vs. 135% (biased high)	OK	OK	OK	OK	OK	OK	OK	OK	TFT =46% vs. 65% (biased low)	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-15-1	1.5-2	01/02/02	453+90	x					x					J: VOCs	Torrent 020103003	OK	Dibromofluoromethane = 147% vs. 135% (biased high)	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-15-2	5-5.5	01/02/02	453+90												Torrent 020103003	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-16-1	1.5-2	01/02/02	466+30	x					x					J-: VOCs	Torrent 020103003	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-16-2	5-5.5	01/02/02	466+30												Torrent 020103003	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-17-1	1.5-2	01/03/02	476+15	x					x	x	x			J-: VOCs	Torrent 020103004	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na
SB-17-2	5-5.5	01/03/02	476+15												Torrent 020103004	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-17-W01	--	01/03/02	476+15	x		x	x		x						Torrent 020103004	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na

Table A-4 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Organics

Sample Information				Laboratory Analyses & Qualifiers											Evaluation of Quality Control Data Acceptability																													
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Organochlorine pesticides (mg/kg)	PCBs (mg/kg)	Organic Lead (mg/kg)	TOC (mg/kg)	Qualifiers	Laboratory Project No./ Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	TOC Holding Time	TOC Surrogate Spike	TOC Method Blank	TOC LCS/LCSD/RPD
SB-18-1	1.5-2	01/03/02	485+90	x					x					J-: VOCs	Torrent 020103004	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-18-2	5-5.5	01/03/02	485+90												Torrent 020103004	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-19-1	1.5-2	01/03/02	493+40	x					x					J-: VOCs	Torrent 020103004	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-19-2	5-5.5	01/03/02	493+40												Torrent 020103004	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-20-1	1.5-2	01/03/02	498+55	x					x					J-: VOCs	Torrent 020103004	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-20-2	5-5.5	01/03/02	498+55												Torrent 020103004	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-21-1	1.5-2	01/03/02	503+45	x					x					J-: VOCs	Torrent 020103004	OK	OK	OK	LCSD 1,1-DCE =62% vs. 75% (biased low)	MSD 1,1-DCE =72% vs. 75% (biased low)	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-21-2	5-5.5	01/03/02	503+45												Torrent 020103004	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-29-S1	4.5-5	01/31/02	364+10												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-29-S2	8.5-9	01/31/02	364+10												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-29-S3	14-14.5	01/31/02	364+10	x											Entech 28751	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-29-S4	18-18.5	01/31/02	364+10	x											Entech 28751	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-29-W01	--	01/31/02	364+10	x					x						Entech 28751	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-29E	1.5-2	01/31/02	364+10												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-30-S1	1.5-2	01/31/02	393+90												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-30-S2	5-5.5	01/31/02	393+90												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-30-S3	10-10.5	01/31/02	393+90												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-30-S4	15-15.5	01/31/02	393+90												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-30-S5	21-21.5	01/31/02	393+90	x					x						Entech 28751	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-30-W01	--	01/31/02	393+90	x											Entech 28751	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-30E	1.5-2	01/31/02	393+90												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Table A-4 Quality Control Review for Samples Collected by Earth Tech for VTA during ROW Acquisition - Organics

Sample Information				Laboratory Analyses & Qualifiers											Evaluation of Quality Control Data Acceptability																													
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Organochlorine pesticides (mg/kg)	PCBs (mg/kg)	Organic Lead (mg/kg)	TOC (mg/kg)	Qualifiers	Laboratory Project No./ Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	TOC Holding Time	TOC Surrogate Spike	TOC Method Blank	TOC LCS/LCSD/RPD
SB-30W	1.5-2	01/31/02	393+90												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31-S1	1.5-2	01/31/02	409+80												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31-S2	5-5.5	01/31/02	409+80												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31-S3	10-10.5	01/31/02	409+80												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31-S4	14-14.5	01/31/02	409+80												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31-S5	17-17.5	01/31/02	409+80	x					x						Entech 28751	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31-W01	--	01/31/02	409+80	x					x						Entech 28751	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31E	1.5-2	01/31/02	409+80												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-31W	1.5-2	01/31/02	409+80												Entech 28751	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32-S1	0.5-1	02/01/02	493+40												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32-S2	4.5-5	02/01/02	493+40												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32-S3	10-10.5	02/01/02	493+40												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32-S4	15-15.5	02/01/02	493+40												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32-S5	20-20.5	02/01/02	493+40	x					x						Entech 28760	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32-W01	--	02/01/02	493+40	x					x						Entech 28760	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32E	1.5-2	02/01/02	493+40												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-32W	1.5-2	02/01/02	493+40												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33-S1	1.5-2	02/01/02	503+45												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33-S2	4.5-5	02/01/02	503+45												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33-S3	10-10.5	02/01/02	503+45												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33-S4	15-15.5	02/01/02	503+45												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33-S5	19-19.5	02/01/02	503+45	x					x						Entech 28760	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33-W01	--	02/01/02	503+45	x					x						Entech 28760	OK	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33E	1.5-2	02/01/02	503+45												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-33W	1.5-2	02/01/02	503+45												Entech 28760	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

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Sample Information				Laboratory Analyses & Qualifiers											Evaluation of Quality Control Data Acceptability																													
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Organochlorine pesticides (mg/kg)	PCBs (mg/kg)	Organic Lead (mg/kg)	TOC (mg/kg)	Qualifiers	Laboratory Project No./ Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	TOC Holding Time	TOC Surrogate Spike	TOC Method Blank	TOC LCS/LCSD/RPD
Investigation of Off-Ballast Concerns in Alameda County																																												
ETAN-03-S1	1.5-2	02/07/02	138+30												Torrent 020207007	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Investigation of Aerially Deposited Lead Concerns																																												
ETAL-01-S1	0-0.5	01/23/02	167+00												Entech 28622	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETAL-01-S2	1-1.5	01/23/02	167+00												Entech 28622	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETAL-02-S1	0-0.5	01/23/02	168+00												Entech 28622	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETAL-02-S2	1-1.5	01/23/02	168+00												Entech 28622	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETAL-03-S1	0-0.5	01/23/02	519+50												Entech 28622	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETAL-03-S2	1-1.5	01/23/02	519+50												Entech 28622	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Investigation of Ballast Concerns																																												
ETSS-05-1	1-1.5	01/10/02	65+80						x						Torrent 020110020	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-05-2	2-2.5	01/10/02	65+80												Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-06-1	1-1.5	01/10/02	105+70												Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-06-2	2-2.5	01/10/02	105+70												Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-07-1	1-1.5	01/10/02	138+00												Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-07-2	2.5-3	01/10/02	138+00												Torrent 020110020	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-08-1	0-0.5	01/11/02	228+65												Torrent 02011034	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-08-2	1-1.5	01/11/02	228+65												Torrent 02011034	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-08-3	2-2.5	01/11/02	228+65												Torrent 02011034	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-09-1	0-0.5	01/11/02	266+50												Torrent 02011034	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-09-2	1-1.5	01/11/02	266+50						x					J: TEPH	Torrent 02011034	na	na	na	na	na	OK	Surrogate diluted out	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-09-3	2-2.5	01/11/02	266+50												Torrent 02011034	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-10-1	0-0.5	01/11/02	311+20												Torrent 02011034	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-10-2	1-1.5	01/11/02	311+20						x						Torrent 02011034	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-10-3	2-2.5	01/11/02	311+20												Torrent 02011034	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

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Sample Information				Laboratory Analyses & Qualifiers											Evaluation of Quality Control Data Acceptability																														
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Approx. Station Number	VOCs (mg/kg)	SVOCs (mg/kg)	TPH-G (mg/kg)	MTBE + BTEX (mg/kg)	TPH-D (mg/kg)	TEPH (mg/kg)	Organochlorine pesticides (mg/kg)	PCBs (mg/kg)	Organic Lead (mg/kg)	TOC (mg/kg)	Qualifiers	Laboratory Project No./ Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS[1]/LCSD/RPD[2]	VOCs MS/MSD[3]/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	TOC Holding Time	TOC Surrogate Spike	TOC Method Blank	TOC LCS/LCSD/RPD
ETSS-11-1	1-1.5	01/07/02	458+60												Torrent 020108008	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-11-2	2-2.5	01/07/02	458+60												Torrent 020108008	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-12-1	1-1.5	01/08/02	545+55						x						Torrent 020109017	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
ETSS-12-2	2-2.5	01/08/02	545+55												Torrent 020109017	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Notes:

[1]LCS/LCSD = laboratory control spike/LCS duplicate
[2]RPD = Relative Percent Difference
[3]MS/MSD = matrix spike/MS duplicate
[4]na = Not analyzed
[5]J = Estimated
[6]J- = Estimated, biased low
[7]J+ = Estimated, biased high

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SB-1-0	0-0.5	12/17/02		57	--		260	--	J+	As: 1.6 Pb: 8.6	J-: Pb	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212100 181/180/202	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	OK	OK	OK	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	180- Hg 181- CAM 16 Metals 202- STLC: As, Pb
SB-1-5	5-5.5	12/17/02		<1.7	--		11	--	J+	--	--	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212100 181/180	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	OK	OK	OK	na	na	180- Hg 181- CAM 16 Metals
SB-1-19.5	19.5-20	12/17/02		--	--	--	--	--	--	--	--	--	--	--	--	--	--	Torrent 0212100	OK	na	na	na	na	na	na	na	na	
SB-1-W1	--	12/17/02		--	<0.04 <0.04		--	<0.05 <0.05		--	--	--	--	x	J+: Mo	--	--	Torrent 0212100 178/R731	OK	OK	Molybdenum 0.014 vs 0.010 mg/L	OK	na	OK	na	na	na	178- CAM 16 Metals R731- Hg
SB-2-0	0-0.5	12/17/02		32	--		160	--		Pb: 4.8	J-: Pb	--	--		--	--	--	Torrent 0212100 179/202	OK	OK	OK	OK	na	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	179- As, Pb 202- STLC: Pb
SB-2-5	5-5.5	12/17/02		<1.7	--		9.8	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-2-19	19-19.5	12/17/02		11	--		10	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-2-W1	--	12/17/02		--	<0.04 <0.04		--	<0.05 <0.05		--	--	--	--	x	J+: Mo	--	--	Torrent 0212100 178/R731	OK	OK	Molybdenum 0.014 vs 0.010 mg/L	OK	na	OK	na	na	na	178- CAM 16 Metals R731- Hg
SB-3-0	0-0.5	12/17/02		49	--		61	--		Pb: 4.2	J-: Pb	--	--		--	--	--	Torrent 0212100 179/202	OK	OK	OK	OK	na	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	179- As, Pb 202- STLC: Pb
SB-3-7	7-7.5	12/17/02		<1.7	--		9.2	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-3-19	19-19.5	12/17/02		<1.7	--		4.4	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SB-3-W1	--	12/17/02		--	<0.04 <0.04		--	<0.05 <0.05	J+	--	--	--	--	x	J+: Mo	--	--	Torrent 0212100 178/R731	OK	OK	Molybdenum 0.014 vs 0.010 mg/L	OK	na	OK	na	na	na	178- CAM 16 Metals R731- Hg
SB-4-0.5	0.5-1.0	12/17/02		<1.7	--		1400	--	J+	--	--	Pb: 22		x	J+: Hg J+: Se	--	--	Torrent 0212100 181/180/203	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	OK	OK	OK	na	OK	180- Hg 181- CAM 16 Metals 203- TCLP: Pb
SB-4-5	5-5.5	12/17/02		<1.7	--		5.4	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-4-19.5	19.5-20	12/17/02		3.2	--		7.5	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-4-W1	--	12/17/02		--	<0.04		--	<0.05	J+	--	--	--	--	x	J+: Mo	--	--	Torrent 0212100 178/R731	OK	OK	Molybdenum 0.014 vs 0.010 mg/L	OK	na	OK	na	na	na	178- CAM 16 Metals R731- Hg
SB-5-0	0-0.5	12/17/02		30	--		27	--	J+	--	--	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212100 181/180	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	OK	OK	OK	na	na	180- Hg 181- CAM 16 Metals
SB-5-4	4-4.5	12/17/02		4.7	--		5.6	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-6-0.5	0.5-1	12/17/02		<1.7	--		14	--	J+	--	--	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212100 181/180	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	OK	OK	OK	na	na	180- Hg 181- CAM 16 Metals
SB-6-5	5-5.5	12/17/02		2.3	--		6.8	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-6-20.5	20.5-21	12/17/02		<1.7	--		7.4	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SB-7-0.0	0-0.5	06/23/03		--	--		60	--	J-	4.85		--	--		--	--	--	Torrent 0306081 385/397	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	OK	na	385- Pb 397- STLC Pb

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SB-7-3.5	3.5-4	06/23/03		--	--		2.1	--	J-	--	--	--	--		--		--	Torrent 0306081 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SB-7-5.0	5-5.5	06/23/03		<1.7	--		8.4	--	J-	--	--	--	--	x	J-: Cd J-: Cr J-: Co J-: Ni J+: Tl J-: V J-: Zn	--	--	Torrent 0306081 387/389	OK	OK	OK	OK	MS: Lead 71.5% vs 80% biased low, MSD: Lead 71.8% vs 80%	OK	MS: Cadmium 68.6% vs 80%, Chromium 79.8% vs 80%, Cobalt 76.3% vs 80%, Nickel 48.5% vs 80%, Thallium 187% vs 120%, Vanadium 78.3% vs 80%, Zinc 70.3% vs 80% MSD: Cadmium 68.2% vs 80%, Chromium 79% vs 80%, Nickel 48.3% vs 80%, Thallium 202% vs 120%, Vanadium 78.3% vs 80%, Zinc 68.3% vs 80%	na	na	387- CAM 16 Metals 389- Hg
SB-7-24.5	24.5-25	06/23/03		--	--		3.8	--	J-	--	--	--	--		--	--	--	Torrent 0306081 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SB-7-W1		06/23/03		--	<0.04 <0.04		--	<0.015 <0.015		--	--	--	--	x	J+: Sb J+: V	--	--	Torrent 0306081 386/388/R1678	OK	OK	386: Antimony 0.02195, Vanadium 0.005048, R1678: Antimony 0.02195, Vanadium 0.005048	OK	OK	OK	OK	na	na	386- CAM 16 Metals 388- Hg R1678- Dissolved CAM 16 Metals
SB-8-0.0	0-0.5	06/23/03		--	--		33	--	J-	--	--	--	--		--	--	--	Torrent 0306081 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SB-8-3.0	3-3.5	06/23/03		--	--		5.1	--	J-	--	--	--	--		--	--	--	Torrent 0306081 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SB-8-5.0	5-5.5	06/23/03		<1.6	--		8.4	--	J-	--	--	--	--	x	J-: Cd J-: Cr J-: Co J-: Ni J+: Tl J-: V J-: Zn	--	--	Torrent 0306081 387/389	OK	OK	OK	OK	MS: Lead 71.5% vs 80% biased low, MSD: Lead 71.8% vs 80%	OK	MS: Cadmium 68.6% vs 80%, Chromium 79.8% vs 80%, Cobalt 76.3% vs 80%, Nickel 48.5% vs 80%, Thallium 187% vs 120%, Vanadium 78.3% vs 80%, Zinc 70.3% vs 80% MSD: Cadmium 68.2% vs 80%, Chromium 79% vs 80%, Nickel 48.3% vs 80%, Thallium 202% vs 120%, Vanadium 78.3% vs 80%, Zinc 68.3% vs 80%	na	na	387- CAM 16 Metals 389- Hg
SB-8-18.5	18.5-19	06/23/03		--	--		6.4	--	J-	--	--	--	--		--	--	--	Torrent 0306081 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SB-8-W1	--	06/23/03		--	<0.04 <0.04		--	0.14 <0.015		--	--	--	--	x	J+: Sb J+: V	--	--	Torrent 0306081 386/388/R1678	OK	OK	386: Antimony 0.02195, Vanadium 0.005048, R1678: Antimony 0.02195, Vanadium 0.005048	OK	OK	OK	OK	na	na	386- CAM 16 Metals 388- Hg R1678- Dissolved CAM 16 Metals

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SS-1-0.0	0.0-0.5	12/16/02		12	--		640	--	J+	Pb: 1.2	J-: Pb	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212095 181/180/202	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	na	OK	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	180- Hg 181- CAM 16 Metals 202- STLC: Pb
SS-1-1.5	1.5-2	12/16/02		6.4	--		90	--		Pb: ND	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	177- As, Pb 202- STLC: Pb
SS-2-0.0	0.0-0.5	12/16/02		1.9	--		14	--		--	--	--	--		--	--	--	Torrent 0212095 177	OK	OK	OK	OK	OK	na	na	na	na	177- As, Pb
SS-2-1.5	1.5-2	12/16/02		<1.7	--		14	--		--	--	--	--		--	--	--	Torrent 0212095 177	OK	OK	OK	OK	OK	na	na	na	na	177- As, Pb
SS-3-0.0	0.0-0.5	12/16/02		44	--		140	--		Pb: 8.7	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	177- As, Pb 202- STLC: Pb
SS-3-1.5	1.5-2	12/16/02		39	--		67	--		Pb: 2.5	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	177- As, Pb 202- STLC: Pb
SS-4-0.0	0.0-0.5	12/16/02		<1.7	--		4	--	J+	--	--	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212095 181/180	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	na	OK	na	na	na	180- Hg 181- CAM 16 Metals
SS-4-1.5	1.5-2	12/16/02		<1.7	--		11	--		--	--	--	--		--	--	--	Torrent 0212095 177	OK	OK	OK	OK	OK	na	na	na	na	177- As, Pb
SS-5-0.0	0.0-0.5	12/16/02		<1.7	--		65	--	J+	Pb: 1.6	J-: Pb	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212095 181/180/202	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	na	OK	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	180- Hg 181- CAM 16 Metals 202- STLC: Pb
SS-5-1.5	1.5-2	12/16/02		23	--		52	--		Pb: 2.3	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	177- As, Pb 202- STLC: Pb

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[1]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SS-6-0.0	0.0-0.5	12/16/02		3	--		110	--		Pb: 46	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	177- As, Pb 202- STLC: Pb
SS-6-1.5	1.5-2	12/16/02		<1.7	--		6.1	--		--	--	--	--		--	--	--	Torrent 0212095 177	OK	OK	OK	OK	OK	na	na	na	na	177- As, Pb
SS-7-0.0	0.0-0.5	12/16/02		5.8	--		69	--		Pb: 6.8	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	177- As, Pb 202- STLC: Pb
SS-7-1.5	1.5-2	12/16/02		54	--		53	--		As: 3.2 Pb: 5.2	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	--	177- As, Pb 202- STLC: As, Pb
SS-8-0.0	0.0-0.5	12/16/02		6.2	--		73	--		Pb: ND	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	--	177- As, Pb 202- STLC: Pb
SS-8-1.5	1.5-2	12/16/02		15	--		810	--		Pb: 5.1	J-: Pb	Pb: ND			--	--	--	Torrent 0212095 177/202/203	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	OK	177- As, Pb 202- STLC: Pb 203- TCLP: Pb
SS-9-0.0	0.0-0.5	12/16/02		<1.7	--		11	--		--	--	--	--		--	--	--	Torrent 0212095 177	OK	OK	OK	OK	OK	na	na	--	--	177- As, Pb
SS-9-1.5	1.5-2	12/16/02		<1.7	--		6.4	--		--	--	--	--		--	--	--	Torrent 0212095 177	OK	OK	OK	OK	OK	na	na	--	--	177- As, Pb
SS-10-C	NA	12/16/02		<1.7	--		13	--	J+	--	--	Cr: ND	J+: Cr	x	J+: Hg J+: Se	--	--	Torrent 0212095 181/180/203	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77, TCLP Cr: 0.003044 vs 0.010	OK	na	OK	na	--	0K	180- Hg 181- CAM 16 Metals 203- TCLP Cr

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SS-11-0.0	0.0-0.5	12/16/02		<1.7	--		8.6	--	J+	--	--	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212095 181/180	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	na	OK	na	na	na	180- Hg 181- CAM 16 Metals
SS-11-1.5	1.5-2	12/16/02		<1.7	--		120	--		Pb: 4.0	J-: Pb	--	--		--	--	--	Torrent 0212095 177/202	OK	OK	OK	OK	OK	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	177- As, Pb 202- STLC: Pb
SS-12-0.0	0.0-0.5	12/17/02		16	--		130	--		Pb: 5.5	J-: Pb	--	--		--	--	--	Torrent 0212100 179/202	OK	OK	OK	OK	na	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	179- As, Pb 202- STLC: Pb
SS-12-1.5	1.5-2	12/17/02		11	--		82	--		Pb: 4.7	J-: Pb	--	--		--	--	--	Torrent 0212100 179/202	OK	OK	OK	OK	na	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	179- As, Pb 202- STLC: Pb
SS-13-0.0	0.0-0.5	12/17/02		<1.7	--		14	--	J+	--	--	--	--	x	J+: Hg J+: Se	--	--	Torrent 0212100 181/180	OK	OK	Pb: 0.448 vs 0.36, Hg: 63.77 vs 72, Se: 2.45 vs 0.77	OK	OK	OK	OK	na	na	180- Hg 181- CAM 16 Metals
SS-13.1.5	1.5-2	12/17/02		<1.7	--		72	--		Pb: 1.1	J-: Pb	--	--		--	--	--	Torrent 0212100 179/202	OK	OK	OK	OK	na	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	179- As, Pb 202- STLC: Pb
SS-14-0.0	0.0-0.5	12/17/02		3.5	--		39	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SS-14-1.5	1.5-2	12/17/02		12	--		7.3	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb
SS-15-0.0	0.0-0.5	12/17/02		5.1	--		120	--		Pb: 9.8	J-: Pb	--	--		--	--	--	Torrent 0212100 179/202	OK	OK	OK	OK	na	na	na	MS: Pb- 63.9, 63.9% vs 80%, MSD: Pb- 73, 76.4% vs 80% biased low	na	179- As, Pb 202- STLC: Pb
SS-15-1.5	1.5-2	12/17/02		13	--		8.9	--		--	--	--	--		--	--	--	Torrent 0212100 179	OK	OK	OK	OK	na	na	na	na	na	179- As, Pb

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SS-16-0.0	0.0-0.5	06/24/03		--	--		170	--	J-	--	--	Pb: 0.12			--	--	--	Torrent 0306098 385/398	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	OK	385- Pb 398- TCLP Pb
SS-16-1.5	1.5-2	06/24/03		--	--		8.0	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-16-3.0	3-3.5	06/27/03		--	--		11	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-17-0.0	0.0-0.5	06/24/03		--	--		1,300	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-17-1.5	1.5-2	06/27/03		--	--		85	--	J-	Pb: 2.91		--	--		--	--	--	Torrent 0306098 385/397	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	OK	na	385- Pb 397- STLC Pb
SS-17-3.0	3-3.5	06/27/03		--	--		5.2	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SS-18-0.0	0.0-0.5	06/24/03		<1.7	--		42	--	J-	Pb: 2.53		Pb: ND		x	J-: Cd J-: Cr J-: Co J-: Ni J+: Tl J-: V J-: Zn	--	--	Torrent 0306098 387/389/397/398	OK	OK	OK	OK	MS: Lead 71.5% vs 80% biased low, MSD: Lead 71.8% vs 80%	OK	MS: Cadmium 68.6% vs 80%, Chromium 79.8% vs 80%, Cobalt 76.3% vs 80%, Nickel 48.5% vs 80%, Thallium 187% vs 120%, Vanadium 78.3% vs 80%, Zinc 70.3% vs 80% MSD: Cadmium 68.2% vs 80%, Chromium 79% vs 80%, Nickel 48.3% vs 80%, Thallium 202% vs 120%, Vanadium 78.3% vs 80%, Zinc 68.3% vs 80%	OK	OK	387- CAM 16 Metals 389- Hg 397- STLC Pb 398- TCLP Pb
SS-18-1.5	1.5-2	06/24/03		--	--		1.5	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-19-0.0	0.0-0.5	06/24/03		<1.7	--		130	--	J-	--	--	--	--		J-: Cd J-: Cr J-: Co J-: Ni J+: Tl J-: V J-: Zn	--	--	Torrent 0306098 387/389	OK	OK	OK	OK	MS: Lead 71.5% vs 80% biased low, MSD: Lead 71.8% vs 80%	OK	MS: Cadmium 68.6% vs 80%, Chromium 79.8% vs 80%, Cobalt 76.3% vs 80%, Nickel 48.5% vs 80%, Thallium 187% vs 120%, Vanadium 78.3% vs 80%, Zinc 70.3% vs 80% MSD: Cadmium 68.2% vs 80%, Chromium 79% vs 80%, Nickel 48.3% vs 80%, Thallium 202% vs 120%, Vanadium 78.3% vs 80%, Zinc 68.3% vs 80%	na	na	387- CAM 16 Metals 389- Hg

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SS-19-1.5	1.5-2	06/24/03		--	--		6.7	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-19-3.0	3-3.5	06/24/03		--	--		4.5	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-20-0.0	0.0-0.5	06/24/03		--	--		6,400	--	J-	--	--	Pb: ND			--	--	--	Torrent 0306098 385/398	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	OK	385- Pb 398- TCLP Pb
SS-20-1.5	1.5-2	06/24/03		--	--		190	--	J-	Pb: 1.67		Pb: ND			--	--	--	Torrent 0306098 385/397/398	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	OK	OK	385- Pb 397- STLC Pb 398- TCLP Pb
SS-21-0.0	0.0-0.5	06/24/03		<1.7	--		100	--	J-	Pb: 3.11		Pb: 0.057		x	J-: Cd J-: Cr J-: Co J-: Ni J+: Tl J-: V J-: Zn	--	--	Torrent 0306098 387/389/397/398	OK	OK	OK	OK	MS: Lead 71.5% vs 80% biased low, MSD: Lead 71.8% vs 80%	OK	MS: Cadmium 68.6% vs 80%, Chromium 79.8% vs 80%, Cobalt 76.3% vs 80%, Nickel 48.5% vs 80%, Thallium 187% vs 120%, Vanadium 78.3% vs 80%, Zinc 70.3% vs 80% MSD: Cadmium 68.2% vs 80%, Chromium 79% vs 80%, Nickel 48.3% vs 80%, Thallium 202% vs 120%, Vanadium 78.3% vs 80%, Zinc 68.3% vs 80%	OK	OK	387- CAM 16 Metals 389- Hg 397- STLC Pb 398- TCLP Pb

Table A-5 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Metals

Sample Information				Laboratory Analyses and Qualifiers														Evaluation of QC Data Acceptability										
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	Total Arsenic (mg/kg)	Total Arsenic/Dissolved Arsenic (mg/L)	Qualifier for Total Arsenic	Total Lead (mg/kg)	Total Lead/Dissolved Lead (mg/L)	Qualifier for Total Lead	WET for As, Cd, Cr, Cu, Pb, and/or Se (mg/L)	Qualifier for WET As, Ba, Cd, Cr, Pb, and/or Se	TCLP for As, Ba, Cd, Cu, Pb and/or Se (mg/L)	Qualifier for TCLP As, Ba, Cd, Cr, Pb and/or Se	CAM 17 Metals	Qualifier for Other Than Total Arsenic or Total Lead	Dissolved Solids	Suspended Solids	Quality Control Batch Number (Sample Daily Group)	Chain of Custody Complete	Metals Holding Time <6 months (28 days Hg)	Metals Non-detectable in Method Blank	As/Pb LCS/LCSD[1]/RPD[2] Recoveries in Range	As/Pb MS/MSD/RPD Recoveries in Range	Other Metals LCS/LCSD[3]/RPD Recoveries in Range	Other Metals MS/MSD/RPD Recoveries in Range	WET for As, Pb, and/or Cu LCS/LCSD/RPD MS/MSD/RPD	TCLP for As and/or Pb LCS/LCSD/RPD MS/MSD/RPD	Notes
SS-21-1.5	1.5-2	06/24/03		--	--		9.8	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-21-3.0	3-3.5	06/24/03		--	--		8.5	--	J-	--	--	--	--		--	--	--	Torrent 0306098 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb
SS-22-0.0	0.0-0.5	06/23/03		--	--		98	--	J-	Pb: 3.42		--	--		--	--	--	Torrent 0306081 385/397	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	OK	na	385- Pb 397- STLC Pb
SS-22-1.5	1.5-2	06/23/03		--	--		9.1	--	J-	--	--	--	--		--	--	--	Torrent 0306081 385	OK	OK	OK	OK	MS: 51%, 65.1% vs 80% biased low, MSD: 71.2%, 64.5% vs 80% biased low	na	na	na	na	385- Pb

Notes:

[1]LCS/LCSD = laboratory control spike/LCS duplicate
[2]RPD = Relative Percent Difference
[3]MS/MSD = matrix spike/MS duplicate
[4]ND = Not detected above laboratory limits
[5]na = Not analyzed
[6]J+ = Estimated, biased high
[7]J- = Estimated, biased low

Table A-6 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Organics

Sample Information				Lab. Analyses & Qualifiers											Evaluation of QC Data Acceptability																																			
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	VOCs	SVOCs	TPH-G	MTBE + BTEX	TPH-D	TEPH	Organochlorine pesticides	PCBs	Organic Lead	PAH	Qualifiers	Laboratory Project No. / Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[2]/RPD	SVOCs Holding Time	SVOCs Surrogate Spike	SVOCs Method Blank	SVOCs LCS/LCSD/RPD	SVOCs MS/MSD/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	PAH Holding Time	PAH Surrogate Spike	PAH Method Blank	PAH LCS/LCSD/RPD	Notes
SB-1-0	0-0.5	12/17/02						x	x					J+: TEPH	Torrent 0212100 R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R761- TEPH
SB-1-5	5-5.5	12/17/02		x				x	x					J+: TEPH	Torrent 0212100 R721/R761	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R721- VOCs R761- TEPH
SB-1-19.5	19.5-20	12/17/02		x				x	x					J+: TEPH	Torrent 0212100 R721/R761	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R721- VOCs R761- TEPH
SB-1-W1	--	12/17/02		x		x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R701/R707/R762	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D 0.037 mg/kg vs ND	OK	OK	OK	TPH-G: 14.58 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R701- VOCs R707- TPH-G R762- TEPH
SB-2-0	0-0.5	12/17/02						x	x					J+: TEPH	Torrent 0212100 R761	na	na	na	na	na	na	na	na	na	na	OK	Pentacosane 206% vs 150% biased high	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R761- TEPH
SB-2-5	5-5.5	12/17/02				x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R718/R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	OK	TPH-G: 37.94 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R718- TPH-G R761- TEPH
SB-2-19	19-19.5	12/17/02				x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R718/R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	Trifluorotoluene 18.4% vs 65% biased low	TPH-G: 37.94 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R718- TPH-G R761- TEPH
SB-2-W1	--	12/17/02		x		x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R701/R707/R762	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D: 0.037 mg/L vs ND	OK	OK	OK	TPH-G: 14.58 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R701- VOCs R707- TPH-G R762- TEPH
SB-3-0	0-0.5	12/17/02						x	x					J+: TEPH	Torrent 0212100 R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R761- TEPH
SB-3-7	7-7.5	12/17/02				x		x	x					J+: TEPH	Torrent 0212100 R717/R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R717- TPH-G R761-TEPH
SB-3-19	19-19.5	12/17/02		x		x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R721/R717/R761	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	Trifluorotoluene 14.5% vs 65% biased low	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R721- VOCs R717- TPH-G R761- TEPH
SB-3-W1	--	12/17/02		x		x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R701/R707/R762	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D: 0.037 mg/L vs ND	OK	OK	OK	TPH-G: 14.58 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R701- VOCs R707- TPH-G R762- TEPH
SB-4-0.5	0.5-1.0	12/17/02						x	x						Torrent 0212100 R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R760- TEPH
SB-4-5	5-5.5	12/17/02				x		x	x					J+: TPH-G	Torrent 0212100 R771/R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	TPH-G: 26.66 ug/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R771- TPH-G R760- TEPH
SB-4-19.5	19.5-20	12/17/02		x		x		x	x						Torrent 0212100 R721/R717/R760	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R721- VOCs R717- TPH-G R760-TEPH
SB-4-W1	--	12/17/02		x		x								J+: TPH-G	Torrent 0212100 R701/R716	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	LCS TPH-G: 144% vs 135% biased high	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R701- VOCs R716- TPH-G
SB-5-0	0-0.5	12/17/02						x	x				x		Torrent 0212100 R760/R776	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	R760- TEPH R776- PAHs
SB-5-4	4-4.5	12/17/02				x		x	x				x		Torrent 0212100 R717/R760/R776	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	R717- TPH-G R760- TEPH R776- PAHs
SB-6-0.5	0.5-1	12/17/02		x				x	x					J+: TEPH	Torrent 0212100 R721/R761	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R721- VOCs R761- TEPH

Table A-6 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Organics

Sample Information			Lab. Analyses & Qualifiers												Evaluation of QC Data Acceptability																																			
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	VOCs	SVOCs	TPH-G	MTBE + BTEX	TPH-D	TEPH	Organochlorine pesticides	PCBs	Organic Lead	PAH	Qualifiers	Laboratory Project No. / Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	SVOCs Holding Time	SVOCs Surrogate Spike	SVOCs Method Blank	SVOCs LCS/LCSD/RPD	SVOCs MS/MSD/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	PAH Holding Time	PAH Surrogate Spike	PAH Method Blank	PAH LCS/LCSD/RPD	Notes
SB-6-5	5-5.5	12/17/02		x		x		x	x					J+: TEPH	Torrent 0212100 R721/R717/R761	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R721- VOCs R717- TPH-G R761-TEPH
SB-6-20.5	20.5-21	12/17/02		x		x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R721/R717/R761	OK	OK	OK	OK	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	Trifluorotoluene 54.9% vs 65% biased low	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R721- VOCs R717- TPH-G R761-TEPH
SB-7-0.0	0-0.5	06/23/03						x	x						Torrent 0306081 R1645	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1645- TEPH
SB-7-3.5	3.5-4	06/23/03						x	x						Torrent 0306081 R1645	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1645- TEPH
SB-7-5.0	5-5.5	06/23/03						x	x						Torrent 0306081 R1645	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1645- TEPH
SB-7-24.5	24.5-25	06/23/03		x		x		x	x					J-: TPH-G	Torrent 0306081 R1651/R1638/R1645	OK	OK	OK	OK	OK	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	MS: TPH-G 52.2% vs 65%, MSD: TPH-G 41% vs 65%	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1651- VOCs R1638- TPH-G R1645- TEPH
SB-7-W1	--	06/23/03		x		x		x	x						Torrent 0306081 R1649/R1629/R1644	OK	OK	OK	OK	OK	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1649- VOCs R1629- TPH-G R1644- TEPH
SB-8-0.0	0-0.5	06/23/03						x	x						Torrent 0306081 R1645	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1645- TEPH
SB-8-3.0	3-3.5	06/23/03						x	x						Torrent 0306081 R1645	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1645- TEPH
SB-8-5.0	5-5.5	06/23/03						x	x						Torrent 0306081 R1645	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1645- TEPH
SB-8-18.5	18.5-19	06/23/03		x		x		x	x					J-: TPH-G	Torrent 0306081 R1651/R1638/R1645	OK	OK	OK	OK	OK	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	MS: TPH-G 52.2% vs 65%, MSD: TPH-G 41% vs 65%	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1651- VOCs R1638- TPH-G R1645- TEPH
SB-8-W1	--	06/23/03		x		x		x	x						Torrent 0306081 R1649/R1629/R1644	OK	OK	OK	OK	OK	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R1649- VOCs R1629- TPH-G R1644- TEPH
SS-1-0.0	0.0-0.5	12/16/02						x	x						Torrent 0212095 R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R760- TEPH
SS-1-1.5	1.5-2	12/16/02						x	x						Torrent 0212095 R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R760- TEPH
SS-2-0.0	0.0-0.5	12/16/02						x	x						Torrent 0212095 R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R760- TEPH
SS-2-1.5	1.5-2	12/16/02						x	x						Torrent 0212095 R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R760- TEPH
SS-3-0.0	0.0-0.5	12/16/02						x	x					J: TEPH	Torrent 0212095 R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R724- TEPH
SS-3-1.5	1.5-2	12/16/02			x	x		x	x					J: TEPH J+: TPH-G	Torrent 0212095 R766/R717/R724	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	OK	Trifluorotoluene 143% vs 135% biased high	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R766- SVOCs R717- TPH-G R724- TEPH
SS-4-0.0	0.0-0.5	12/16/02						x	x	x	x			J: TEPH J+: Pesticides J+: PCBs	Torrent 0212095 R724/R722/R723	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	OK	OK	OK	4, 4'- DDT 658% vs 130%, Aldrin 469% vs 130%, Dieldrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130% biased high, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% biased high	OK	OK	Aroclor 1016 0.0379 vs 0.0 biased high	OK	na	na	na	na	R724- TEPH R722- Pesticides R723-PCBs
SS-4-1.5	1.5-2	12/16/02						x	x					J: TEPH	Torrent 0212095 R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R724- TEPH
SS-5-0.0	0.0-0.5	12/16/02						x	x					J: TEPH	Torrent 0212095 R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R724- TEPH
SS-5-1.5	1.5-2	12/16/02			x	x		x	x					J: TEPH	Torrent 0212095 R766/R717/R724	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R766- SVOCs R717- TPH-G R724- TEPH
SS-6-0.0	0.0-0.5	12/16/02						x	x					J: TEPH	Torrent 0212095 R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R724- TEPH

Table A-6 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Organics

Sample Information			Lab. Analyses & Qualifiers												Evaluation of QC Data Acceptability																																			
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	VOCs	SVOCs	TPH-G	MTBE + BTEX	TPH-D	TEPH	Organochlorine pesticides	PCBs	Organic Lead	PAH	Qualifiers	Laboratory Project No. / Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[1]/RPD	SVOCs Holding Time	SVOCs Surrogate Spike	SVOCs Method Blank	SVOCs LCS/LCSD/RPD	SVOCs MS/MSD/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	PAH Holding Time	PAH Surrogate Spike	PAH Method Blank	PAH LCS/LCSD/RPD	Notes
SS-6-1.5	1.5-2	12/16/02				x		x	x					J: TEPH	Torrent 0212095 R717/R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R717- TPH-G R724- TEPH
SS-7-0.0	0.0-0.5	12/16/02						x	x					J: TEPH	Torrent 0212095 R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R724- TEPH
SS-7-1.5	1.5-2	12/16/02						x	x					J: TEPH	Torrent 0212095 R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R724- TEPH
SS-8-0.0	0.0-0.5	12/16/02						x	x	x	x			J: TEPH J: Pesticides J+: PCBs	Torrent 0212095 R724/R722/R723	na	na	na	na	na	na	na	na	na	na	OK	Pentacosane 177% vs 150% biased high	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	na	na	na	na	na	na	na	na	OK	Tetrachloro-m-xylene 24.0% vs 65% biased low	OK	4, 4'- DDT 658% vs 130%, Aldrin 469% vs 130%, Dieldrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130% biased high, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% biased high	OK	OK	Aroclor 1016 0.0379 vs 0.0 biased high	OK	na	na	na	na	R724- TEPH R722- Pesticides R723-PCBs
SS-8-1.5	1.5-2	12/16/02				x		x	x						Torrent 0212095 R717/R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R717- TPH-G R760- TPH-D
SS-9-0.0	0.0-0.5	12/16/02						x	x						Torrent 0212095 R760	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R760- TEPH
SS-9-1.5	1.5-2	12/16/02				x		x	x					J: TEPH J+: TPH-G	Torrent 0212095 R717/R724	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	OK	Trifluorotoluene 23.5% vs 65% biased low	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R717- TPH-G R724- TEPH
SS-10-C	NA	12/16/02													Torrent 0212095	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-10-RH					x			x	x	x	x			J: Pesticides J+: PCBs	Torrent 0212095 R766/R760/R722/R723	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	Tetrachloro-m-xylene 36.0% vs 65% biased low	OK	4, 4'- DDT 658% vs 130%, Aldrin 469% vs 130%, Dieldrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130% biased high, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% biased high	OK	OK	Aroclor 1016 0.0379 vs 0.0 biased high	OK	na	na	na	na	R766- SVOCs R760- TEPH R722- Pesticides R723- PCBs
SS-10-RH					x			x	x	x	x			J: Pesticides J+: PCBs	Torrent 0212095 R766/R760/R722/R723	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	Tetrachloro-m-xylene 36.0% vs 65% biased low	OK	4, 4'- DDT 658% vs 130%, Aldrin 469% vs 130%, Dieldrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130% biased high, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% biased high	OK	OK	Aroclor 1016 0.0379 vs 0.0 biased high	OK	na	na	na	na	R766- SVOCs R760- TEPH R722- Pesticides R723- PCBs
SS-10-RH					x			x	x	x	x			J: Pesticides J+: PCBs	Torrent 0212095 R766/R760/R722/R723	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	Tetrachloro-m-xylene 36.0% vs 65% biased low	OK	4, 4'- DDT 658% vs 130%, Aldrin 469% vs 130%, Dieldrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130% biased high, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% biased high	OK	OK	Aroclor 1016 0.0379 vs 0.0 biased high	OK	na	na	na	na	R766- SVOCs R760- TEPH R722- Pesticides R723- PCBs

Table A-6 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Organics

Sample Information			Lab. Analyses & Qualifiers												Evaluation of QC Data Acceptability																																		
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	VOCs	SVOCs	TPH-G	MTBE + BTEX	TPH-D	TEPH	Organochlorine pesticides	PCBs	Organic Lead	PAH	Qualifiers	Laboratory Project No. / Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	SVOCs Holding Time	SVOCs Surrogate Spike	SVOCs Method Blank	SVOCs LCS/LCSD/RPD	SVOCs MS/MSD/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	PAH Holding Time	PAH Surrogate Spike	PAH Method Blank	PAH LCS/LCSD/RPD	Notes
SS-10-RH					x			x	x	x	x			J: Pesticides J+: PCBs	Torrent 0212095 R766/R760/R722/R723	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	Tetrachloro-m-xylene 36.0% vs 65% biased low	OK	4, 4'- DDT 658% vs 130%, Aldrin 469% vs 130%, Dieldrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130% biased high, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% biased high	OK	OK	Aroclor 1016 0.0379 vs 0.0 biased high	OK	na	na	na	na	R766- SVOCs R760- TEPH R722- Pesticides R723- PCBs
SS-11-0.0	0.0-0.5	12/16/02						x	x	x	x			J+: TEPH J: Pesticides J+: PCBs	Torrent 0212095 R760/722/R723	na	na	na	na	na	na	na	na	na	na	OK	Pentacosane 154% vs 150% biased high	OK	OK	na	na	na	na	na	na	na	na	OK	Tetrachloro-m-xylene 34.2% vs 65% biased low	OK	4, 4'- DDT 658% vs 130%, Aldrin 469% vs 130%, Dieldrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130% biased high, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% biased high	OK	OK	Aroclor 1016 0.0379 vs 0.0 biased high	OK	na	na	na	na	R760- TEPH R722- Pesticides R723- PCBs
SS-11-1.5	1.5-2	12/16/02			x	x		x	x					J: TEPH	Torrent 0212095 R766/R717/R724	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	TPH-D 1.256 mg/kg vs ND	LCS: TPH-D 41.5% vs 50% biased low	OK	OK	OK	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R766- SVOCs R717- TPH-G R724- TEPH
SS-12-0.0	0.0-0.5	12/17/02						x	x					J+: TEPH	Torrent 0212100 R761	na	na	na	na	na	na	na	na	na	na	OK	Pentacosane 19.5% vs 50% biased low	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R761- TEPH
SS-12-1.5	1.5-2	12/17/02			x	x		x	x					J+: SVOCs J+: TEPH J+: TPH-G	Torrent 0212100 R776/R718/R761	na	na	na	na	na	OK	2,4,6-Tribromophenol 149% vs 122%, 2-Fluorobiphenyl 136% vs 115%, 2-Fluorophenol 121% vs 144%, Nitrobenzene-d5 140% vs 91%, Phenol-d6 147% vs 91%, p-Terphenyl-d14 195% vs 137% biased high	OK	OK	na	OK	Pentacosane 23.3% vs 50% biased high	TPH-D 1.256 mg/kg vs ND	OK	OK	OK	TPH-G: 37.94 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R776- SVOCs R718- TPH-G R761- TEPH
SS-13-0.0	0.0-0.5	12/17/02						x	x	x	x			J+: TEPH J+: Pesticides J+: PCBs	Torrent 0212100 R761/R722/R723	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	OK	Decachlorobiphenyl 183% vs 135% biased high	OK	LCS: 4,4'-DDT 658% vs 130%, Aldrin 469% vs 130%, Diedrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130%, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% LCSD: 4,4'-DDT 134% vs 130% - RPD 65.78 vs 30, Aldrin RPD 46.95 vs 30, Dieldrin RPD 53.24 vs 30, Endrin RPD 55.55 vs 30, gamma-BHC 54.6 vs 30, Heptachlor 49.24 vs 30	OK	OK	Aroclor 1016: 0.0379 mg/kg vs ND	OK	na	na	na	na	R761- TEPH R722- Pesticides R723- PCBs
SS-13.1.5	1.5-2	12/17/02						x	x					J+: TEPH	Torrent 0212100 R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R761- TEPH

Table A-6 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Organics

Sample Information			Lab. Analyses & Qualifiers												Evaluation of QC Data Acceptability																																			
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	VOCs	SVOCs	TPH-G	MTBE + BTEX	TPH-D	TEPH	Organochlorine pesticides	PCBs	Organic Lead	PAH	Qualifiers	Laboratory Project No. / Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	SVOCs Holding Time	SVOCs Surrogate Spike	SVOCs Method Blank	SVOCs LCS/LCSD/RPD	SVOCs MS/MSD/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	PAH Holding Time	PAH Surrogate Spike	PAH Method Blank	PAH LCS/LCSD/RPD	Notes
SS-14-0.0	0.0-0.5	12/17/02						x	x	x	x			J+: TEPH J+: Pesticides J+: PCBs	Torrent 0212100 R761/R722/R723	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	OK	OK	OK	LCS: 4,4'-DDT 658% vs 130%, Aldrin 469% vs 130%, Diedrin 532% vs 130%, Endrin 556% vs 130%, gamma-BHC 546% vs 130%, Heptachlor 492% vs 130%, Surr: Decachlorobiphenyl 507% vs 135%, Surr: Tetrachloro-m-xylene 449% vs 135% LCSD: 4,4'-DDT 134% vs 130% - RPD 65.78 vs 30, Aldrin RPD 46.95 vs 30, Dieldrin RPD 53.24 vs 30, Endrin RPD 55.55 vs 30, gamma-BHC 54.6 vs 30, Heptachlor 49.24 vs 30	OK	OK	Aroclor 1016: 0.0379 mg/kg vs ND	OK	na	na	na	na	R761- TEPH R722- Pesticides R723- PCBs
SS-14-1.5	1.5-2	12/17/02			x	x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R776/R718/R761	na	na	na	na	na	OK	OK	OK	OK	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	OK	TPH-G: 37.94 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R776- SVOCs R718- TPH-G R761- TEPH
SS-15-0.0	0.0-0.5	12/17/02						x	x					J+: TEPH	Torrent 0212100 R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R761- TEPH
SS-15-1.5	1.5-2	12/17/02				x		x	x					J+: TEPH J+: TPH-G	Torrent 0212100 R718/R761	na	na	na	na	na	na	na	na	na	na	OK	OK	TPH-D 1.256 mg/kg vs ND	OK	OK	OK	TPH-G: 37.94 ug/L vs ND	OK	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	R718- TPH-G R761- TEPH
SS-16-0.0	0.0-0.5	06/24/03													Torrent 0306098	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-16-1.5	1.5-2	06/24/03													Torrent 0306098	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-16-3.0	3-3.5	06/27/03													Torrent 0306098	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-17-0.0	0.0-0.5	06/24/03													Torrent 0306098	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-17-1.5	1.5-2	06/27/03													Torrent 0306098	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-17-3.0	3-3.5	06/27/03													Torrent 0306098	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-18-0.0	0.0-0.5	06/24/03						x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma- BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'- DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1645- TEPH R1675- Pesticides R1674- PCBs
SS-18-1.5	1.5-2	06/24/03				x		x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1654/R1645/R1675/R16 74	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma- BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'- DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1654- TPH-G R1645- TEPH R1675- Pesticides R1674- PCBs
SS-19-0.0	0.0-0.5	06/24/03						x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma- BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'- DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1645- TEPH R1675- Pesticides R1674- PCBs
SS-19-1.5	1.5-2	06/24/03				x		x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1654/R1645/R1675/R16 74	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma- BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'- DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1654- TPH-G R1645- TEPH R1675- Pesticides R1674- PCBs
SS-19-3.0	3-3.5	06/24/03													Torrent 0306091	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	
SS-20-0.0	0.0-0.5	06/24/03						x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma- BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'- DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1645- TEPH R1675- Pesticides R1674- PCBs

Table A-6 Quality Control Review for Samples Collected by Earth Tech from UPRR Newhall Yard - Organics

Sample Information				Lab. Analyses & Qualifiers												Evaluation of QC Data Acceptability																																		
Sample ID	Depth (feet below ground surface)	Sample Collection Date	Apparent Population	VOCs	SVOCs	TPH-G	MTBE + BTEX	TPH-D	TEPH	Organochlorine pesticides	PCBs	Organic Lead	PAH	Qualifiers	Laboratory Project No. / Order ID No.	VOCs Holding Time	VOCs Surrogate Spike	VOCs Method Blank	VOCs LCS/LCSD[1]/RPD[2]	VOCs MS/MSD[3]/RPD	SVOCs Holding Time	SVOCs Surrogate Spike	SVOCs Method Blank	SVOCs LCS/LCSD/RPD	SVOCs MS/MSD/RPD	TEPH Holding Time	TEPH Surrogate Spike	TEPH Method Blank	TEPH LCS/LCSD/RPD	TPH-G Holding Time	TPH-G Surrogate Spike	TPH-G Method Blank	TPH-G LCS/LCSD/RPD	MTBE & BTEX Holding Time	MTBE & BTEX Surrogate Spike	MTBE & BTEX Method Blank	MTBE & BTEX LCS/LCSD/RPD	Organochlorine Pesticides Holding Time	Organochlorine Pesticides Surrogate Spike	Organochlorine Pesticides Method Blank	Organochlorine Pesticides LCS/LCSD/RPD	PCBs Holding Time	PCBs Surrogate Spike	PCBs Method Blank	PCBs LCS/LCSD/RPD	PAH Holding Time	PAH Surrogate Spike	PAH Method Blank	PAH LCS/LCSD/RPD	Notes
SS-20-1.5	1.5-2	06/24/03				x		x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1654/R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma-BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'-DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1654- TPH-G R1645- TEPH R1675- Pesticides R1674- PCBs
SS-21-0.0	0.0-0.5	06/24/03						x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	na	na	na	na	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma-BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'-DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1645- TEPH R1675- Pesticides R1674- PCBs
SS-21-1.5	1.5-2	06/24/03				x		x	x	x	x			J: Pesticides J+: PCBs	Torrent 0306091 R1654/R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	OK	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma-BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'-DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1654- TPH-G R1645- TEPH R1675- Pesticides R1674- PCBs
SS-21-3.0	3-3.5	06/24/03													Torrent 0306091	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	nn	na	na	na	
SS-22-0.0	0.0-0.5	06/23/03						x	x	x	x			J-: TEPH J: Pesticides J+: PCBs	Torrent 0306081 R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	Pentacosane 43.3% vs 50% biased low	OK	OK	na	na	na	na	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma-BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'-DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1645- TEPH R1675- Pesticides R1674- PCBs
SS-22-1.5	1.5-2	06/23/03				x		x	x	x	x			J-: TPH-G J: Pesticides J+: PCBs	Torrent 0306081 R1638/R1645/R1675/R1674	na	na	na	na	na	na	na	na	na	na	OK	OK	OK	OK	OK	OK	OK	MS: TPH-G 52.2% vs 65%, MSD: TPH-G 41% vs 65%	na	na	na	na	OK	OK	4, 4'-DDT 0.4476, Aldrin 0.1226, Endosulfan II 0.3792. gamma-BHC 0.7789 ug/kg	LCSD: Aldrin RPD, MS: 4,4'-DDT 21.9% vs 65%, MSD: 4,4'-DDT -47.4% vs 65%	OK	OK	Aroclor 1260 0.0095 mg/kg	OK	na	na	na	na	R1638- TPH-G R1645- TEPH R1675- Pesticides R1674- PCBs

Notes:

[1]LCS/LCSD = laboratory control spike/LCS duplicate
[2]RPD = Relative Percent Difference
[3]MS/MSD = matrix spike/MS duplicate
[4]na = Not analyzed
[5]J- = Estimated, biased low
[6]R = Rejected
[7]J = Estimated
[8]J+ = Estimated, biased high

BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes
MTBE = Methyl Tertiary Butyl Ethe
PAH = Polynuclear Aromatic Hydrocarbon
PCB = Polychlorinated Bipheny
SVOCs = Semivolatile Organic Compounds
TEPH = Total Extractable Petroleum Hydrocarbons
TPH-D = Total Petroleum Hydrocarbons as Diese
TPH-G = Total Petroleum Hydrocarbons as Gasoline
VOCs = Volatile Organic Compounds

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LIST OF ABBREVIATIONS AND ACRONYMS

BART	Bay Area Rapid Transit
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CMP	Contaminant Management Plan
COPC	chemicals of potential concern
CSF	cancer slope factor
DTSC	Department of Toxic Substance and Control
HI	Hazard Index
HQ	Hazard Quotient
HHRA	human health risk assessment
kg	kilogram
LOAEL	low adverse effect level
mg/d	milligrams per day
mg/m^3	milligrams per cubic meter
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
m^3/day	cubic meter per day
mg/day	milligrams per day
mg/kg	milligrams per kilogram
ND	not detected
NE	not established
NOAEL	no adverse effect level
OEHHA	Office of Environmental Health Hazard Assessment
PAH	polyaromatic hydrocarbon
PEF	particulate emission factor
RfC	reference concentration
RfD	reference dose
RWQCB	Regional Water Control Board
TPH	total petroleum hydrocarbons
UF	uncertainty factor
U.S. EPA	United States Environmental Protection Agency
VF	volatilization factor
VOC	volatile organic compound
VTA	Santa Clara Valley Transportation Authority
WOE	weight of evidence
$\mu g/l$	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
mg/m^3	milligrams per cubic meter
mg/kg-day	milligrams per kilogram per day
m^3/day	cubic meter per day

1.0 INTRODUCTION

The purpose of this assessment is to develop criteria for the reuse of excavated soil which will be disturbed during construction operations to extent the Bay Area Rapid Transit (BART) system from Fremont into Silicon Valley, and link up with public transportation from the Santa Clara Valley Transportation Authority (VTA). Soil excavation will occur along the rail lines, rail right-of-way, and with the construction of related facilities such as stations and maintenance areas. The criteria developed in this report are designed to be protective of human health and the environment, and will be used to guide where and how the excavated soil can be reused, both on- and off-site. These criteria will be used in the *Contaminant Management Plan* (*CMP*), along with other criteria developed by State and Federal agencies, to select final chemical-specific criteria for the various reuse options specified in the *CMP*.

1.1 SITE LOCATION AND DESCRIPTION

The VTA is responsible for the extension of the BART system through Silicon Valley for 16.3 miles, from Fremont to Santa Clara. This project is known as the Silicon Valley Rapid Transit (SVRT) project, or the BART SJX extension. Segments of the project include the following:

- Line Segment: The Line Segment extends approximately 9.8 miles in a north-south alignment from the planned Warm Springs BART Station in Fremont through Milpitas to the East Tunnel Portal in San Jose. The track will be located along a former Union Pacific Railroad (UPRR) alignment. The UPRR alignment was owned and operated by Western Pacific Railroad (WPRR) before it was purchased by UPRR. VTA has since purchased the alignment from UPRR

- Tunnel Segment: The Tunnel Segment extends in a general east-west alignment beginning at the East Tunnel Portal located at the southern limit of the Line Segment, extends towards the west as a subway under Santa Clara Street in downtown San Jose, and ends at the West Tunnel Portal near Newhall Street in San Jose.

- Yard and Shops Segment (Facilities Segment): The Yard and Shops Segment begins at the West Tunnel Portal and extends to the Project's terminus near the existing Caltrain Station in the City of Santa Clara and will include a maintenance facility.

- Stations Segment: The Stations Segment includes project improvements, such as parking garages, access roads, and bus transit facilities, on the portions of the stations campuses not directly on the BART alignment.

1.2 SITE CHARACTERIZATION

Soil along the right-of-way and proposed locations for stations and maintenance facilities have undergone extensive chemical characterization. The results of these investigations have been reported primarily in the following documents:

- Jacobs, Chase, Frick Kleinkopf & Kelly, LLC. 2001. *Environmental Documents for WP Milpitas Line, Prepared by: Geomatrix, 2101 Webster Street, 12th Floor, Oakland, CA 94612, Date: October 8, 2001.*

- Earth Tech, 2002. *UPRR Alignment Investigation Data for BART Extension to San Jose, Fremont/Milpitas/San Jose, California. March 29.*

- Earth Tech, 2003a. *Draft Phase II Investigation Data Summary Report for UPRR Newhall Yard, San Jose/Santa Clara, California. February 11.*

- Earth Tech, 2003b. *Draft Additional Investigation Data Summary Report for UPRR Newhall Yard, San Jose/Santa Clara, California. July 25.*

- Earth Tech, 2004. *Silicon Valley Rapid Transit Project, Draft Line Segment Hazardous Materials Characterization Report. March 18.*

A summary of the chemicals tested and detected at the site is presented in Appendix A of the *CMP*. Briefly, all of the California Assessment Manual (CAM) 17 metals were detected at least once in soil sampled to characterize the site. While this assessment will develop health-based reuse levels of all the metals, the general distribution and detected levels suggest that the only metals likely to be of concern at this site are arsenic and lead. Both volatile and semivolatile organic chemicals have also been tested in site soil. The most frequently detected organic compounds are total petroleum hydrocarbons (TPH). In general, however, only the higher-boiling point fraction of TPH (i.e., motor oil) was detected. Lighter petroleum hydrocarbon constituents (i.e., ethylbenzene, toluene and xylenes) were detected only in one sample, and polyaromatic hydrocarbons were not detected. The agricultural pesticides DDE and DDT were the most frequently detected organic chemicals at the site, and were detected in about 6 percent of the samples. Other pesticides (i.e., alpha and gamma chlordane, endrin aldehyde, dieldrin and toxaphene) were detected in only one or two samples. Similarly, polychlorinated biphenyls (PCBs) were tested from various locations, and were only detected (as Aroclor 1260) in a few samples collected from the Newhall Yard portion of the site.

2.0 EXPOSURE ASSESSMENT

The proposed project is expected to involve excavation activities that are anticipated to move relatively large quantities of soil. Based on the results of the chemical characterization described above, the reuse of that soil may result in exposure of personnel involved in the construction as well as post-construction workers, and visitors (e.g., commuters) to the constructed facilities to chemicals detected in soil. In addition, if site soil is exported off-site, exposure to surface or subsurface soil may occur to off-site receptors.

The presence of streams along the proposed right-of-way raises the possibility that site soil may be disturbed during construction operations and be transported into freshwater bodies, and perhaps downstream into the San Francisco Bay. Criteria to protect fresh and marine water have been developed by several agencies. For this reason, such criteria are not developed specifically for the *CMP* as they are for the protection of human health. The *CMP* specifies that these criteria be considered at locations on the project site where freshwater or marine habitats may be impacted by project activities. Similarly, if excavation and subsequent encapsulation requires site soil to be buried within 5 feet of the groundwater table, the *CMP* specifies or provides the procedures used to specify what levels of chemicals are necessary so that potential leaching will not impact underlying groundwater to levels in excess of drinking water standards.

2.1 EXPOSURE SETTING

Although project options are currently being evaluated to select the exact route and height the rail line will take, it is certain where the extension will start, and what sort of activities it will entail. The VTA portion of the BART extension will begin at the planned Warm Springs Station, and proceed into San Jose and Santa Clara. The activities will involve excavation and construction to develop rail lines, stations and a maintenance facility. Following construction, activities will include right-of-way and rail car maintenance, and the occasional or routine visits to stations by travelers and commuters.

Currently, the land is used for a variety of purposes. Much of the land in the line segment portion of the site is railroad right-of-way. Some of the right-of-way is located in an open, rural setting, though most is located in an urban setting. The urban portion of the BART line is located primarily in areas with a history of commercial and light industrial land use, as are the planned locations for the BART stations. However, some portions of the BART extension pass through residential neighborhoods adjacent to the UPRR tracks. The planned location of the maintenance facility is a 50-acre area in Union Pacific's Newhall Yard, near the Santa Clara Station.

2.2 POTENTIALLY EXPOSED POPULATIONS AND PATHWAYS OF EXPOSURE

Based on the planned development of the site discussed above, it is reasonable to anticipate that soil excavated during the project will be suitable for some reuse scenarios, but not for others. The potential impact to the health of the receptors associated with the various types of activities anticipated for the project is the most important of the criteria for deciding how excavated soil can be reused. These activities, and the receptors associated with them, constitute the basis for the reuse scenarios anticipated for this project. These scenarios will be used to identify the exposure parameters necessary to calculate risk-based concentrations for the chemicals of concern to protect the receptors for each reuse scenario. The reuse scenarios are described below.

2.2.1 Reuse Scenario 1

This scenario allows for soil to be used anywhere either on-site or off-site without restriction as to where or how the soil is used. For example, this soil could be used as fill on a site that may be developed for residential or for industrial use. Therefore, the most restrictive potential scenario, residential use, was used to develop these criteria.

The potential exposure pathways used to assess the residential scenario are consistent with those recommended in the *Preliminary Endangerment Assessment Guidance Manual* (DTSC, 1999). These pathways assume that hypothetical residents will be exposed to chemicals in site soil via ingestion, dermal contact, inhalation of nonvolatile chemicals in fugitive dust and volatile chemicals in air.

2.2.2 Reuse Scenario 2

This scenario allows for soil to be used for any of the activities likely to occur on-site. These uses are best described using a hypothetical industrial exposure scenario. An industrial setting may include routine post-construction use of either station or maintenance facilities. For example, this reuse scenario also pertains to routine commuter use after construction of the station facilities. Commuters are included in this scenario because they are expected to be exposed to a lesser degree than industrial users as they are anticipated to be at a station for only a relatively short time compared to workers. Thus, a risk-based concentration developed to be protective of industrial receptors will also be protective of commuters.

The potential exposure pathways used to assess the industrial scenario are consistent with those recommended in the *Risk Assessment Guidance for Superfund, Volume 1, Part A* (U.S. EPA, 1989). These pathways assume that hypothetical receptors engaged in an industrial setting will be exposed to chemicals in site soil via incidental ingestion, dermal contact, inhalation of nonvolatile chemicals in fugitive dust and volatile chemicals in air.

2.2.3 Reuse Scenario 3

This scenario allows for soil to be placed along the railroad right-of-way, and assumes that workers engaged in routine inspection and occasional maintenance of the right-of-way will come in contact with it. The exposure assumptions used to represent this scenario are similar to those used for the industrial scenario described in Reuse Scenario 2, above. However, the major difference is the frequency of exposure assumed for the right-of-way worker is significantly less than either a commuter or a facility worker. This is consistent with the expectation that a right-of-way worker will travel to all parts of the right-of-way, and thus be exposed to any one segment for a relatively short period of time.

2.2.4 Reuse Scenario 4

This scenario allows for soil to be placed below the final grade as part of the construction operations. Following placement, the soil will be covered in such a way as be essentially isolated from further routine contact. Thus, the exposure assumed for the purpose of calculating a risk-based reuse level will consist of the contact anticipated as part of the placement operations during construction.

The potential exposure pathways used to assess the construction scenario are essentially the same as those used for the industrial scenario, but differ in the values used for some of the exposure parameters such as exposure frequency, duration, and dust generation rates.

2.2.5 Reuse Scenario 5

This scenario allows for soil to be placed on the surface anywhere on site and protect against chemicals in that soil from being transported as fugitive dust generated by passing trains, and adversely impacting the health of off-site, down-wind receptors. Although it is not practical to tailor this scenario to specific receptors, the most health-protective approach is to assume the most restrictive case, which would be downwind residential receptors. The approach generally follows that used for the residential receptors described in Scenario 1, with the difference being that only the inhalation pathway is evaluated in this scenario. The risk-based reuse concentrations developed for this scenario are expected to be applicable to several of the reuse scenarios described above. For this reason, instead of being a separate reuse scenario, levels develop using this scenario will be included among the various criteria for selecting the final values for reuse scenarios 1, 2, and 3.

2.3 SELECTION OF CHEMICALS OF POTENTIAL CONCERN

A risk-based reuse concentration will be developed for most of the chemicals detected in the characterizations studies discussed in Section 1.2, and for every reuse scenario described in Section 2.3. The metals magnesium, sodium, potassium, and calcium are essential nutrients and, as such, are not considered chemicals of potential concern (COPCs) for HHRA purposes. In addition, risk-based criteria will not be developed for combinations of chemicals such as total petroleum hydrocarbons or diesel fuel because toxicity criteria are not available for such compounds. Instead, these compounds will be represented by specific chemicals which are components of petroleum hydrocarbons (e.g., benzene).

Following the development of the risk-based reuse concentrations, the concentrations detected at the site will be compared to the most stringent risk-based levels. Only the COPCs whose maximum concentrations exceed these levels will be carried forward in the *Contaminant Management Plan* as chemicals of concern.

3.0 TOXICITY ASSESSMENT

In the context of a regulatory risk assessment, toxicity of a COPC is expressed in terms its non-carcinogenic and carcinogenic potentials; each of which is defined by numerical toxicity values used to quantify risk. The following toxicity assessment provides those values selected for use in the risk assessment, as well as a general description of toxicity value derivation.

3.1 TOXICITY VALUES

The non-carcinogenic and carcinogenic toxicity values used in this risk assessment are presented in **Table B-1**. The values presented in Table B-1 are from the California Environmental Protection Office of Environmental Health Hazard Assessment (OEHHA). Two OEHHA sources were used. The primary source is the Toxicity Criteria Database (www.oehha.ca.gov/risk/ChemicalDB/index.asp). A secondary source is the Air – Chronic RELs, (www.oehha.ca.gov/air/chronic_rels/AllChrels.html). If toxicity values from OEHHA were not available, the toxicity values were provided by the following alternative sources:

- Risk Assessment Information System (U,S, EPA, 2005).
- U.S. EPA Region 9 Preliminary Remediation Goal Table (U.S. EPA, 2004)

It should be noted that OEHHA provides toxicity criteria only for the hexavalent form of chromium. Since the activities along the right-of-way and proposed facility locations do not include those that are associated with this form, it was assumed that the chromium detected at this site as "total chromium" is not in the hexavalent form, and thus the OEHHA criteria were not used for this assessment. However, as a protective measure, the oral cancer criterion for "total chromium" used by the U.S. EPA Region 9 was used for this assessment. This criterion is derived by assuming that one-sixth of the total chromium detected at a site is in the hexavalent form. Since this assumption is likely to over-estimate the calculated risk, use of this criterion is considered protective of human health.

3.1.1 Toxicity Values for Non-carcinogens

Non-carcinogenic toxicity values are presented as reference doses (RfDs). Oral RfDs (expressed in units of milligrams per kilogram per day [mg/kg-day]) have been developed to evaluate the potential for

Table B-1 - Toxicity Criteria

	CSFo	CSFi		RfDo		RfDi	
Metals							
Arsenic	9.45E+00	1.20E+01		3.00E-04		8.6E-06	
Barium	NA	NA		7.00E-02	(1)	1.4E-04	(1)
Beryllium	NA	8.40E+00		2.00E-03		5.7E-06	(1)
Cadmium	NA	1.50E+01		5.00E-04		5.7E-06	
Chromium	NA	4.20E+01	(1)	1.50E+00		NA	
Cobalt	NA	NA		2.00E-02	(2)	5.7E-06	(2)
Copper	NA	NA		4.00E-02	(2)	NA	
Mercury	NA	NA		3.00E-04		2.6E-05	
Molybdenum	NA	NA		5.00E-03	(1)	NA	
Nickel	NA	9.10E-01		5.00E-02		1.4E-05	
Selenium	NA	NA		5.00E-03	(1)	5.7E-03	
Silver	NA	NA		5.00E-03	(1)	NA	
Thallium	NA	NA		6.60E-05	(1)	NA	
Vanadium	NA	NA		1.00E-03	(2)	NA	
Zinc	NA	NA		3.00E-01	(1)	NA	
SVOCs							
Aroclor 1260	5.00E+00	2.00E+00		2.0E-05	(1)	2.00E-05	(2)
Pesticides							
p,p'-DDE	3.40E-01	3.40E-01		5.00E-04	(1)	5.0E-04	(2)
p,p'-DDT	3.40E-01	3.40E-01		5.00E-04	(1)	5.0E-04	(2)
Pentachlorophenol	8.10E-02	1.80E-02		3.00E-02	(1)	3.0E-02	(2)
alpha Chlordane	1.3	1.2		5.00E-04	(1)	2.0E-04	(2)
gamma Chlordane	1.3	1.2		5.00E-04	(1)	2.0E-04	(2)
Dieldrin	16	16		5.00E-05	(1)	5.0E-05	(2)
Endrin aldehyde	NA	NA		3.00E-04	(1)	3.0E-04	(2)
Toxaphene	1.2	1.2		NA		NA	
VOCs							
t-Butanol	NA	NA		0.3	(1)	3.00E-01	(2)
Ethyl benzene	NA	NA		0.1	(1)	5.71E-01	
Toluene	NA	NA		2.00E-01	(1)	8.57E-02	
Xylenes	NA	NA		2.00E-01	(1)	2.00E-01	

Notes:

Except as noted, all criteria are from OEHHA Toxicity Criteria Database (www.oehha.ca.gov/risk/ChemicalDB/start.asp) or the OEHHA Air - Chronic RELs (www.oehha.ca.gov/air/chronic_rels/AllChrels.html).

1. Integrated Risk Information Service, (www.oehha.ca.gov/risk/ChemicalDB/start.asp)
2. U.S. EPA Region 9 PRGs. (www.epa.gov/region09/waste/sfund/prg/index.htm)

Values for "chlordane" used for both alpha and gamma chlordane

Values for "endrin" used for endrin aldehyde

Iso-butanol used as a surrogate for t-butanol

SVOCs = Semivolatile organic chemicals

VOCs = Volatile organic chemicals

CSFo = Oral cancer slope potency factor

CSFi = Inhalation cancer slope potency factor

RfDo = Chronic oral reference dose

RfDi = Chronic inhalation reference dose adverse non-cancer health effects from ingestion of chemicals. Chronic RfDs are specifically developed to be protective for long-term exposure to a chemical and are generally used to evaluate the potential non-cancer effects associated with exposure periods between seven years and a lifetime (U.S. EPA, 1989). The RfD is derived from a no-observed-adverse-effect-level (NOAEL) or a lowest-observed-adverse-effect-level (LOAEL). For the risk assessment, a NOAEL is the key datum obtained from a study of a dose-response relationship. It is the highest level tested at which no adverse effects were demonstrated. In some studies, only a LOAEL is available for use in defining the RfD. However, the use of a LOAEL requires the application of additional uncertainty factors (UFs) and modifying factors (MFs) to ensure that a health-protective toxicity value is used.

UFs are typically 10-fold factors used to calculate RfDs from laboratory data and attempt to account for uncertainty in:

- sensitivity among the members of the human population (i.e., interhuman or intraspecies variability);
- extrapolating animal data to humans (i.e., interspecies variability);
- extrapolating from data obtained in a study with less-than-lifetime exposure to lifetime exposure (i.e., extrapolating from subchronic to chronic exposure);
- extrapolating from a LOAEL rather than from a NOAEL; and
- extrapolating from animal data when the database is incomplete.

MFs are included to reflect the scientific uncertainties not explicitly addressed using UFs, and range from 1 to 10. The default value for a MF is 1.

Methods used to derive inhalation RfDs are conceptually similar to those used to derive oral RfDs. However, the actual analysis of inhalation exposures is more complex than that for oral exposures because of the dynamics of the respiratory system and ability to account for inhaled dose in the experimental design of laboratory studies. The reference values from inhalation studies are generally reported as a reference concentration (RfC) of the toxicant in air (milligrams per cubic meter [mg/m^3]). However, these values are converted to RfDs for use in risk assessments using a human body weight of 70 kilograms (kg) and inhalation rate of 20 cubic meters per day (m^3/day).

3.1.2 Toxicity Values for Carcinogens

U.S. EPA's current approach in determining a chemical's carcinogenic potential is a complex process that can be summarized as follows. Initially, the toxicity database for a substance is evaluated as to its potential utility in assessing carcinogenic potential. In this step, a weight-of-evidence (WOE) classification is assigned to the chemical. The WOE classification scheme is designed to present the likelihood that a chemical will cause cancer in humans based on the strength of supporting human and/or animal data. The WOE classifications defined by EPA (1996) are:

- Known/likely
- Cannot be determined
- Not likely

The "known/likely" classification is used when the available evidence demonstrates that there is carcinogenic potential in humans based on one of the following lines of evidence:

- The agent is known to be carcinogenic in humans based on either epidemiologic evidence or a combination of epidemiologic and experimental evidence, demonstrating causality between human exposure and cancer.
- The agent is treated as if it were a known human carcinogen, based on a combination of epidemiological data showing a plausible causal association (not demonstrating it definitively) and strong experimental evidence.
- The agent is likely to be carcinogenic in humans based on evidence that suggests the mode of action of cancer formation for available data is relevant or assumed to be relevant to human carcinogenicity.

The "cannot be determined" classification is applied when available carcinogenic data are conflicting or limited in quantity, and thus are not adequate to convincingly demonstrate carcinogenic potential for humans. The descriptor of "cannot be determined" is used with a subdescriptor that captures one of these rationales:

- The carcinogenic potential of the agent cannot be determined, but there is suggestive evidence that raises concern for carcinogenic effects.
- The available carcinogenic data is conflicting.
- There are inadequate data to evaluate the carcinogenic potential of the agent.
- There are no data available to evaluate the carcinogenic potential of the agent.

The "not likely" classification is applied when the current evidence is sufficient to determine that the agent is not likely to be carcinogenic in humans.

- The agent is not likely to be a carcinogen in humans because the agent did not produce results indicative of a carcinogen in two well conducted studies in two appropriate animal species.
- The agent is not likely to be a carcinogen in humans because the carcinogenic effects seen in animal studies from exposure to the agent are not relevant to humans.

- The agent is not likely to be a carcinogen in humans through a specific exposure route or dose range.
- The agent is not likely to be a carcinogen in humans based on extensive human evidence demonstrating lack of carcinogenicity.

The predominant theory behind cancer development as it relates to risk assessment is that a small number of molecular events can evoke changes in a single cell, which can lead to uncontrolled cellular proliferation and, eventually, to cancer. In this model (i.e., the linear low dose model), it is assumed that there is no level of exposure to a chemical that does not pose "a finite probability, however small, of generating a carcinogenic response" (U.S. EPA, 1989). Recent insight into cancer processes does, however, support the theory that a threshold mechanism may be operative, especially if the cancer is a "…secondary effect of toxicity or of an induced physiological change that is itself a threshold" (U.S. EPA, 1999a). However, because data have not been deemed sufficient by regulatory agencies to apply the "threshold" concept in the development of risk assessments, the linear low-dose model is still applied.

Cancer toxicity values are expressed as oral cancer slope factors (CSFo) and, for inhalation studies, unit risk values. CSFs are defined as the proportion of a population affected per mg/kg-day dose and are typically reported in units of $(mg/kg\text{-}day)^{-1}$. The unit risk (expressed as $[mg/m^3]^{-1}$ or $[\mu g/m^3]^{-1}$) is used in inhalation cancer toxicity data and can be interpreted as the increase in the lifetime risk of an individual who is exposed for a lifetime to either 1 mg/m^3 or $\mu g/m^3$ of the cancer agent. Extrapolating from the inhalation to oral route of exposure, DTSC and U.S. EPA Region 9 convert unit risks to CSFo by multiplying by the inhalation rate of 20 m^3/day and dividing by a body weight of 70 kg.

3.2 AVAILABILITY OF TOXICITY VALUES

Very often, toxicity values are not available either because a particular exposure route has not been evaluated or there are no relevant toxicity data upon which to base calculation of a value for any exposure route. In the first instance, route-to-route extrapolations are used in order to calculate a toxicity value. Toxicity values are generally available for the oral route of exposure and inhalation toxicity values have also been developed for some constituents. However, extrapolations from one exposure route to another (i.e., route-to-route extrapolations) are frequently used when there are no toxicity values available for a given route of exposure.

In instances where no data are available and a route-to-route extrapolation is not appropriate, the evaluation of risk is not feasible.

4.0 CALCULATION OF HUMAN HEALTH RISK-BASED REUSE CONCENTRATIONS

The calculation of risk-based reuse concentrations essentially uses the procedures developed to estimate potential cancer and noncancer risks. In calculating risks, chemical-specific toxicity values are applied in conjunction with chemical concentrations of COPCs and intake assumptions to estimate the theoretical probability of developing cancer (i.e., carcinogenic risks) and noncarcinogenic health effects. Risk estimates for noncarcinogenic and carcinogenic chemicals are calculated separately to account for differences in toxic mechanisms. To estimate risk-based reuse levels, a target risk is used to back-calculate the concentration in soil corresponding to the selected target risk. DTSC has no specific guidance for establishing target levels, except to note that "…a risk estimation greater than 10^{-6} or a hazard index greater than 1 indicate the presence of contamination that may pose a significant threat to human health. …" (DTSC, 1999). In addition, California's *Safe Drinking Water and Toxic Enforcement Act of 1986* (Proposition 65) legislates an incremental lifetime cancer risk of 1×10^{-5} or less for workplace exposures. Under CERCLA, a cancer risk of 1×10^{-6} is considered "the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure" (CERCLA, 1980), although cancer risks within the range of 1×10^{-4} to 1×10^{-6} or less are considered acceptable lifetime incremental risks by the U.S. EPA (U.S. EPA, 1991). For noncarcinogenic effects, CERCLA does not specify a point of departure, but it generally is appropriate to assume an HI equal to 1 (U.S. EPA, 1991).

The approach for setting up the equations used for the back-calculation mentioned above is described in U.S. EPA Region 9 Preliminary Remediation Goals (U.S. EPA, 2004), and by the San Francisco Regional Water Quality Control Board (RWQCB, 2005). In general, this approach was used for this evaluation. A detailed description of the calculations are presented in the following sections.

4.1 NONCANCER RISK-BASED CONCENTRATIONS FOR CHEMICALS IN SOIL/FILL

The calculational approach used for reuse scenarios 1 through 4 is presented below:

$$Cs = \frac{THQ \text{ x } BW \text{ x } AT}{EF \text{ x } ED \text{ x} \left[\left(\frac{IRs}{RfDo \text{ x } CF} \right) + \left(\frac{SA \text{ x } AF \text{ x } ABS}{RfDo \text{ x } CF} \right) + \left(\frac{IRi}{RfDi \text{ x } PEF} \right) + \left(\frac{IRi}{RfDi \text{ x } VF} \right) \right]} \quad \text{Equation 4-1}$$

where:

Cs = scenario-specific reuse concentration (mg/kg)
THQ = target hazard quotient (unitless)
BW = body weight (kg)
AT = averaging time (365 days/year x ED, days)
EF = exposure frequency (days per year)
ED = exposure duration (years)
IR = intake rate; soil ingestion rate (IRs, mg/day), inhalation rate (IRi,m^3/day)
RfD = reference dose; oral reference dose (RfDo), inhalation reference dose (RfDi) (mg/kg-day)
CF = conversion factor (1E+06 mg/kg)
SA = skin surface area (cm^2/day)
AF = soil-skin adherence factor (mg/cm^2)
ABS = dermal absorption factor (unitless)
PEF = particulate emission factor (m^3/kg)
VF = volatilization factor (m^3/kg)

Note that equation 4-1 is a general equation, in that it includes the approach for both volatile and nonvolatile chemicals, which are dealt with separately. To determine which chemicals are considered volatile for the purposes of this evaluation, U.S. EPA decision rules were used. The U.S. EPA criteria are a Henry's Law constant greater than 1E-05 atmospheres-cubic meters per mole (atm-m^3/mole) and a molecular weight less than 200 grams per mole (g/mole).

It should also be noted that, consistent with the procedure recommended for calculating preliminary remediation goals, concentrations calculated for the residential scenario (Reuse Scenario 1) were performed using the exposure parameters for children (ages 0 – 6 years). The lower bodyweights of children make this a health-protective approach.

A slightly different approach was used for Scenario 5. Since this scenario involves a dust source (disturbances created from a passing train) that cannot be simulated using a PEF, an alternative approach had to be used. The dust generated from a passing train was estimated for a similar assessment (ERM, 2002). The concentration of dust generated by a passing train was estimated to be 0.005 milligrams per cubic meter. Using this dust concentration, the following equation is used to estimate the reuse concentration from the inhalation pathway:

$$Cs = \frac{THQ \text{ x } BW \text{ x } AT \text{ x } RfDi \text{ x } CF}{EF \text{ x } ED \text{ x } IRi \text{ x } PC} \qquad \text{Equation 4-2}$$

Where:

Cs = scenario-specific reuse concentration (mg/kg)
THQ = target hazard quotient (unitless)
BW = body weight (kg)
AT = averaging time (365 days/year x ED, days)
RfD = inhalation reference dose (mg/kg-day)
CF = conversion factor (1E+06 mg/kg)
EF = exposure frequency (days per year)
ED = exposure duration (years)
IRi = inhalation rate (m^3/day)
PC = daily concentration of dust generated by passing trains (mg/m^3)

4.2 CANCER RISK-BASED CONCENTRATIONS FOR CHEMICALS IN SOIL/FILL

The calculational approach used for Reuse Scenarios 1 through 4 are similar, but differ because Reuse Scenario 1 involves a residential scenario for which age-adjusted parameters are used for the cancer calculations to represent both children and adult exposures. Such adjusted parameters are not used for the industrial/construction scenarios (Reuse Scenarios 2 and 3) because only adults are considered. The approach used for Reuse Scenario 1 to calculate reuse levels for potential carcinogens is presented in Equation 4-3.

$$Cs = \frac{TR \text{ x } ATc}{EF \text{ x } \left[\left(\frac{CSFo \text{ x } IRs,_{adj}}{CF}\right) + \left(\frac{CSFo \text{ x } SFS \text{ x } ABS}{CF}\right) + \left(\frac{CSFi \text{ x } IRa,_{adj}}{PEF}\right) + \left(\frac{CSFi \text{ x } IRa,_{adj}}{VF}\right)\right]} \qquad \text{Equation 4-3}$$

Where:

Cs = scenario-specific reuse concentration (mg/kg)
TR = target cancer risk (unitless)
ATc = averaging time – carcinogens (days)
EF = exposure frequency (days per year)
CSF = cancer slope factor – CSFo oral, CSFi inhalation ($\frac{1}{\text{mg/kg - day}}$)
IR_{adj} = age-adjusted intake rate – $IRs,_{adj}$ soil ingestion rate, adjusted (mg yr/kg day), $IRa,_{adj}$ inhalation rate, adjusted (m^3 yr/kg day)
CF = conversion factor (1E+06 mg/kg)
SFS = dermal factor (mg yr/kg day)

ABS = dermal absorption factor (unitless)
PEF = particulate emission factor (m^3/kg)
VF = volatilization factor (m^3/kg)

The approach used for to calculate reuse levels for the nonresidential exposures (Reuse Scenarios 2, 3 and 4) is presented in Equation 4-4.

$$Cs = \frac{TR \text{ x } BW \text{ x } ATc}{EF \text{ x } ED \text{ x} \left[\left(\frac{CSFo \text{ x } IRs}{CF}\right) + \left(\frac{CSFo \text{ x } SA \text{ x } AF \text{ x } ABS}{CF}\right) + \left(\frac{CSFi \text{ x } IRa}{PEF}\right) + \left(\frac{CSFi \text{ x } IRa}{VF}\right)\right]} \qquad \text{Equation 4-4}$$

Where:

Cs = scenario-specific reuse concentration (mg/kg)
BW =body weight (kg)
TR = target cancer risk (unitless)
ATc = averaging time – carcinogens (days)
EF = exposure frequency (days per year)
ED = exposure duration (years)
CSF = cancer slope factor – CSFo oral, CSFi inhalation ($\frac{1}{\text{mg/kg - day}}$)
IR = intake rate – IRs soil ingestion rate (mg/day), IRa inhalation rate (m^3/day)
CF = conversion factor (1E+06 mg/kg)
SA = skin surface area (cm^2/day)
AF = soil adherence factor (mg/cm^2)
ABS = dermal absorption factor (unitless)
PEF = particulate emission factor (m^3/kg)
VF = volatilization factor (m^3/kg)

As described above for the noncarcinogenic reuse calculations, a slightly different approach was used for Scenario 5. Since this scenario involves a dust source that cannot be simulated using a PEF, a scenario-specific dust concentration and the following equation are used to estimate the reuse concentration from the inhalation pathway.

$$Cs = \frac{TR \text{ x } ATc \text{ x } CF}{CSFi \text{ x } PC \text{ x } EF \text{ x} \left[\left(\frac{IRa \text{ x } EDa}{BWa}\right) + \left(\frac{IRc \text{ x } EDc}{BWc}\right)\right]} \qquad \text{Equation 4-5}$$

Where:

Cs = scenario-specific reuse concentration (mg/kg)
TR = target cancer risk (unitless)

ATc = averaging time – carcinogens (days)
CF = conversion factor (1E+06 mg/kg)
CSF = inhalation cancer slope factor ($\frac{1}{\text{mg/kg - day}}$)
PC = daily concentration of dust generated by passing trains (mg/m^3)
EF = exposure frequency (days per year)
IR = inhalation rate - IRa adult, IRc child (m^3/day)
ED = exposure duration – EDa adult, EDc a child (years)
BW = body weight – BWa adult, BWc child (kg)

It should be noted that some chemicals exhibit both carcinogenic and noncarcinogenic health effects. For this reason, both carcinogenic and noncarcinogenic risk-based concentrations will be calculated for these chemicals, and the lowest value will be presented as the final risk-based concentration. However, an exception to this generality is the case of the construction worker. To recognize the fact that these exposures are likely to occur over relatively short periods of time (i.e., less than one year) compared to those for the residential and industrial scenarios (more than a year), DTSC recommended that the reuse levels correspond to the noncarcinogenic effects rather than the carcinogenic effects for those chemicals that exhibit both carcinogenic and noncarcinogenic effects (DTSC memorandum from Kimiko Klein to Lynn Nakashima, October 1, 2004). An example of such a chemical is arsenic.

4.3 CONCENTRATIONS FOR LEAD IN SOIL/FILL

Although lead is classified as a probable human carcinogen by the U.S. EPA, there are no published slope factors for unspecified lead compounds. The State of California has developed an oral slope factor for lead acetate but not for the type of lead compounds that are likely to be present at the site. Thus, exposure and risks associated with contact with lead in the environment are based on estimating blood lead level. In a memorandum from Kimiko Klein to Lynn Nakashima, October 1, 2004, DTSC recommended that the Cal/EPA blood lead model LeadSpread 7 by used for the residential exposure scenarios, and the U.S. EPA Adult Lead Model (U.S. EPA, 2003) be used for the industrial and other worker exposure scenarios. Both models use a blood lead level of 10 micrograms lead per deciliter blood as a target. It should be noted that the approach used by LeadSpread 7 differs from that used to estimate reuse levels described above because LeadSpread 7 includes lead from sources other than soil in its calculations, including levels of lead in drinking water, household dust and food. By incorporating these inputs, LeadSpread 7 offers lead reuse concentrations with an additional level of health protection. It is also noted that the U.S. EPA Adult Lead Model was developed, in part, to estimate levels of lead in soil and dust that would not constitute an unreasonable risk to the fetus of pregnant mothers. Although few workers on the project site are expected to be pregnant women, the use of this model is therefore expected to provide an additional level of health protection. In fact, the choice of this conservative blood lead model is appropriate because it is known that the body burden for lead can persist for several years following incidental occupational exposure to lead in soil. Thus, the worker does not have to be pregnant at the time of exposure for a fetus to be at risk. For the purpose of this assessment, the values for the geometric standard deviation (2.1) and the baseline blood lead level (1.96 μg/dl) of a heterogeneous workforce (including white, black and Mexican workers) were used.

Some of the standard default values used in LeadSpread 7 were revised to make the model more site-specific. For example, the values for background concentrations of lead in ambient air, lead in soil and in drinking water were adjusted to reflect the project area. Data collected by the California Air Resources Board for lead in respirable airborne dust indicate that lead levels in air from Alameda and Santa Clara Counties have steadily decreased from 1989 (www.arb.ca.gov/adam/toxics/sitepages). To reflect current air quality, average lead concentrations for Fremont and San Jose from 1998 to 2002 (the most recent data available) were averaged to yield 0.0117 micrograms lead per cubic meter. To represent drinking water quality for Alameda and Santa Clara counties, the most recent reports from Santa Clara Valley Water District (www.sjmuniwater.com) Alameda County Water District (www.acwd.org) were used. The results show that the concentration in lead in drinking water in San Jose was less than 2 micrograms per liter (μg/l), while that for Alameda County was 7.4 μg/l. An average value of 4.7 μg/l was used to conservatively estimate lead levels in drinking water. Little information is available to represent average lead levels in soil. An average concentration of 23.9 mg/kg is reported for California (Bradford, et al, 1996). However, this result does not include any samples collected from the San Francisco Bay area. A more representative value (11.4 mg/kg) for this project was presented by Scott (1995) from 158 samples collected in Santa Clara County. Values for the remaining exposure parameters used in the blood lead models are discussed in Section 4.4 below.

4.4 EXPOSURE PARAMETERS

The values for the exposure parameters used in this assessment are selected to be site-specific where possible. Where site-specific values are not available, health-protective, default values are used. The values for the parameters are listed in **Table B-2**. In general, most of the values listed in **Table B-2** are the standard values recommended for the specific exposure scenarios by State and Federal risk assessment guidance. Derivation of the site-specific values are discussed below.

Table B-2 - Exposure Parameters

Exposure Parameter (Exposure Scenario: / Resuse Scenario:)	Residential (Unrestricted Off-Site)		Industrial (Both Unrestricted On-Site and Stations and Facilities)		Industrial (Right of Way)		Construction (Encapsulation)		Residential (Multiple Resuse Scenarios)	
concentration in soil (mg/kg)	calculated		calculated		calculated		calculated		calculated	
target risk	1.00E-06	a	1.00E-05	a	1.00E-05	a	1.00E-05	a	1.00E-06	a
target hazard quotient	1.00E+00	a	1.00E+00	a	1.00E+00	a	1.00E+00	a	1.00E+00	a
body weight, adult (kg)	70	b	70	b	70	b	70	b	70	b
body weight, child (kg)	15	b	NA		NA		NA		15	b
cancer slope factor - oral, inhalation (1/mg/kg-d)	chem specific		chem specific		chem specific		chem specific		chem specific	
noncancer reference dose, oral, inhalation (mg/kg -d)	chem specific		chem specific		chem specific		chem specific		chem specific	
averaging time for carcinogens - (d)	25550	b	25550	b	25550	b	25550	b	25550	b
averaging time for noncarcinogens - (d)	365 x ED	b	365 x ED	b	365 x ED	b	365 x ED	b	365 x EDa,c	b
exposure frequency - (d/y)	350	b	250	c	100	d	20 / 140	f	350	b
exposure duration (for adult scenarios) - (y)	30	b	25	c	25	c	7 / 1	f	NA	
exposure duration, (for adult, child scenarios) - (y)	24 / 6	b	NA		NA		NA		24 / 6	b
soil ingestion rate, adjusted (mg yr / kg d)	114	g	NA		NA		NA		NA	
soil ingestion rate, adult, child (mg/d)	100 / 200	b	75 / NA	c	75 / NA	c	330 / NA	e	NA	
conversion factor (mg/kg)	1.00E+06		1.00E+06		1.00E+06		1.00E+06		1.00E+06	
dermal soil factor, (mg yr / kg d)	361	g	NA		NA		NA		NA	
skin surface area, adult/child (cm^2/d)	5700/2800	b	3300/NA	c	3300/NA	c	3300/NA	c	NA	
Soil/skin adherence factor (mg/cm^2)	0.07	c	0.2	c	0.2	c	0.2115	h	NA	
dermal absorption factor (unitless)	chem specific		chem specific		chem specific		chem specific		NA	
inhalation rate, adult/child (m^3/d)	20 / 8.3	d, h	20 /NA	c	20 /NA	c	20 /NA	c	15.2 / 8.3	d, h
inhalation rate, adjusted (m^3 yr/kg d)	11 (adjusted)	g	NA		NA		NA		NA	
particulate emission factor (m^3/kg)	9.30E+09	c	9.30E+09	c	9.30E+09	c	6.75E+07	e	NA	
volatilization factor (m^3/kg)	chem specific		chem specific		chem specific		chem specific		NA	
particulate concentration (mg/m^3)	NA		NA		NA		NA		0.005	d

Notes:

a For noncancer: PEA (DTSC 1999). For cancer: 1E-06 used for residential-based scenarios (PEA, DTSC, 1999), and 1E-05 used for industrial/construction based-scenarios
b Preliminary Endangerment Assessment Guidance Manual (DTSC, 1999), and Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites
c RAGS, Supplemental Guidance Standard Default Exposure Factors (USEPA, 1991), and Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater
d CTX report text.
e Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA, 2001)
f values are for cancer / noncancer calculations (Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, SFRWQCB, 2003)
g Region 9 PRGs (USEPA, 2002)
h Exposure Factors Handbook, Volume 1 (USEPA, 1997)
i Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Vol.2 (SFRWQCB, 2003)

No State guidance is available for the frequency that a worker spends in checking conditions along a railroad right-of-way (exposure frequency, Table B-2). A value of 90 days per year was used for a similar project using input from the railroad industry (ERM, 2002). However, the report quoted a value of 100 days per year in the text, and this is the value that the DTSC (October 1, 2004 memorandum) has recommended we use for this assessment.

Similarly, no State guidance is available for the exposure frequency or the soil ingestion rate of a construction worker involved in soil excavation activities. The value used for this assessment (330 milligrams per day [mg/day]) is recommended specifically for such activity by the U.S. EPA (2001). The incidental soil ingestion rate for adults not engaged in construction activities (i.e., 75 milligrams per day) was recommended by the DTSC (telephone conference August 13, 2004) as intermediate between 50 and 100 milligrams per day.

Age-specific values for inhalation rates were used for this assessment to match the age-specific age ranges defined for the adults and children, and for consistency with the ERM, 2002. Accordingly, the recommended inhalation rates for children aged 3 to 5 years (8.3 m^3/day) were used for children, and the recommended inhalation rates for adults aged 19 to 65 years (15.2 m^3/day) were used for adults (U.S.EPA, 1997).

Default particulate emission factors (PEFs) and volatilization factors (VFs) and their calculation methods are presented by U.S. EPA (2002) and the San Francisco RWQCB (2005). The values for PEF and VF used for this assessment were made using the recommended calculation methods and more site-specific values for some of the components of these parameters. A Q/C term is used for evaluating atmospheric dispersion in the calculation for both the PEF and the VF. The Q/C term for a 1-acre source in the climatic zone for the San Francisco Bay area (78.51 grams/m^2 per kg/m^3) was used in place of the default value for a half-acre site in the climatic zone for Minneapolis (U.S. EPA, 1996b). Site-specific wind and soil conditions are also involved in the calculation of PEF. For the purpose of this assessment, the average annual wind velocity for San Jose over the 10 years from 1992 to 2002 (2.9 meters per second, San Jose Air Airport www.calclim.dri.edu/ccda/comparative/avgwind.html) and soil texture information representative of anticipated site conditions (i.e., bare soil of a texture similar to a plowed field, Cowherd et al, 1985) were used to make the PEF term more site-specific.

It should be noted that the value for PEF used for the construction scenario (6.75E+07 m^3/kg) was calculated according to Appendix 2, Table 4 in the San Francisco RWQCB (2005) guidance, and described in the equation below.

$$PEF = \frac{Q/C}{Jw} \qquad \text{Equation 4-6}$$

Where:

PEF = particulate emission factor (m^3/kg)

Q/C = inverse of the mean concentration at the center of a 1-acre site in San Francisco (78.51 g/m^2-second per kg/m^3)

Jw = PM10 emission flux (g/m^2–second)

The recommended value for the construction dust emission flux (1.2 tons/month-acre or 1.16E-06 g/m^2-second) was used along with the site-specific Q/C discussed above to estimate the value for PEF used to represent the construction scenario.

In the case of VF, the default value for the exposure duration term used in the VF calculation (30 years or 9.5E+08 seconds) was used for the assessment of the residential scenarios, and the corresponding values for the exposure duration (converted to seconds) for each of the other scenarios were used in place of the default for Scenarios 2 (25 years), 3 (25 years) , and 4 (seven years and one year for the carcinogenic and noncarcinogenic calculations, respectively).

To estimate the risk-based level of soil lead for the off-site residential scenario, it is assumed that residents are exposed to background levels of lead in soil and groundwater, and the model was than used to estimate the concentration of lead in air corresponding to a blood lead level of 10 μg/l. The modeled air concentration was then used to calculate the corresponding soil concentration as follows:

$$Cs = \frac{C_{part}}{C_{dust}} \text{ x CF1 x CF2} \qquad \text{Equation 4-7}$$

Where:

Cs = scenario-specific reuse concentration (mg/kg)
C_{part} = concentration of lead in air particulates ($\mu g/m^3$)

C_{dust} = concentration of particulates in air (mg/m^3)
CF1 = conversion factor (1E+06 mg/kg)
CF2 = conversion factor (1E-03 mg/μg)

Note that the term C_{dust} is equivalent to the term PC used in equations 4-2 and 4-5, above.

It should also be noted that the approach represented by Equation 4-7 is expected to under-estimate the concentration of lead in soil corresponding to an acceptable risk (and is thus health-protective) because it assumes that all the lead in soil is associated with respirable sized particles, and the approach does not account for the decreases in dust levels resulting from dispersion, and thus assumes the receptors are located right at the source rather than off site.

4.5 ARSENIC BIOAVAILABILITY

An unknown but significant amount of the roadbed material at this site is believed to recycled slag from smelters. This has important consequences for this project because such slag is known to contain elevated concentrations of various metals, such as arsenic. However, it is also widely known that arsenic, while in the slag matrix, is relatively stable. In particular, even under the low acid conditions of the stomach, arsenic is known to be only sparingly leached from the slag matrix. Therefore, arsenic in slag has a very low bioavailability. Typically, when *in vivo* studies are performed to determine the toxicity of arsenic, arsenic is administered to the subjects as solutions of sodium arsenate. However, the low bioavailability of arsenic in slag means that it is likely to be absorbed into the subject at a greatly reduced rate compared to the arsenic in solution. This reduced absorption (referred to as relative bioavailability or just bioavailability) depends on the specific source of the slag, but has been measured in a review performed by EPA Region 8 using various mammalian species and various sources of smelter slag to range from seven to 51 percent of a sodium arsenate solution (U.S. EPA, 1997). This review included both mine tailings and smelter slag, and found the values for smelter slag values were 7%, 10%, 15%, 18%, and 51%. Although the 51% appears to be an outlier, the average is 20%, and is 12.5% excluding the outlier. For the purpose of this assessment a value of 20% is used. This value is considered conservative because the information in the literature suggests that a more representative value for slag is probably closer to 12%.

5.0 RESULTS

Risk-based soil reuse concentrations were calculated for the COPCs identified at the project site. Site-specific concentrations were calculated for each of the reuse scenarios discussed in Section 2.3 of this report. The risk-based calculations are presented in Attachment B-1. As discussed previously, reuse concentrations were calculated for both cancer and noncancer health impacts. Except for the excavation reuse scenario, if one chemical has both cancer and noncancer endpoints, the lowest of the two was used as the risk-based reuse concentration. At the recommendation of the DTSC, the noncancer reuse levels are used for the excavation reuse scenario because construction activities are expected to result in only short-term exposures The resulting risk-based reuse concentrations for the chemicals detected at the site are summarized in **Table B-3**. The risk-based calculations used to obtain the results presented for lead in **Table B-3** are provided in Attachment B-1 of this appendix, and are summarized in **Table B-4**.

Table B-3 - Summary of Site-Specific Reuse Values

	Reuse Exposure Scenarios				
Chemical	Scenario 1 Residential	Scenario 2 Industrial	Scenario 3 Right-of-Way	Scenario 4 Construction	Multiuse Scenario Residential
Metals					
Arsenic	0.21	8.7	21.8	830	181
Barium	5,475	95,385	100,000	38,712	52,771
Beryllium	156.4	2,725	6,813	1,106	204
Cadmium	39.1	681	1,703	277	114
Chromium	1,469	31,682	79,205	100,000	NA
Cobalt	1,564	27,253	68,128	11,061	2,149
Copper	3,129	54,506	100,000	22,121	NA
Lead	213	646	1,615	262	100,000
Mercury	23.5	409	1,022	166	9,687
Molybdenum	391.1	6,813	17,033	2,765	NA
Nickel	3,911	68,132	170,326	27,652	1,881
Selenium	391.1	6,813	17,033	2,765	100,000
Silver	391.1	6,813	17,033	2,765	NA
Thallium	5.2	90	225	37	NA
Vanadium	78.2	1,363	3,407	553	NA
Zinc	23,464	100,000	100,000	100,000	100,000
SVOCs					
Aroclor 1260	0.09	3.4	8.5	16	856
Pesticides					
p,p'-DDE	1.63	77.9	194.8	277	5,033
p,p'-DDT	1.63	77.9	194.8	277	5,033
Pentachlorophenol	4.41	147.2	368.0	3125.9	95,073
alpha Chlordane	0.44	21.7	54.3	274.3	1,426
gamma Chlordane	0.44	21.7	54.3	274.3	1,426
Dieldrin	0.03	1.7	4.1	21.9	107
Endrin aldehyde	23.5	409	1,022	166	100,000
Toxaphene	0.46	22.1	55.2	291.5	1,426
VOCs					
t-Butanol	22,516	50,164	100,000	25,093	NA
Ethyl benzene	4,452	9,601	24,003	3,693	NA
Toluene	555	1,143	2,856	588	NA
Xylenes	1,939	4,018	10,044	2,067	NA

Notes:

NA = Not applicable

If calculated value exceeds 100,000 mg/kg, the value presented defaults to 100,000 mg/kg consistent with the ceiling limit of 100,000mg/kg used by the USEPA Region 9 PRGs.

Table B-4 - Summary of Lead Reuse Values

Reuse Exposure Scenario	Description	Receptor	Soil Lead Concentration [1] (mg/kg)
1	On/Off-site Residential	adult child	903 213
2	On-site industrial	adult	646
3	Right-of-way	adult	1,615
4	Construction	adult	262
multiuse	Off-site residential exposed to on-site soil via wind-blown dust	adult child	344,000 368,000

Notes:

[1] Values for scenario 1 and the multipurpose land use were derived using LeadSpread7
Values for the scenarios 2, 3, and 4 were derived using the Adult Lead Model, see text.
A heterogeneous worker population was assumed with a geometric standard deviation of 2.0 and a baseline blood concentrtion of 1.96 μg/dl.

Multiuse scenario calculations:

adult: (1.72 ug/m^3 / 0.005 mg/m^3) x 10^6 mg/kg x 10^{-3} mg/ug = 344,000 mg/kg, see text

child: (1.83 ug/m^3 / 0.005 mg/m^3) x 10^6 mg/kg x 10^{-3} mg/ug = 368,000 mg/kg, see text

mg/kg = milligrams per kilogram

6.0 UNCERTAINTY

Understanding the major uncertainties assists with the interpretation of the risk characterization results. In general, the HHRA process operates in a "cascade" fashion, whereby each phase relies on information generated in the previous phase. If uncertainty is introduced at any stage in the process, this uncertainty is carried along through each of the subsequent risk assessment phases. When successive uncertainties introduce health-protective biases, the final risk-based concentrations will incorporate a significant safety factor, and be very protective of human health. Examples of uncertainties involved in each major step of the risk assessment process (i.e., exposure assessment, toxicity assessment, and risk characterization) are discussed separately below.

6.1 UNCERTAINTIES IN EXPOSURE ASSESSMENT

The identification of receptor groups for each reuse scenario is thought to represent a health-protective selection of future land uses. For example, unrestricted use is represented by the residential scenario, which is expected to be far more health protective than the selection of an industrial land use scenario, for which such soil could also be used.

Similarly, the use of the industrial scenario to represent restricted off-site use or for the construction of stations or the maintenance facility is also expected to be protective of human health because it is likely that the workers and commuters will not be exposed to site soil at the levels assumed for this scenario. Commuters are not likely to contact soil at all because the stations are expected to be paved and landscaped. While offsite use is difficult to anticipate, workers at the maintenance facility are likely to spend more time indoors rather than the assumption used for this assessment that they spend their entire day in contact with site soil. Thus, while considerable uncertainty is associated with the exposure scenarios used to represent the various reuse scenarios, the uncertainties are biased toward health protection.

Most of the values used for the exposure parameters listed in Table B-2 and those used for the lead evaluation are the default values recommended by State and Federal risk guidance to represent reasonable maximum exposure conditions. As such, they inherently introduce uncertainty biased toward an over-estimation of risk. The factors that incorporate some degree of site-specificity (e.g., PEF, VF, ingestion rate for the construction scenario) tend to reduce the bias to a more neutral level (i.e., neither over-nor underestimating). Taken together, these factors serve to produce risk-based criteria that significantly underestimate the concentration corresponding to the risk-based reuse levels calculated for each scenario.

A significant amount of uncertainty is associated with the fact that metals in soil tend to be less available following ingestion than is expressed by the toxicity criteria used to estimate their toxic effects. This particularly true for arsenic. This uncertainty comes from a variety of sources, the most important of which concerns the source of arsenic in site soil. A certain level of arsenic is likely to be naturally occurring in these soils. Naturally occurring background arsenic soil levels for California have been documented to range from 0.6 to 11.0 mg/kg (Bradford, 1996). In the southern portion of the San Francisco Bay, where the subject site is located, levels have been documented to range from less the 0.5 to 20 mg/kg (Scott, 1995). This is important because numerous studies have conducted *in vivo* bioavailability tests which show that generally less than 50 percent of the arsenic detected in soil is released within the human gastrointestinal tract and considered to be biologically available (Ruby, 1999). However, the situation at this site is further complicated by the fact that some of the arsenic comes from the historical use of smelter slag as road base material. As discussed in Section 4.5, the bioavailability of arsenic and lead in slag is even less than in soil. To account for this, a value of 20 percent was used for bioavailability in the calculations of risk-based reuse levels. Although the bioavailability of arsenic in slag from a variety of sources ranges from about 7 to 51 percent, the use of 20 percent for this assessment is considered health protective because the bulk of the measured values are less than 20 percent. However, this factor represents a source of uncertainty for these calculations.

6.2 UNCERTAINTIES IN TOXICITY ASSESSMENT

Toxicity assessment involves the selection of noncancer toxicity indices (i.e., RfDs) and CSFs. RfDs are developed using animal data that must be extrapolated to human receptors in the HHRA process. This animal-to-human extrapolation process typically involves application of several uncertainty factors (UFs) and modifying factors applied to animal test data that drive calculated RfD to very conservative values. For instance, a UF of 10 is routinely applied to animal data to reduce a threshold dose ten-fold to arrive at the RfD. This UF is based on the assumption that humans are inherently 10-times more sensitive than the laboratory animal to the substance. This application of the UFs is likely to overestimate noncarcinogenic toxicity, as noted by Dourson et. al. (1992).

Slope factors developed by the U.S. EPA are conservative, and represent the upper bound limit (i.e., upper 95 percent UCL) probability of a cancer response occurring. Thus, the actual carcinogenic risk due to exposure to selected chemicals is likely to be lower than the calculated risk. One other source of uncertainty in the toxicity assessment lies in extrapolating experimental carcinogenic observations at high doses to the low doses experienced by the human population of interest. Because there is no empirical way to detect risks below the 5 to 10 percent range, the shape of the dose-response curve in the low dose region (Rodricks 1992) can only be hypothesized. Because the standard default approach is to assume that all carcinogens have a linear, no-threshold dose-response curve, the cancer potency for carcinogenic COPCs (e.g., arsenic, benzo(a)pyrene, etc.) is likely overestimated.

U.S. EPA guidance indicates that carcinogenic risks and HQs resulting from various multiple chemicals should be considered additive (U.S. EPA 1989). In the absence of supporting data for synergy or antagonism, the assumption of additively could overestimate or underestimate potential cancer risk or HQs for receptors.

6.3 UNCERTAINTY CONCLUSION

Given that virtually all of the major sources of uncertainty described in this Section are identified as resulting in overestimations of cancer risks and noncancer hazard, it is concluded that the chemical-specific risk-based concentrations calculated for each reuse scenario correspond to risk levels significantly less than the target levels used for the calculations (i.e., cancer target risk of 1E-06 for residential exposure and 1E-05 for industrial and construction, and a noncancer hazard index of 1). Thus, the calculated reuse levels are protective of human health.

7.0 REFERENCES

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ATTACHMENT B-1

RISK-BASED CALCULATIONS FOR REUSE SCENARIOS

Residential Exposure Scenario, Cancer Risks

$$C(mg/kg) = \frac{TR \times AT_c}{EF \times \left[\left(\frac{CSF_o \ x \ IRs_{adj}}{CF}\right) + \left(\frac{SFS \ \times CSF_o \times ABS}{CF}\right) + \left(\frac{IRa,_{adj} \ x \ CSF_i}{PEF}\right) + \left(\frac{IRa_{adj} \ x \ CSF_i}{VF}\right)\right]}$$

Symbol		
C	concentration in soil (mg/kg)	calculated
TR	target hazard quotient	1.00E-06
CSFo, CSFi	cancer slope factor - oral, inhalation (1/mg/kg-d)	chem specific
ATc	averaging time for carcinogens - (d)	25550
EF	exposure frequency - residential (d/y)	350
IRsadj	soil ingestion rate, age adjusted - (mg - yr/kg - d)	114
CF	conversion factor (mg/kg)	1.00E+06
SFadj	dermal soil factor, age-adjusted (mg - yr/kg - d)	361
AFc	Soil/skin adherance factor (mg/cm^2)	0.07
ABS	dermal absorbtion factor (unitless)	chem specific
IRa, adj	inhalation rate, age-sdjusted (m^3 -yr/kg - d)	11
PEF	particulate emission factor (m^3/kg)	9.30E+09
VF	volatilization factor (m^3/kg)	chem specific
	arsenic bioavailability	0.2

Chemical	CSFo	CSFi	ABS	risk-based concentration (mg/kg)
Metals				
Arsenic	9.45E+00	1.20E+01	0.04	0.21
Barium	NA	NA	0.01	NA
Beryllium	NA	8.40E+00	0.01	7,347
Cadmium	NA	1.50E+01	0.001	4,115
Chromium	NA	4.20E+01	0.01	1,469
Cobalt	NA	NA	0.01	NA
Copper	NA	NA	0.01	NA
Mercury	NA	NA	0.1	NA
Molybdenum	NA	NA	0.01	NA
Nickel	NA	9.10E-01	0.0002	67,822
Selenium	NA	NA	0.01	NA
Silver	NA	NA	0.01	NA
Thallium	NA	NA	0.01	NA
Vanadium	NA	NA	0.01	NA
Zinc	NA	NA	0.01	NA
SVOCs				
Aroclor 1260	5.00E+00	2.00E+00	0.14	0.09
Pesticides				
p,p'-DDE	3.40E-01	3.40E-01	0.05	1.63
p,p'-DDT	3.40E-01	3.40E-01	0.05	1.63
Pentachlorophenol	8.10E-02	1.80E-02	0.25	4.41
alpha Chlordane	1.3	1.2	0.04	0.44
gamma Chlordane	1.3	1.2	0.04	0.44
Dieldrin	16	16	0.05	0.03
Endrin aldehyde	NA	NA	0.05	NA
Toxaphene	1.2	1.2	0.05	0.46

Residential Exposure Scenario, Cancer Risks

			VF	
VOCs				
t-Butanol	NA	NA	4.93E+04	NA
Ethyl benzene	NA	NA	4.67E+03	NA
Toluene	NA	NA	3.46E+03	NA
Xylenes	NA	NA	5.27E+03	NA

Notes:

SVOCs = Semivolatile organic chemicals
VOCs = Volatile organic chemicals
CSFo = Oral cancer slope potency factor
CSFi = Inhalation cancer slope potency factor

Residential Exposure Scenario, Noncancer Risks

$$C(\mathrm{mg/kg}) = \frac{THQ \times BW_c \times AT_n}{EF_r \times ED_c \times \left[\left(\frac{IRs_c}{RfD_o \times CF}\right) + \left(\frac{SA_c \times AF_c \times ABS}{RfD_o \times CF}\right) + \left(\frac{IRi_c}{RfD_i \text{ x } PEF}\right) + \left(\frac{IRi_c}{RfD_i \times VF}\right)\right]}$$

Symbol		
C	concentration in soil (mg/kg)	calculated
THQ	target hazard quotient	1
RfDo, RfDi	reference dose - oral, inhalation (mg/kg-d)	chem specific
BW_c	body weight - (kg)	15
AT_n	averaging time for noncarcinogens - (d)	2190
EF_r	exposure frequency - residential (d/y)	350
ED_c	exposure duration - (y)	6
IRs_c	soil ingestion rate - (mg/d)	200
CF	conversion factor (mg/kg)	1.00E+06
SAc	skin surface area, child (cm^2/d)	2800
AFc	Soil/skin adherance factor (mg/cm^2)	0.2
ABS	dermal absorbtion factor (unitless)	chem specific
IRi_c	inhalation rate (m^3/d)	8.3
PEF	particulate emission factor (m^3/kg)	9.30E+09
VF	volatilization factor (m^3/kg)	chem specific
	arsenic bioavailability	0.2

Chemical	RfDo	RfDi	ABS	risk-based concentration (mg/kg)
Metals				
Arsenic	3.00E-04	8.6E-06	0.04	117.3
Barium	7.00E-02	1.4E-04	0.01	5,475
Beryllium	2.00E-03	5.7E-06	0.01	156.4
Cadmium	5.00E-04	5.7E-06	0.001	39.1
Chromium	1.50E+00	NA	0.01	100,000
Cobalt	2.00E-02	5.7E-06	0.01	1,564
Copper	4.00E-02	NA	0.01	3,129
Mercury	3.00E-04	2.6E-05	0.1	23.5
Molybdenum	5.00E-03	NA	0.01	391.1
Nickel	5.00E-02	1.4E-05	0.0002	3,911
Selenium	5.00E-03	5.7E-03	0.01	391.1
Silver	5.00E-03	NA	0.01	391.1
Thallium	6.60E-05	NA	0.01	5.2
Vanadium	1.00E-03	NA	0.01	78.2
Zinc	3.00E-01	NA	0.01	23,464
SVOCs				
Aroclor 1260	2.0E-05	2.00E-05	0.14	1.6
Pesticides				
p,p'-DDE	5.00E-04	5.0E-04	0.05	39.1
p,p'-DDT	5.00E-04	5.0E-04	0.05	39.1
Pentachlorophenol	3.00E-02	3.0E-02	0.25	2,346
alpha Chlordane	5.00E-04	2.0E-04	0.04	39.1
gamma Chlordane	5.00E-04	2.0E-04	0.04	39.1
Dieldrin	5.00E-05	5.0E-05	0.05	3.9

Residential Exposure Scenario, Noncancer Risks

Endrin aldehyde	3.00E-04	3.0E-04	0.05		23.5
Toxaphene	NA	NA	0.05		NA
VOCs				VF	
t-Butanol	0.3	3.00E-01		4.93E+04	22,516
Ethyl benzene	0.1	5.71E-01		4.67E+03	4,452
Toluene	2.00E-01	8.57E-02		3.46E+03	555
Xylenes	2.00E-01	2.00E-01		5.27E+03	1,939

Notes:

SVOCs = Semivolatile organic chemicals
VOCs = Volatile organic chemicals
ABS = dermal absorption factor
VF = volatilization factor
RfDo = Chronic oral reference dose
RfDi = Chronic inhalation reference dose
iso butanol used as surrogate for t-butanol
endrin aldehyde evaluated as endrin
Calculations are for child only, in accordacne with "DTSC PRGs" which use EPA PRG guidance
If calculated value exceeds 100,000mg/kg, the value presented defaults to 100,000mg/kg consistent with the ceiling limit of 100,000mg/kg used by the USEPA Region 9 PRGs.

Industrial, Right-Of-Way, and Construction Scenarios, Cancer Risks

Risk-Based Cleanup Goals for Carcinogenic Risk

$$C(mg/kg) = \frac{TR \times BW \times ATc}{EF \times ED \times \left[\left(\frac{IRs \times CSFo}{CF}\right) + \left(\frac{SA \times AF \times ABS \times CSFo}{CF}\right) + \left(\frac{IRa \times CSFi}{PEF}\right) + \left(\frac{IRa \times CSFi}{VF}\right)\right]}$$

Symbol	Definition	ind onsite	ROW	construct
C	concentration in soil (mg/kg)	calculated	calculated	calculated
TR	target hazard quotient	1.00E-05	1.00E-05	1.00E-05
BW	body weight (kg)	70	70	70
CSFo, CSFi	cancer slope factor - oral, inhalation(1/mg/kg-d)	chem specific	chem specific	chem specific
ATc	averaging time for carcinogens - (d)	25550	25550	25550
EF	exposure frequency - (d/y)	250	100	20
ED	exposure duration - (y)	25	25	7
IRs	soil ingestion rate - (mg/d)	75	75	330
CF	conversion factor (mg/kg)	1.00E+06	1.00E+06	1.00E+06
SA	skin surface area (cm^2/day)	3300	3300	3300
AF	Soil/skin adherance factor (mg/cm^2)	0.2	0.2	0.21
ABS	dermal absorption factor (unitless)	chem specific	chem specific	chem specific
IRa,	inhalation rate (m^3/d)	20	20	20
PEF	particulate emission factor (m^3/kg)	9.30E+09	9.30E+09	6.75E+07
VF	volatilization factor (m^3/kg)	chem specific	chem specific	chem specific
	arsenic bioavailability	0.2	0.2	0.2

Chemical	CSFo	CSFi	ABS	risk-based concentration (mg/kg)		
Metals						
Arsenic	9.45E+00	1.20E+01	0.03	8.7	21.8	154.8
Barium	NA	NA	0.01	NA	NA	NA
Beryllium	NA	8.40E+00	0.01	100,000	100,000	51,328
Cadmium	NA	1.50E+01	0.001	88,710	100,000	28,744
Chromium	NA	4.20E+01	0.01	31,682	79,205	10,266
Cobalt	NA	NA	0.01	NA	NA	NA
Copper	NA	NA	0.01	NA	NA	NA
Mercury	NA	NA	0.1	NA	NA	NA
Molybdenum	NA	NA	0.01	NA	NA	NA

Industrial, Right-Of-Way, and Construction Scenarios, Cancer Risks

Nickel	NA	9.10E-01	0.0002				100,000	100,000	100,000
Selenium	NA	NA	0.01				NA	NA	NA
Silver	NA	NA	0.01				NA	NA	NA
Thallium	NA	NA	0.01				NA	NA	NA
Vanadium	NA	NA	0.01				NA	NA	NA
Zinc	NA	NA	0.01				NA	NA	NA
SVOCs									
Aroclor 1260	5.00E+00	2.00E+00	0.14				3.4	8.5	59.7
Pesticides									
p,p'-DDE	3.40E-01	3.40E-01	0.05				77.9	194.8	1028.9
p,p'-DDT	3.40E-01	3.40E-01	0.05				77.9	194.8	1028.9
Pentachlorophenol	8.10E-02	1.80E-02	0.25				147.2	368.0	3125.9
alpha Chlordane	1.3	1.2	0.04				21.7	54.3	274.3
gamma Chlordane	1.3	1.2	0.04				21.7	54.3	274.3
Dieldrin	16	16	0.05				1.7	4.1	21.9
Endrin aldehyde	NA	NA	0.05				NA	NA	NA
Toxaphene	1.2	1.2	0.05				22.1	55.2	291.5
VOCs				VFind	VFrow	VFconst			
t-Butanol	NA	NA		3.73E+04	3.73E+04	2.38E+04	NA	NA	NA
Ethyl benzene	NA	NA		3.54E+03	3.54E+03	2.25E+03	NA	NA	NA
Toluene	NA	NA		2.62E+03	2.62E+03	1.67E+03	NA	NA	NA
Xylenes	NA	NA		3.99E+03	3.99E+03	2.54E+03	NA	NA	NA

Notes:

SVOCs = Semivolatile organic chemicals
VOCs = Volatile organic chemicals
CSFo = Oral cancer slope potency factor
CSFi = Inhalation cancer slope potency factor
ABS = dermal absorption factor
VF = volatilization factor
iso butanol used as surrogate for t-butanol
endrin aldehyde evaluated as endrin
If calculated value exceeds 100,000mg/kg, the value presented defaults to 100,000mg/kg consistent with the ceiling limit of 100,000 mg/kg used by the USEPA Region 9 PRGs

Industrial, Right-of-Way, and Construction Scenarios, Noncancer Risks

$$C(mg/kg) = \frac{THQ \times BW \times AT_n}{EF \times ED \times \left[\left(\frac{IRs}{RfD_o \times CF}\right) + \left(\frac{SA \times AF \times ABS}{RfD_o \times CF}\right) + \left(\frac{IRa}{RfD_i \text{ x } PEF}\right) + \left(\frac{IRa}{RfD_i \times VF}\right)\right]}$$

Symbol	**Definition**	ind onsite	ROW	construct
C	concentration in soil (mg/kg)	calculated	calculated	calculated
THQ	target hazard quotient	1	1	1
BW	body weight (kg)	70	70	70
RfDo, RfDi	reference dose - oral, inhalation(mg/kg-d)	chem specific	chem specific	chem specific
AT_n	averaging time for noncarcinogens - (d)	9125	9125	365
EF	exposure frequency - (d/y)	250	100	140
ED	exposure duration - (y)	25	25	1
IRs	soil ingestion rate - (mg/d)	75	75	330
CF	conversion factor (mg/kg)	1.00E+06	1.00E+06	1.00E+06
SA	skin surface area (cm^2/day)	3300	3300	3300
AF	Soil/skin adherance factor (mg/cm^2)	0.2	0.2	0.21
ABS	dermal absorption factor (unitless)	chem specific	chem specific	chem specific
IRa,	inhalation rate (m^3/d)	20	20	20
PEF	particulate emission factor (m^3/kg)	9.30E+09	9.30E+09	6.75E+07
VF	volatilization factor (m^3/kg)	chem specific	chem specific	chem specific
	arsenic bioavailability	0.2	0.2	0.2

	Chemical	RfDo	RfDi	ABS	risk-based concentration (mg/kg) ind onsite	ROW	construct
Metals							
	Arsenic	3.00E-04	8.57E-06	0.03	2,044	5,107	830
	Barium	7.00E-02	1.4E-04	0.01	95,385	100,000	38,712
	Beryllium	2.00E-03	5.7E-06	0.01	2,725	6,813	1,106
	Cadmium	5.00E-04	5.7E-06	0.001	681	1,703	277
	Chromium	1.50E+00	NA	0.01	100,000	100,000	100,000
	Cobalt	2.00E-02	5.7E-06	0.01	27,253	68,128	11,061
	Copper	4.00E-02	NA	0.01	54,506	100,000	22,121
	Mercury	3.00E-04	2.6E-05	0.1	409	1,022	166
	Molybdenum	5.00E-03	NA	0.01	6,813	17,033	2,765
	Nickel	5.00E-02	1.4E-05	0.0002	68,132	170,326	27,652
	Selenium	5.00E-03	5.7E-03	0.01	6,813	17,033	2,765
	Silver	5.00E-03	NA	0.01	6,813	17,033	2,765
	Thallium	6.60E-05	NA	0.01	90	225	37
	Vanadium	1.00E-03	NA	0.01	1,363	3,407	553
	Zinc	3.00E-01	NA	0.01	100,000	100,000	100,000

Industrial, Right-of-Way, and Construction Scenarios, Noncancer Risks

SVOCs										
	Aroclor 1260	2.0E-05	2.00E-05	0.14				27	68	16
Pesticides										
	p,p'-DDE	5.00E-04	5.00E-04	0.05				681	1,703	277
	p,p'-DDT	5.00E-04	5.00E-04	1.05				680	1,697	278
	Pentachlorophenol	3.00E-02	3.0E-02	0.25				40,866	102,110	16,591
	alpha Chlordane	5.00E-04	2.0E-04	0.04				681	1,703	277
	gamma Chlordane	5.00E-04	2.0E-04	0.04				681	1,703	277
	Dieldrin	5.00E-05	5.0E-05	0.05				68	170	28
	Endrin aldehyde	3.00E-04	3.0E-04	0.05				409	1,022	166
	Toxaphene	NA	NA	0.05				NA	NA	NA
VOCs					VFind	VFrow	VFconst			
	t-Butanol	0.3	3.00E-01		3.73E+04	3.73E+04	1.08E+04	50,164	100,000	25,093
	Ethyl benzene	0.1	5.71E-01		3.54E+03	3.54E+03	7.60E+02	9,601	24,003	3,693
	Toluene	2.00E-01	8.57E-02		2.62E+03	2.62E+03	7.56E+02	1,143	2,856	588
	Xylenes	2.00E-01	2.00E-01		3.99E+03	3.99E+03	1.15E+03	4,018	10,044	2,067

Notes:

SVOCs = Semivolatile organic chemicals
VOCs = Volatile organic chemicals
ABS = dermal absorption factor
VF = volatilization factor
RfDo = Chronic oral reference dose
RfDi = Chronic inhalation reference dose
iso butanol used as surrogate for t-butanol
endrin aldehyde evaluated as endrin
If calculated value exceeds 100,000mg/kg, the value presented defaults to 100,000mg/kg consistent with the ceiling limit of 100,000mg/kg used by the USEPA Region 9 P

Off-Site Residential Dust Exposure, Cancer Risks

$$C\ (\text{mg/kg}) = \frac{TR \times ATc \times CF}{CSF \times PC \times EF \times \left[\left(\frac{IRa \times EDa}{BWa}\right) + \left(\frac{IRc \times EDc}{BWc}\right)\right]}$$

Symbol		
C	concentration in soil (mg/kg)	calculated
TR	target risk	1.00E-06
BWc	body weight, child (kg)	15
Bwa	body weight, adult (kg)	70
CSFi	cancer slope factor - inhalation (1/mg/kg-d)	chem specific
ATc	averaging time for carcinogens - (d)	25550
EF	exposure frequency - residential (d/y)	350
EDc	exposure duration, child (yr)	6
EDa	exposure duration, adult (yr)	24
CF	conversion factor (kg/mg)	1.00E+06
IRc	inhalation rate, child (m^3/d)	8.3
IRa	inhalation rate, adult (m^3/d)	15.2
PC	particulate concentration (mg/m^3)	5.00E-03

Chemical	CSFi	risk-based concentration (mg/kg)
Metals		
Arsenic	9.45E+00	181
Barium	NA	NA
Beryllium	8.40E+00	204
Cadmium	1.50E+01	114
Chromium	NA	NA
Cobalt	NA	NA
Copper	NA	NA
Mercury	NA	NA
Molybdenum	NA	NA
Nickel	9.10E-01	1,881
Selenium	NA	NA
Silver	NA	NA
Thallium	NA	NA
Vanadium	NA	NA
Zinc	NA	NA
SVOCs		
Aroclor 1260	2.00E+00	856
Pesticides		
p,p'-DDE	3.40E-01	5,033
p,p'-DDT	3.40E-01	5,033
Pentachlorophenol	1.80E-02	95,073
alpha Chlordane	1.2	1,426
gamma Chlordane	1.2	1,426
Dieldrin	16	107
Endrin aldehyde	NA	NA
Toxaphene	1.2	1,426

Notes:

Off-Site Residential Dust Exposure, Cancer Risks

Off-site dust is treated differently than onsite dust to account for the passage of trains as the largest source, rather than fugitive dust for onsite receptors (CTX report)

Bioavailability of arsenic is not appropriate here because there is no ingestion route; just inhalation

SVOCs = Semivolatile organic chemicals
endrin aldehyde evaluated as endrin

If calculated value exceeds 100,000mg/kg, the value presented defaults to 100,000mg/kg consistent with the ceiling limit of 100,000mg/kg used by the USEPA Region 9 PRGs.

CSFi = Inhalation cancer slope potency factor

Off-Site Residential Dust Exposure, Noncancer Risks

$$C\ (mg/kg) = \frac{CF \times RfDi \times BWc \times ATn \times THQ}{PC \times IRc \times EF \times EDc}$$

Symbol		
C	concentration in soil (mg/kg)	calculated
THQ	target hazard quotient	1.00E+00
BWc	body weight, child (kg)	15
CSFi	cancer slope factor - inhalation (1/mg/kg-d)	chem specific
Atn	averaging time for carcinogens - (d)	2190
EF	exposure frequency - residential (d/y)	350
EDc	exposure duration, child (yr)	6
CF	conversion factor (kg/mg)	1.00E+06
IRc	inhalation rate, child (m^3/d)	8.3
PC	particulate concentration (mg/m^3)	5.00E-03

Chemical	RfDi	risk-based concentration (mg/kg)
Metals		
Arsenic	8.6E-06	3,230
Barium	1.4E-04	52,771
Beryllium	5.7E-06	2,149
Cadmium	5.7E-06	2,152
Chromium	NA	NA
Cobalt	5.7E-06	2,149
Copper	NA	NA
Mercury	2.6E-05	9,687
Molybdenum	NA	NA
Nickel	1.4E-05	5,390
Selenium	5.7E-03	2,152,306
Silver	NA	NA
Thallium	NA	NA
Vanadium	NA	NA
Zinc	NA	NA
SVOCs		
Aroclor 1260	2.00E-05	7,539
Pesticides		
p,p'-DDE	5.0E-04	100,000
p,p'-DDT	5.0E-04	100,000
Pentachlorophenol	3.0E-02	100,000
alpha Chlordane	2.0E-04	75,387
gamma Chlordane	2.0E-04	75,387
Dieldrin	5.0E-05	18,847
Endrin aldehyde	3.0E-04	100,000
Toxaphene	NA	NA

Notes:

Off-Site Residential Dust Exposure, Noncancer Risks

Off-site dust is treated differently than onsite dust to account for the passage of trains as the largest source, rather than fugitive dust for onsite receptors (CTX report)

Bioavailability of arsenic is not appropriate here because there is no ingestion route; just inhalation

SVOCs = Semivolatile organic chemicals
endrin aldehyde evaluated as endrin

Calculations are for child only, in accordance with "DTSC PRGs" which use EPA PRG guidance

If calculated value exceeds 100,000mg/kg, the value presented defaults to 100,000mg/kg consistent with the ceiling limit of 100,000mg/kg used by the USEPA Region 9 PRGs.

RfDi = Chronic inhalation reference dose

Results Applicable to the Off-Site Residential Scenario

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE **to version 7**

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.0117
Lead in Soil/Dust (ug/g)	11.4
Lead in Water (ug/l)	2
% Home-grown Produce	7%
Respirable Indoor Dust (ug/m^3)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	0.4	0.7	0.8	1.0	1.2	903	1289
BLOOD Pb, CHILD	0.8	1.4	1.7	2.1	2.4	213	315
BLOOD Pb, PICA CHILD	0.9	1.6	1.9	2.3	2.6	137	202
BLOOD Pb, OCCUPATIONAL	0.4	0.7	0.8	1.0	1.1	4610	6588

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2800
Skin area occupational	cm^2	3300	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/day)	0.00011	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/day)	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/day)	0.082	0.192
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in produce	ug/kg	5.1	

PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	4.2E-5	0.00	0%	1.7E-5	0.00	0%
Soil Ingestion	8.8E-4	0.01	3%	6.3E-4	0.01	2%
Inhalation1		0.02	5%		0.01	4%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.11	29%		0.11	31%
Food Ingestion1		0.22	56%		0.23	64%
Food Ingestion	2.4E-3	0.03	7%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.9E-5	0.00	0%		0.00	0%
Soil Ingestion	7.0E-3	0.08	10%	1.4E-2	0.16	18%
Inhalation1	1.5E-6	0.00	0%		0.00	0%
Inhalation		0.02	2%		0.02	2%
Water Ingestion		0.13	16%		0.13	15%
Food Ingestion, child		0.50	64%		0.50	58%
Food Ingestion	5.5E-3	0.06	8%		0.06	7%

Reuse Scenario 2: On-Site Industrial

Calculations of Preliminary Remediation Goals (PRGs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PRG Equation[1] 1*	PRG Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario GSDi = Het
$PbB_{fetal, 0.95}$	X	X	95th percentile PbB in fetus	ug/dL	10
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.96
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.075
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	250
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	days/yr	365
PRG			**Preliminary Remediation Goal**	**ppm**	**646**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same PRG.

***Equation 1, based on Eq. 4 in USEPA (1996).**

$$\textbf{PRG} = \frac{([PbB_{95}fetal/(R*(GSD_i^{1.645})])-PbB_0)*AT_{S,D}}{BKSF*(IR_{S+D}*AF_{S,D}*EF_{S,D})}$$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Reuse Scenario 4: Construction

Calculations of Preliminary Remediation Goals (PRGs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PRG Equation[1] 1*	PRG Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario GSDi = Het
$PbB_{fetal,\ 0.95}$	X	X	95th percentile PbB in fetus	ug/dL	10
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.96
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.330
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--
$AF_{S,\ D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S,\ D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	140
$AT_{S,\ D}$	X	X	Averaging time (same for soil and dust)	days/yr	365
PRG			**Preliminary Remediation Goal**	**ppm**	**262**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same PRG.

***Equation 1, based on Eq. 4 in USEPA (1996).**

$$\mathbf{PRG} = \frac{([PbB_{95}fetal/(R*(GSD_i^{1.645})])-PbB_0)*AT_{S,D}}{BKSF*(IR_{S+D}*AF_{S,D}*EF_{S,D})}$$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Reuse Scenario 3: Right-Of-Way

Calculations of Preliminary Remediation Goals (PRGs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 05/19/03

Exposure Variable	PRG Equation[1] 1*	PRG Equation[1] 2**	Description of Exposure Variable	Units	Values for Non-Residential Exposure Scenario GSDi = Het
$PbB_{fetal, 0.95}$	X	X	95th percentile PbB in fetus	ug/dL	10
$R_{fetal/maternal}$	X	X	Fetal/maternal PbB ratio	--	0.9
BKSF	X	X	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	X	X	Geometric standard deviation PbB	--	2.0
PbB_0	X	X	Baseline PbB	ug/dL	1.96
IR_S	X		Soil ingestion rate (including soil-derived indoor dust)	g/day	0.075
IR_{S+D}		X	Total ingestion rate of outdoor soil and indoor dust	g/day	--
W_S		X	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--
K_{SD}		X	Mass fraction of soil in dust	--	--
$AF_{S, D}$	X	X	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	X	X	Exposure frequency (same for soil and dust)	days/yr	100
$AT_{S, D}$	X	X	Averaging time (same for soil and dust)	days/yr	365
PRG			**Preliminary Remediation Goal**	**ppm**	**1,615**

[1] Equation 1 does not apportion exposure between soil and dust ingestion (excludes W_S, K_{SD}).
When $IR_S = IR_{S+D}$ and $W_S = 1.0$, the equations yield the same PRG.

***Equation 1, based on Eq. 4 in USEPA (1996).**

$$\textbf{PRG} = \frac{([PbB_{95}fetal/(R*(GSD_i^{1.645})])-PbB_0)*AT_{S,D}}{BKSF*(IR_{S+D}*AF_{S,D}*EF_{S,D})}$$

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

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LIST OF ABBREVIATIONS AND ACRONYMS

BART	Bay Area Rapid Transit
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
ER	effects range
ERA	ecological risk assessment
ER-L	effects range-low
ER-M	effects range-median
mg/kg	milligrams per kilogram
MPZ	migration potential zone
NOAA	National Oceanic and Atmospheric Administration
ROW	right of way
RWQCB	Regional Water Quality Control Board, San Francisco Bay Region
SVRT	Silicon Valley Rapid Transit
TEPH	total extractable petroleum hydrocarbons
TPH	total petroleum hydrocarbons
UP	Union Pacific Railroad
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
VTA	Santa Clara Valley Transportation Authority

1.0 INTRODUCTION

In order to evaluate risks to potential ecological receptors, a screening level ecological risk assessment (ERA) has been performed for the Silicon Valley Rapid Transit (SVRT) project. The screening level ERA generally follows the guidance in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments - Interim Final* (U.S. EPA, 1997). The ERA includes a summary of site information as it pertains to ecological receptors, problem formulation, and screening-level toxicity evaluations, exposure estimations, risk calculations, and recommended actions to ameliorate ecological risks. Only post-construction conditions are evaluated in this ERA.

2.0 BACKGROUND INFORMATION

The ecological setting and list of special status species presented in this ERA are based on the detailed site-specific ecological evaluation presented in the *Final Environmental Impact Report (Final EIR)* for the SVRT project (VTA, 2004).

The affected environment in the SVRT project area was assessed by trained biologists (during various seasons in 2002 and 2003) to determine vegetation communities, jurisdictional waters of the United States including wetlands, wildlife corridors, and suitable habitat for 'special status' species. Although the surveys focused on the area that would be impacted by project construction, vegetation communities and incidental sightings of species were recorded for both the SVRT and its vicinity.

As detailed below, the survey found that the SVRT project alignment is the location of some of the sensitive environments listed in the *Ecological Risk Assessment Guidance*:

- habitat known to be used by federal designated or proposed endangered or threatened species;
- habitat known to be used by state designated endangered or threatened species;
- migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches where fish spend extended periods of time; and
- wetlands.

2.1 ENVIRONMENTAL SETTING

The SVRT project area covers a variety of environmental settings. The following biological communities were identified in the project area or its immediate vicinity:

- Ruderal/disturbed habitat, including agriculture and ornamental landscapes, with a mixture of native and exotic plant species. The most common habitat. Exotic plant species may provide valuable habitat elements such as cover for nesting and roosting, as well as food sources such as nuts or berries.

- Seasonal and freshwater emergent wetlands, including those on the bottoms of ditches and depressions excavated for flood control or other purposes. Wetland plant species are typically low-growing, tenacious perennials that tolerate disturbance and perennial wetness, though there are also annuals that tolerate seasonal wetness. Wetlands are among the most productive wildlife habitats in California, and provide food, cover, and water for various species of birds, mammals, reptiles, and amphibians. Wetlands are typically present along the creek banks and in the drainage ditches that cross the project corridor in approximately 14 locations. Most of the wetlands are also classified as Waters of the United States; the *Draft EIS/EIR* identified a total of 2.668 acres of Waters of the United States within the SVRT project area, though some of these are above the tunnel segment.

- The Central Coast cottonwood-sycamore riparian forest, 2.6 acres of which are located on fine-grained alluvial soils within the floodplains of Berryessa Creek, Coyote Creek, and Penitencia Creek. This habitat provides a wide range of resources to wildlife, such as cover, water, movement and migration corridors, and a variety of foraging opportunities.

- Non-native annual grassland similar to non-native grassland communities in the valleys and foothills throughout much of California; these can also contain some native annual grasses and other vegetation. These grasslands provide foraging and nesting habitat for a wide variety of wildlife species including raptors, seed eating birds, small mammals, amphibians, and reptiles.

Most portions of the SVRT project area are disturbed (or 'ruderal') habitat, since the BART tracks will be located on the former railroad right-of-way (ROW) for the Union Pacific Railroad (UP) and most stations or other facilities will be built on previously developed property. The former ROW has been regularly used by trains since Western Pacific Railroad constructed the railroad tracks in the 1920s. In most areas, the ROW corridor is about 60 feet wide, and bordered on either side by fences which impede the movement of land-borne animals. Much of the middle of the corridor consists of gravel used as ballast beneath the railroad tracks (the ballast width is generally greater than 18 feet wide where tracks were constructed above the surrounding grade, but widths of 10 to 33 feet have been observed), often with a buffer zone of bare earth on either side of the ballast. As a result, much of the railroad ROW cannot be considered a habitat for significant biological communities. However, as noted above, the project area also contains valuable biological communities other than ruderal habitat.

2.2 SPECIAL STATUS SPECIES

Special status species are species that have been afforded special recognition and protection by federal, state, or local resource conservation agencies and organizations. The assessment to identify special status species summarized in the *Draft EIS/EIR* identified a number of special status species with the potential to be present (or with suitable habitat) within the SVRT project area. The assessment included field surveys, literature searches and queries of agencies. The following special status species were identified as present or potentially present:

Aquatic or amphibious species:

- Central California coast steelhead, federally listed as threatened. Viable populations of this fish spawn in Coyote Creek and Upper Penitencia Creek from November through April, with juveniles typically remaining in the creeks into summer.
- Central Valley late fall-run Chinook salmon, federally listed as threatened and a California species of special concern. Viable populations of this fish spawn in Coyote Creek and Upper Penitencia Creek from October through December, with juveniles typically migrating from the creeks in another few months.
- California red-legged frog, federally listed as threatened and a California species of special concern. These amphibians prefer permanent and semi-permanent aquatic habitats, such as the riparian habitat along the creeks.
- Southwestern pond turtle, a federal and state species of special concern. These amphibians are typically found in or adjacent to quiet waters with emergent vegetation, with habitat in streams including Coyote Creek, Upper Penitencia Creek and Lower Silver Creek.

Winged predatory species:

- Western burrowing owl, a federal and state species of special concern. These birds nest underground in open, dry annual or perennial grasslands and forages primarily for rodents.
- Cooper’s hawk, a California species of special concern. This hawk generally nests in riparian and evergreen forests, is tolerant of human disturbance, and eats primarily smaller birds and mammals.
- White-tailed kite, a hawk which is a federal species of concern and fully protected by the state. The white-tailed kite nests in riparian forest and oak woodland and forages in open habitats for primarily small mammals.
- Loggerhead shrike, a predatory songbird which is a federal and state species of special concern. Loggerhead shrikes prefer open habitat with grasses interspersed with trees and bare ground, where they hunt for a wide variety of prey including insects, small mammals and birds, and reptiles. Loggerhead shrikes are adaptable to urban settings, and were observed at a number of locations in the SVRT project area during the ecological assessment.
- Yuma myotis bat, a winged mammal that is a federal species of concern. May be found roosting under bridges and buildings in the project area, or roosting and feeding in riparian areas. Has not been observed in the project area.
- Long-legged myotis bat, a winged mammal that is a federal species of concern. May be found roosting under bridges, buildings, or trees (in snags or under the bark) in riparian areas. Has not been observed in the project area.

- Pacific long-eared myotis bat, a winged mammal that is a federal species of concern. May be found roosting under bridges, buildings, or trees (in snags or under the bark) in riparian areas. Has not been observed in the project area.
- Western big-eared bat, a winged mammal that is a federal and state species of concern. May be found roosting under bridges and buildings. Has not been observed in the project area.

Vegetation species:

- Congdon's tarplant, a flowering thistle-like plant that is a federal species of concern. The Condon's tarplant grows in unplowed grasslands, and has been observed within the SVRT project area.
- Alkali milkvetch, a tiny, annual member of the pea family, is a federal species of concern. This plant can be found in moist grasslands in heavy clay soils, and is not considered likely to be present within the SVRT project area.
- Diamond-petaled California poppy, a federal species of concern, is a relative of the California poppy. It is typically located in depressions in alkaline heavy clay soils and is unlikely to be present within the SVRT project area.

In addition, swallows are federally protected species of birds that may nest in colonies under artificial structures, such as bridges. Tree swallows have been observed under the Abel Street undercrossing.

2.3 PRIMARY CONTAMINANTS

Living environments for ecological receptors tend to be concentrated in surface and near-surface soils. Preliminary characterization of the SVRT project alignment indicates that the primary contaminants in surface and near-surface site soils are arsenic, lead, and higher molecular weight petroleum hydrocarbons (TPH), the same as at greater depth. The metals appear to be primarily related to the use of smelter slag for some of the ballast underlying the railroad tracks, though lead from aerial deposition and other localized sources (e.g., batteries for signalized intersections) also appears present. The petroleum hydrocarbons appear to be primarily widely-spread lubricants and fuels related to railroad operation, though there are also areas where off-site releases of gasoline have migrated onto the site in groundwater.

2.3.1 Contaminant Characterization Information

Based on hundreds of samples, approximately 40 percent of ballast along the railroad tracks in the line segment contains arsenic concentrations of at least 120 milligrams per kilogram (mg/kg), with levels up to 323 mg/kg detected. For the shallow soil underlying the ballast, approximately 40 percent of samples contain arsenic concentrations of at least 80 mg/kg. Arsenic concentrations in shallow soil adjacent to (not under) the ballast are even lower, with concentrations typically around 50 mg/kg. At the future maintenance facility, arsenic was detected in 25 of the 50 samples, at concentrations averaging 18.4 mg/kg and not exceeding 57 mg/kg. Arsenic levels in station/station campus locations off the former UP railroad tracks are expected to be substantially lower, near naturally-occurring background levels below 10 mg/kg.

Lead concentrations in ballast along the line segment exceed 20 mg/kg approximately half the time, with levels up to 599 mg/kg detected. Lead levels in soil along the line segment were typically less than 10 mg/kg, though this level was often exceeded, especially in shallow soil immediately beneath the ballast. Near intersections with major roadways, where aerially deposited lead could be expected, lead levels were greater than 50 mg/kg about half the time. At the future maintenance facility, lead concentrations appear greater than along the line segment. Lead was detected in each of 71 samples, at concentrations averaging 190.9 mg/kg, though the average concentration was 65.5 mg/kg if three locations with lead levels above 1,000 mg/kg are excluded. Lead levels in station/station campus locations off the railroad tracks are expected to be substantially lower, near naturally-occurring background levels below 10 mg/kg.

TPH is relatively widespread in the project area, particularly along the former railroad tracks in the line segment and the maintenance facility yard. However, TPH concentrations are generally quite limited. Along the line segment, Earth Tech performed analyses for total extractable petroleum hydrocarbons (TEPH, all relatively low volatility petroleum hydrocarbons with between 10 and 34 carbons) in 37 locations, with TEPH detected in 13 of the locations. The average detected concentration was 11.6 mg/kg, and the maximum detected concentration was 34.6 mg/kg. TPH concentrations in the maintenance facility area (Newhall Yard) are known to be higher than along the line segment. Excluding known hot spots such as the locomotive refueling area, 53 analyses were run for TPH as motor oil, with 37 detections, at an average detected concentration of 367 mg/kg. TPH levels in station/station campus locations off the railroad tracks are expected to be lower than either the line segment or the maintenance facility yard.

Other inorganic compounds do not appear to be present consistently at levels above background levels. Other organic chemicals, such as pesticides and volatile organic compounds (VOCs), have only been detected intermittently, and at relatively low levels.

2.3.2 Contaminant Mobility

The physical/chemical characteristics of the chemicals of primary concern (arsenic, lead and TPH) suggest that these chemicals are unlikely to migrate significantly outside the project ROW.

Metals present in site materials are generally adsorbed to or physically an integral component of site materials. The slag from smelting contains lead and arsenic which are physical components of the slag, in the sense that they are integrated within the matrix of the slag material. Metals are leached from the slag by surface water, and carried in a dissolved form. The degree to which metals are carried by water or bound to soil and sediment is largely a function of the oxidation state of the metal and its interaction with other substances present in soil. Because of the limited solubilities and ionic states of lead and arsenic, these dissolved metals are quickly adsorbed onto soil or sediments, limiting their downward migration (though they will intermittently desorb and be carried deeper by infiltrating surface water before resorbing). Metals can also be carried laterally in surface water runoff in either dissolved form or adsorbed to sediment particles; although the ballast and rail tracks are elevated, the surrounding land is flat, which lessens the potential for significant lateral migration of metals.

TPH is somewhat more mobile than metals, particularly the lower molecular weight, more soluble components. However, the TPH on site is primarily higher molecular weight.

3.0 SCREENING-LEVEL PROBLEM FORMULATION

3.1 KEY ECOLOGICAL RECEPTORS

This section identifies means by which the ecological receptors (inhabitants of biological communities, including but not limited to special status species) described in Sections 2.1 and 2.2 may contact the chemicals of potential concern described in Section 2.3.

Ecological receptors within the SVRT project area are primarily located along the former UP ROW, since other areas of the SVRT project alignment are even more disturbed than the ROW. After completion of the SVRT, the SVRT tracks will pass through riparian forest, grasslands, and surface water bodies/wetlands such as creeks, not just disturbed land. Ecological receptors will be located within each of these three habitats, and special status species have the potential to be located within each of these habitats. However, in terms of habitat complexity and the numbers of special status species that may be present, the wetlands and associated riparian forest are more critical habitat than the grasslands.

The chemicals of potential concern (Section 2.3) are believed to have greater ecotoxicity for animal receptors (including mammals, birds, amphibians and fish) than for plant receptors. This is for two primary reasons:

- Their more complex biological structures make animals generally less resistant than plants to the ecotoxicity of natural soil components such as arsenic and lead; and
- Animals bioaccumulate toxic chemicals to a much greater degree than do plants.

It should be noted that the special status species identified in Section 2.2 represent carnivorous species. Although herbivorous and granivorous species are not represented, bioaccumulation of chemicals such as arsenic and lead up the food chain towards carnivores make them sensitive species. As a result, this ecological risk assessment will focus on animals, particularly predatory animals, which are expected to feel the greatest effects of bioaccumulation.

There are 12 special status animal species listed in the "aquatic or amphibious species" and "winged predatory species" categories in Section 2.2. This ecological risk assessment will consider these species to be the key ecological receptors, because:

- They are all considered to be species of special concern, and thus receive greater protection;
- They may be present in each of the habitats under consideration, and thus provide a good proxy for the health of each habitat; and
- 11 of the 12 animal special status species are predatory, and thus are sensitive indicators of bioaccumulation in the food chain.

3.2 COMPLETE EXPOSURE PATHWAYS

3.2.1 Exposure Routes

There are different possible exposure routes through which the different types of key receptors may be exposed to contaminants. These are discussed below.

3.2.1.1 Exposure Routes for Aquatic and Amphibious Species

For the four aquatic and amphibious species, possible exposure routes include:

- ingestion and dermal contact with sediment and water; and
- ingestion of contaminated food.

Direct contact with contaminated material by an aquatic or amphibious species will require that the contaminants be transported from the SVRT site to the aquatic habitat (hereafter called a creek because of the prevalence of creeks along the project alignment). If contaminants are not transported to a creek, the potential exposure pathways listed above will not be complete, and exposure will not occur. Due to the limited solubility of the contaminants, and their limited potential for lateral migration, impact from the SVRT site on either the water or the sediment in nearby creeks is not expected to be significant.

3.2.1.2 Exposure Routes for Winged Predatory Species

For the eight winged predatory species, possible exposure routes include:

- inhalation of contaminated dusts or vapors;
- ingestion of contaminated prey; and
- dermal absorption after direct contact between the skin and contaminated material.

Inhalation of contaminated dusts or vapors could be a significant concern for the winged predatory species if sources of contaminated dusts or vapors were near where the individuals spend significant amounts of time, the nesting areas of the species. Generally, sources of dusts or vapors further from the nesting areas would result in significantly less exposure due to attenuation near nests and significantly lower exposure duration in areas further from the nest. At this site, exposure would tend to be to dusts, given the physical characteristics of the chemicals of potential concern.

If predators take prey from the contaminated areas of the SVRT site, then exposure to site contaminants may occur. However, most if not all of the winged predatory species of special concern cover a significant range, which would tend to dilute contaminated prey with prey captured outside the SVRT project area. Ingestion of contaminated soil may also occur during cleaning of feathers, though the amount of SVRT soil ingested during preening is likely to be very small, and thus the incidental ingestion pathway is not expected to result in significant exposure.

Dermal absorption is not expected to be a significant exposure pathway for the winged predatory species of concern. The birds are covered with feathers, which tends to limit dermal exposure through the prevention of direct dermal contact. Although bats do not have feathers, they tend to spend the vast majority of their time airborne or perched above the ground surface, which reduces the potential for dermal exposure.

3.2.1.3 Summary of Exposure Routes

In summary, the most realistic routes for exposure to contaminated material are:

- Aquatic and amphibious species: direct contact with contaminated sediments, and ingestion of contaminated food and sediments.

- Winged predatory species: inhalation of contaminated dusts near nests, and ingestion of contaminated prey.

3.2.2 Exposure Pathways

To be complete, an exposure pathway requires both an exposure route and a mechanism which moves the either the receptor or a chemical into a location where it can be exposed to the contaminant.

This section identifies potential exposure pathways and evaluates the extent to which they may be considered complete by evaluating contaminant transport mechanisms. In order to complete an exposure pathway which would lead to one of the most realistic exposure routes listed in Section 3.2.1.3, the transport mechanisms described below would be necessary.

3.2.2.1 Exposure Pathways for Aquatic and Amphibious Species

For aquatic and amphibious species to have direct contact with contaminated sediments, site-related chemicals would have to be transported into the aquatic environment. Due to the low solubility of site-related chemicals, this would be most likely to occur through the physical action of surface water bringing contaminated soil into suspension (such as via small-scale erosion caused by storm water runoff), and then flowing downhill to a creek where the contaminated sediment could be deposited. It is also possible that high winds could pick up soil as dust and deposit it in a creek. Only in these circumstances would an exposure pathway leading to direct contact with contaminated sediment be completed. In either case, the contaminated media would have started its transport from the ground surface, relatively near a creek.

Ingestion of contaminated food could occur if the food is affected by contaminated stream sediments or through ingestion of contaminated prey. The mechanism which would cause contaminated stream sediments is the same as that discussed in the prior paragraph for sediment. Two separate transport mechanisms are possible for ingestion of contaminated prey:

- Prey species such as insects and small mammals could ingest contaminated soil or plant material, and then be ingested. It is also possible that such prey species living beyond the hunting range of the aquatic species could ingest contaminated site material, and then move to the hunting range and become ingested.

- An amphibious receptor, such as a frog or a turtle, could move out of the creek and ingest animal or vegetable matter that has been contaminated by contact with site-impacted media. It should be noted that amphibious receptors are likely to limit their foraging to within a relatively short distance from their water source.

In summary, ingestion of contaminated prey could result from the presence of contaminated surface or near-surface soil near a creek.

3.2.2.2 Exposure Pathways for Winged Predatory Species

Winged predatory species would only inhale contaminated material from the air around their nests if it were mobilized as dust by high winds. To represent a significant exposure pathway, the generation of dust would have to take place near the nests. For most of the winged predatory species of special concern listed above, nests within the project area would be located within riparian habitats near creek banks. Only the burrowing owl (which has not been observed in the project area) and the loggerhead shrike (which has) would be expected to nest in open areas. Thus, based on the nesting habits of the winged predatory species of special concern identified at this site, exposure via inhalation of dust generated from surface soils is of concern primarily in the riparian cottonwood-sycamore forest near creek banks.

The ingestion of contaminated prey by winged predatory species could realistically include surface dwelling prey such as insects, and near-surface species such as earthworms, and rodents. If these prey species were in contact with contaminated surface or subsurface site soil, then the pathway between contaminated site soil and winged predatory species may be considered complete. Winged predatory species would be expected to have access to prey species at any location along the project alignment.

3.2.3 Summary of Complete Exposure Pathways

Considering both exposure routes and contaminant transport mechanisms, the following potential exposure pathways are considered to be complete for the purpose of this assessment:

- For aquatic and amphibious species, direct contact with or ingestion of contaminated sediments carried to a creek by runoff from nearby surface site soil.
- For aquatic and amphibious species, ingestion of mobile prey that are contaminated by surface or subsurface soil near a creek and then moves to the creek.
- For amphibious species, ingestion of prey contaminated by surface or subsurface soil near a creek.
- For winged predatory species, inhalation of contaminated airborne dust generated from contaminated surface soil near riparian forest along a creek.

- For winged predatory species, ingestion of prey contaminated by surface or subsurface soil anywhere along the project alignment.

4.0 ECOLOGICAL PROTECTION

Ecological protection will focus on preventing exposure of species of special concern or other ecological receptors in the habitats of concern. Because most potentially complete exposure pathways involve surface or near-surface soil near a creek, exposure minimization measures will focus on reducing the presence of contaminated material at the surface or near-surface in areas of the site near creeks.

4.1 CHEMICAL-SPECIFIC ECOLOGICAL SCREENING LEVELS

In determining reuse criteria for soil/fill near surface water boundaries, Earth Tech assumed that chemical levels in soil near a creek could translate into the same chemical levels in creek sediments. Thus, sediment levels developed to safeguard aquatic habitats can be applied to site soils. Sediment quality benchmarks for specific chemicals were obtained from Table 3 of the Cal/EPA Regional Water Quality Control Board San Francisco Bay Region's *Staff Report, Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments* (RWQCB, 1998). These benchmarks, called effects ranges (ER) for potential toxic effects in sediments, were developed by Dr. Long of the National Oceanic and Atmospheric Administration (NOAA) (Long et al, 1995).

The ER benchmarks were developed to identify concentrations of contaminants that were associated with biological effects in laboratory, field or modeling studies. They were derived from a large database spanning hundreds of data points, taken from numerous projects across the country. The ER-L (effects range-low) value is the concentration equivalent to the lower 10^{th} percentile of the compiled study data, while the ER-M (effects range-median) is the concentration equivalent to the 50^{th} percentile of the compiled study data. These benchmarks are generally interpreted as follows: sediment concentrations below the ER-L are "rarely" associated with adverse effects, sediment concentrations between the ER-L and the ER-M are "occasionally" associated with adverse effects, and sediment concentrations above the ER-M are "frequently" associated with adverse effects.

The ER-L and ER-M for chemicals of potential concern are presented in **Table C-1**.

4.2 ECOLOGICAL PROTECTION MEASURES

This screening level ecological risk assessment has been prepared in order to identify potential risks to ecological receptors and to allow selection of protective measures which will substantially reduce the risks of chemical exposure by ecological receptors. Appropriate ecological protection measures are described herein.

Most complete exposure pathways, and thus most potential risks to ecological receptors, involve contaminated surface or near-surface soil near a creek, surface waters, or other aquatic habitat. Thus, the focus of ecological protection measures will be on reducing the presence of contaminated material at the surface or near-surface of areas near creeks.

The attached *Contaminant Management Plan* text identifies Migration Potential Zones (MPZs) as areas where reuse of impacted soil or ballast will be restricted due to the proximity of groundwater or surface waters. In order to protect ecological receptors, materials containing contaminant levels greater than the ER-M thresholds will not be used within an MPZ. In order to simplify the process of contaminated soil reuse, the *Contaminant Management Plan* will use the more-restrictive requirement that materials unable to meet the standards for unrestricted on-site or off-site reuse will not be used within an MPZ.

Table C-1 – Ecological Screening Values

Chemical	RWQCB ESL for Groundwater Protection, Residential, Shallow Soil, Drinking Water Resource [a]	RWQCB Sediment ER-L [d] (dry weight)	NOAA SQuiRT Conservative Value [e]	Background Value	Resulting Ecological Screening Value
Arsenic	N/A	8.2	5.9 [4]	5.5 [f]	5.9
Lead	N/A	46.7	30.24 [5]	16.1 [f]	30.24
Benzene	0.044	N/A	N/A	0.0	0.044
TPH-Gasoline	100	N/A	N/A	0.0	100
TPH-Diesel (middle distillates)	100	N/A	N/A	0.0	100
TPH-Oil (residual fuels)	1,000	N/A	N/A	0.0	1,000
PCE	0.7	N/A	0.057 [6]	0.0	0.057
TCE	0.46	N/A	0.041 [6]	0.0	0.041
DDT	4.3	0.00158 [7]	0.00389 [5]	0.0	0.00158
Arochlor 1260	6.3 [3]	0.0227 [3]	0.02155 [3, 5]	0.0	0.0255
Benzo (a) pyrene	130	0.43	0.0319 [4]	0.0	0.0319

Notes:

All concentrations are in mg/kg unless otherwise noted.
[1] Arsenic PRG is the cancer endpoint.
[2] Lead "CAL-Modified PRG", non-standard method applied.
[3] Value for total PCBs used.
[4] Freshwater Sediment TEL.
[5] Marine Sediment TEL.
[6] Marine Sediment AET.
[7] DDTs, total of 6 isomers.

[a] San Francisco Bay RWQCB, 2003. *July 2003 Update to Environmental Screening Levels Technical Document* . July 21.
[b] EPA, 2002. *EPA Region 9 PRGs Table* . October 1. Edited February 2003.
[c] California Code of Regulations, Title 22, Section 66261.
[d] San Francisco Bay RWQCB, 1998. *Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments* . May.
[e] NOAA, 1999. *Screening Quick Reference Tables (SQuiRTs)* . September.

DDT	Dichlorodiphenyltrichloroethane
ESL	Environmental Screening Level
ER-L	Effects Range - Low
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
N/A	Not Applicable
NOAA	National Oceanographic and Atmospheric Administration
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
RWQCB	Regional Water Quality Control Board
SQuiRT	Screening Quick Reference Tables
TCE	Trichloroethylene
TPH	Total Petroleum Hydrocarbons
US EPA	United States Environmental Protection Agency

MPZs are defined as areas within 50 feet of creeks, wetlands or other surface water drainage features, or within 5 feet of the groundwater table. Based on the relatively flat land surface in the project area, a distance of 50 feet is a reasonable buffer between the edge of the MPZ and the edge of a creek or other aquatic habitat, and thus between ecological receptors and significant contaminant exposure.

Actions are also appropriate to address exposure by potential receptors not in aquatic habitats or riparian forest, though there are fewer complete exposure pathways for special status species outside the aquatic or riparian habitats. The attached *Contaminant Management Plan* text identifies chemical levels above which contaminated soil must be encapsulated. These provide ecological receptors in grasslands or ruderal habitats with an additional level of protection.

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METHODOLOGY FOR DETERMINING SITE-SPECIFIC ENVIRONMENTAL SCREENING LEVELS FOR METALS

The dilution attenuation factor (DAF) for metals will be determined in two-step process. First, the correlation between total and soluble metal will be estimated. This will allow a determination of the site-specific solubility of each chemical of concern (COC), and provide an estimate of the concentration of that metal in the soil solution as a function of its total concentration in soil. This step will require the use of a test to simulate the soil leaching process. The second step will account for the dilution that occurs after the COC in the soil solution mixes with the groundwater. This step will require the estimation of soil infiltration rates and groundwater flow rates that are representative of the site.

To achieve the first step, an extraction procedure will be used to determine the correlation between total and dissolved metal. As recommended in the Environmental Screening Level (ESL) guidance document produced by the Regional Water Quality Control Board, San Francisco Bay Region (RWQCB), a procedure such as the Synthetic Precipitation Leaching Procedure or the Waste Extraction Test (WET) modified to use deionized (DI) water will be used (RWQCB, 2005). The results will be multiplied by the dilution factor used for the test to yield the soluble concentration of metal. Soils representing a range of total metal levels will be tested, and the results will be plotted to obtain of best-fit correlation between total and soluble metal concentrations. This relationship will be used to obtain the soluble metal level of a soil which corresponds to a given total metal level. In turn, the soluble metal level can be used in a simple model such as the Summers Model to estimate the concentration in groundwater corresponding to a given concentration in soil.

The Summer's Model is given below:

Cgw = [(Qp x Cp) + (Qa x Ca)] / Qp + Qa (U.S.EPA, 1989)

Where:

Cgw = final concentration in groundwater (milligrams per liter [mg/L])

Qp = volumetric flux of water through the vadose zone (meters per square meter per day [m/m^2-day])

Cp = concentration of the chemical in the vadose zone soil pore water (leachate) (mg/L)

Qa = volumetric groundwater flux (m/m^2-day)

Ca = concentration already in groundwater (mg/L)

With the relationship between the total and groundwater concentrations (i.e., DAF), the concentration of total metal in a soil that corresponds to a given concentration (e.g. the Maximum Contaminant Level or an ESL to protect aquatic wildlife) can be calculated and used to establish reuse criteria if the situation at the site warrants.

The approach described above is directly applicable to the soil/groundwater pathway. However, the soil/surface water pathway is more complicated. This involves a combination of infiltration and surface runoff, and is further complicated by the more variable rates of stream flow throughout the year. As a practical solution to this problem, if and when a DAF for surface water is needed, the value calculated for the groundwater case described above may be used for surface water. This is expected to provide a conservative estimate for surface water protection because the times during which infiltration and runoff are expected to occur are also the times of maximum stream velocity, and this velocity is expected to greatly exceed that of the groundwater. Thus, DAFs for the surface water scenario are expected to greatly exceed those for the groundwater scenario. For this reason, the DAF for groundwater is expected to significantly underestimate that for surface water, and thus provide a large safety factor.

Example of Site-Specific ESL Modification for Arsenic:

As described above, the first step is to determine the relationship between the total and soluble concentrations of arsenic for a range of soil representing arsenic levels likely to be encountered during the project. For the following example, representative samples were selected from along the SVRT Line Segment portion of the project based on arsenic concentrations and locations along and within the alignment, including proximity to the ballast within the right-of-way. These soil samples were initially collected in September 2004 and October 2004 during the preliminary engineering phase and analyzed for total arsenic (Earth Tech, 2005). These soil samples were subsequently extracted using the WET test modified with DI water, and the results are presented in **Table D-1**.

Based on the arsenic DI Wet Results presented in Table D-1, the relationship between total and soluble arsenic is plotted in **Figure D-1**, along with the equation that represents a best-fit relationship between the two. Note that of the ten paired data points, one appeared to be inconsistent with the rest (330 mg/kg total arsenic, and less than 0.04 mg/L soluble arsenic), and was therefore not included in the graph.

Table D-1 - Summary of Site-Specific (SVRT Line Segment) Arsenic DI WET Results

Sample ID	Depth (feet bgs)	Sample Collection Date	Total As (mg/kg)	DI WET Result (mg/L)	Comments
PESS-11-3	3-3.5	10/11/04	190	1.8	
PESS-13-2	2-2.5	10/11/04	300	11	
PESS-14-1.5	1.5-2	10/01/04	420	11	
PESS-15-0	0-0.5	10/01/04	330	0.04	see Note 1 and 2
PESS-17-2	2-2.5	10/01/04	22	0.04	see Note 2
PESB-09-5	5-5.5	10/01/04	100	0.04	see Note 2
PESS-18-1.5	1.5-2	10/01/04	33	0.04	see Note 2
PESS-26-0	0-0.5	09/17/04	150	2.5	
PESB-11-0	0-.05	10/16/04	85	0.04	see Note 2
PESB-02-0	0-0.5	09/03/04	11	0.04	see Note 2

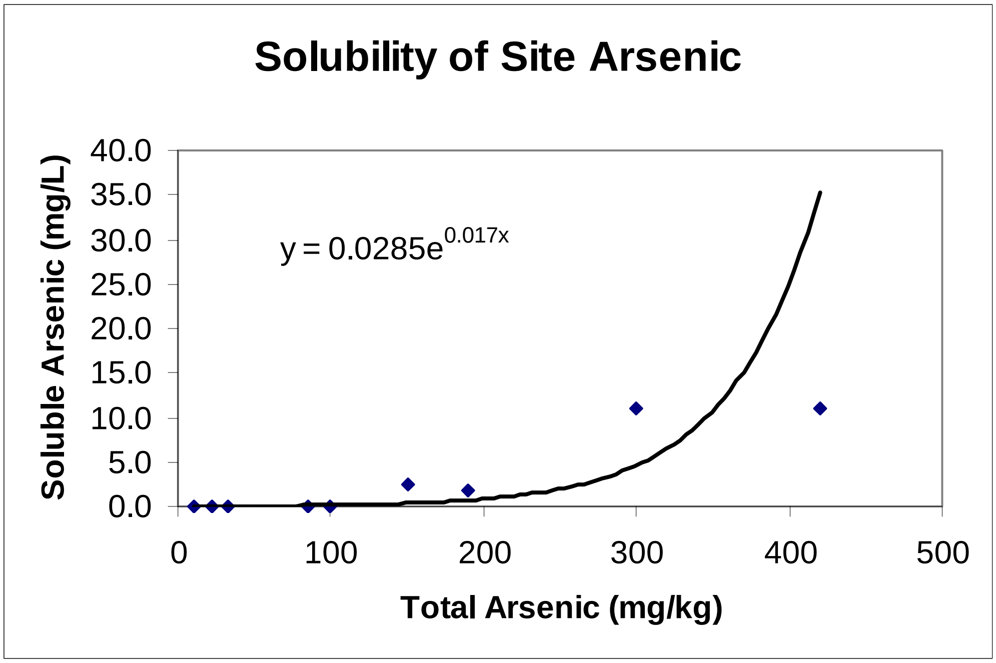
Notes:

bgs = below ground surface

mg/kg = milligrams per kilogram

1. The data for PESS-15-0 (total arsenic concentration of 330 mg/kg and soluble concentration of <0.04mg/L) was not used for further evaluation since it was inconsistent with the results for the remaining data
2. Where the soluble concentration was not detected above the laboratory reporting limit (0.04mg/L), the laboratory reporting limit was used for evaluating the site-specific solubility of arsenic.

Figure D-1 - Site-Specific (SVRT Line Segment) Solubility of Arsenic



Next, to use the Summer's Model, the volumetric flow through the vadose zone (Qp) is calculated as follows:

$$Qp = Vinf \times A \times \eta_{eff}$$

Where:

Vinf = vertical infiltration rate of dissolved metal (m/day)

A = area of source (m^2)

η_{eff} = effective porosity (unitless)

For the purpose of this example, the value for Vinf is assumed to be equal to the rainfall rate for the City of San Jose, adjusted for a typical runoff of 30 percent as recommended by Caltrans for a rail yard (Caltrans Highway Design Manual, 2005). Average daily precipitation data were obtained from the University of California Integrated Pest Management Program (www.ipm.ucdavis.edu/caludt.cgi/) for the period from 1951 to the present. Since infiltration can be expected to occur only during rainfall event, the average daily rainfall was totaled for the period where daily rainfall exceeded 0.05 inches. Corrected for 30 percent runoff, the calculated rate becomes 1.81E-06 centimeters per second (cm/s).

For the purpose of this example, the average area is assumed to be equal to the typical width of the right-of-way (60 feet); and, for simplicity, is assumed to be a square. Thus the area used for these calculations is 3,600 ft^2 (334 m^2).

The value used for η_{eff} was estimated based on the soil types logged along the Line Segment during environmental investigations that were conducted during the preliminary engineering phase (Earth Tech, 2005). The value used for η_{eff} is 0.32, which is the value recommended by Ghislain (1986) for silty clay soils.

The value used for Qa in the Summer's Model is calculated as follows:

$$Qa = Vgw \times W \times L$$

Where:

Vgw = average groundwater velocity (m/day)
W = width of reuse area perpendicular to the flow of groundwater (m)
L = thickness of aquifer (m)

Vgw was estimated using the standard Darcy approach, as follows:

$$Vgw = \frac{K \times i}{\eta_{eff}}$$

Where:

K	=	hydraulic conductivity (cm/s)
i	=	hydraulic gradient (ft/ft)
η_{eff}	=	effective porosity (unitless)

The values for these three parameters were obtained as follows:

- The value of η_{eff} (0.32) was estimated as described above.
- The values for K were obtained from aquifer tests performed at three areas (Kato Road, Montague Expressway, and Hostetter Road) along the Line Segment (Earth Tech, 2005). The calculated values for K ranged over an order of magnitude: from 0.036 gallons per minute gallons per minute per square foot (gpm/ft^2) (2.44E-03 cm/s) at Kato Road, to 0.32 gpm/ft^2 (2.17E-02 cm/s) at Hostetter Road. For this reason, an average value (1.21E-02 cm/s) was used to estimate the reuse values.
- Values for the hydraulic gradient were obtained from reports available for sites where there has been groundwater monitoring and/or remediation conducted near the Line Segment. The hydraulic gradient values were more consistent than the K values, with values of approximately 0.007 ft/ft near Kato Road (Shaw, 2004), 0.008 ft/ft near Montague Expressway/Capitol Avenue (Levine-Fricke, 2005), and 0.007 near Hostetter Road (ETIC, 2001). Based on these values, a value of 0.007 was used for this example.

The value for L was also obtained from the aquifer tests performed at three areas (Kato Road, Montague Expressway, and Hostetter Road) along the Line Segment (Earth Tech, 2005). Aquifer thickness was estimated to range from about 50 to 60 feet. For the purpose of this example, the value for aquifer thickness was conservatively assumed to be 50 feet (15.24 m)

Finally, the combination of the Summer's Model and the solubility relationships was used to solve for the total concentration in soil corresponding to a target groundwater concentration. This concentration will depend on the situation encountered in the field. If the situation is a portion of the site which is 5 feet or less to groundwater, then the target concentration may be the Maximum Contaminant Level to protect groundwater for the purpose of drinking. For arsenic, this is 50 μg/L. However, if the situation is reuse in an area within 50 feet of a surface water body, then the target may be the surface water ESL to protect freshwater aquatic life. For arsenic, this is 150 μg/L (RWQCB, 2005).

The Summer's Model, now set up to represent conditions that are likely to be typical of the project site, can be used to calculate the soluble concentration of arsenic that will correspond to the endpoint concentrations described above. The relationship displayed in Figure D-1 can then be used to estimate the concentration of total arsenic corresponding to the soluble level calculated in the Summer's Model.

Based on the above example, the calculated results are provided in **Table D-2**.

Table D-2 – Calculated Site-Specific Arsenic Reuse Values

	Permeability
Reuse Goal	1.21E-02 cm/s
Protect Drinking Water (50 μg/L)	298 mg/kg
Protect Aquatic Habitat (150 μg/L)	364 mg/kg

Notes:

cm/s = centimeters per second

mg/kg = milligrams per kilogram

μg/L = micrograms per liter

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GEOMATRIX

SITE MANAGEMENT PLAN

Former Ford Automobile Assembly Plant
Formerly 1100 South Main Street
Milpitas, California

Prepared for

Ford Motor Land Development Corporation
One Parklane Boulevard
Dearborn, Michigan 48120

March 1997
Project No. 3341.01K

Geomatrix Consultants

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Former Ford Automobile Assembly Plant
Formerly 1100 South Main Street
Milpitas, California

1.0 INTRODUCTION

Geomatrix Consultants, Inc (Geomatrix) has prepared this Site Management Plan (SMP) on behalf of Ford Motor Land Development Corporation (FMLDC) for the former Ford Assembly Plant located at the former 1100 South Main Street, Milpitas, California[1] (the Property, Figure 1), currently the Great Mall of the Bay Area (Great Mall) The objectives of this SMP are to 1) summarize the remaining decommissioning activities necessary to complete site closure, 2) provide information on the known environmental conditions at the Property which will remain upon completion of the decommissioning activities, and, 3) address the current system for notification or other requirements during ongoing operations, maintenance, or development of the Property following the decommissioning activities

The SMP is organized as follows·

- Section 2 0 – presents background information on the Property, including descriptions of the Property and its use history, a description of shallow subsurface conditions, and a summary of soil and groundwater investigation and remediation activities performed at the Property
- Section 3 0 – discusses the human health and ecological risk issues associated with residual chemicals in soil and petroleum hydrocarbons in groundwater at the Property
- Section 4 0 – describes the remaining decommissioning activities necessary to complete closure of existing remediation systems
- Section 5 0 – presents Property management measures developed to address notification and other requirements for the Property that should be considered during ongoing operations and maintenance of the Property, the continuing development of the Property, or if Property use changes Included in this section is

[1] *The current address of Great Mall Management is 947 Great Mall Drive, Milpitas, California.*

a discussion on management of any disturbed or excavated soil and potential use of groundwater on the Property

2.0 BACKGROUND

This section summarizes pertinent background information regarding the Property, including a description of the Property, shallow subsurface conditions, Property use history, and remedial investigations and activities performed at the Property

2.1 PROPERTY DESCRIPTION

The Property is located at the former 1100 South Main Street in a predominantly commercial and industrial area of Milpitas, California. According to the City of Milpitas Planning Department, the Property is designated as a central commercial zone (C-2 zone) Land use in the Property vicinity is agricultural (A zone) to the west, heavy industrial (M-2 zone) to the north, east, and south, and central commercial (C-2 zone) to the southwest and northwest of the Property Interstate 880 is approximately 1 5 miles to the west, and San Francisco Bay is approximately 5 miles to the northwest

The Property currently is occupied by a large enclosed shopping mall, the Great Mall The Great Mall has a building footprint area in excess of two million square feet (approximately 46 acres) The current property configuration is the result of a 1996 subdivision of a larger parcel into the "Great Mall parcel" and nine "out-parcels," as shown on Figure 2 The subsurface impact of chemicals from former site operations is limited to the Great Mall parcel, therefore, the Property refers only to the Great Mall parcel for purposes of this management plan

2.2 SHALLOW SUBSURFACE CONDITIONS

The Property is located on relatively flat terrain in Santa Clara Valley that gently slopes northwest toward San Francisco Bay Ground elevations vary from approximately 45 feet above mean sea level (msl) in the southeastern portion of the Property, to approximately 25 feet above msl in the northwestern corner of the Property The Property is underlain by a complex sequence of heterogeneous and laterally discontinuous deposits of clay, silt, sand, and gravel to at least 50 feet below ground surface (bgs) The sediments underlying the Property are predominantly fine grained This fine-grained matrix contains numerous discontinuous layers of coarse-grained sands and gravel The coarse-grained layers are typically thin (less than 5 feet thick), however, locally, some borings at the Property had up to 15 feet of sand at depths below 25 feet bgs Shallow groundwater beneath the Property generally has been observed between 5 and 15 feet bgs Horizontal hydraulic gradients at the Property generally have been towards the north and northwest A more detailed description of hydrogeologic conditions at the Property is included in the Groundwater Quality Investigation Report (Geomatrix, 1996a)

2.3 PROPERTY USE HISTORY

Ford Motor Company purchased the Property in 1953 from Western Pacific Railroad. A passenger car and commercial vehicle assembly plant was built in 1953 and operated until May 1983 During its operating life, chemical handling at the automobile assembly plant included the storage and use of

- solvents, thinners, paints, and other chemical formulations for surface preparation and application of vehicle finish coatings,
- lubricating oils and gasoline for motor vehicles, and
- diesel fuel to power pumps in the emergency fire suppression system.

An industrial wastewater treatment system, that included on-site wastewater lagoons, discharged treated wastewater to the City of Milpitas sanitary sewer system

The Property was sold to Mariani Financial Corporation in December 1984, and portions of the Property were leased to a variety of tenants, primarily for warehouse/storage uses The Property was subsequently re-acquired by FMLDC in 1988 In 1994, the former automobile assembly plant building was remodeled into the Great Mall A detailed description of the historical uses of the Property is presented in the Site Use History, Former Ford Automobile Assembly Plant report (McLaren/Hart Environmental Engineering [McLaren/Hart], 1992)

2.4 SUMMARY OF SOIL INVESTIGATION AND REMEDIATION ACTIVITIES

Soil investigation and remediation activities were performed at the Property from 1982 to 1993 by various consultants and contractors on behalf of FMLDC Investigative and remedial activities undertaken for soil at the Property are summarized below

2.4.1 Soil Investigation Activities

McLaren/Hart and others conducted soil investigation activities in localized areas of the property based on the use or storage of chemicals in these areas In addition, McLaren/Hart conducted two phases of soil investigations, one in October-November 1992 (Phase I), and one in February 1993 (Phase II) (McLaren/Hart, 1996a) to identify remedial actions for soil Chemicals detected in soil at the Property primarily consisted of petroleum hydrocarbons, including gasoline, stoddard solvent, hydraulic oil, polynuclear aromatic compounds (PNAs), and benzene, toluene, ethylbenzene and xylenes (BTEX), as well as tetrachloroethylene (PCE), trichloroethylene (TCE), methylene chloride, naphthalene, 1,2-methylnaphthalene, acetone, nickel and zinc McLaren/Hart established cleanup concentrations for the soil at the Property based on potential exposure to chemicals in soil assuming both residential and commercial industrial scenarios and protection of groundwater quality For each chemical, the lowest of these values was selected as the cleanup concentration Cleanup concentrations for soil at the Property were approved by the staff of the Regional Water Quality Control Board - San Francisco Bay Region (RWQCB) The cleanup concentrations established for soil at the Property are 760 milligrams per kilogram (mg/kg) for acetone, 0 7 mg/kg for benzene, 900 mg/kg for ethylbenzene, 7 mg/kg for methylene chloride, 120 mg/kg for 2-methylnaphthalene, 45 mg/kg for naphthalene, 1600 mg/kg for toluene, and 24 mg/kg for xylenes. For all other volatile organic compounds (VOCs), the cleanup concentration is 1 mg/kg total VOCs, as stated in RWQCB Order No 90-63

2.4.2 Soil Remediation Activities

A summary of soil remediation activities conducted by McLaren/Hart at the Property from 1983 through 1993 is presented in McLaren/Hart's Phase I and II Soil Investigation Report (McLaren/Hart, 1996a) Approximately 10,000 cubic yards of soil were excavated from various areas of the site Affected soil at the Property was either removed from the Property or remediated on site to concentrations below the cleanup concentrations (McLaren/Hart, 1996b)

2.5 SUMMARY OF GROUNDWATER INVESTIGATION AND REMEDIATION ACTIVITIES

Groundwater investigation and remediation activities were performed at the Property from 1982 to 1996 by various consultants and contractors on behalf of FMLDC Based on the results of investigations performed by McLaren/Hart and others, the groundwater at the Property was impacted in two primary areas by petroleum hydrocarbons

1. Former Gasoline Pump No 1 Area a former gasoline pump and associated 20,000-gallon gasoline underground storage tank (UST), located outside and adjacent to the assembly plant, that was used to fuel maintenance vehicles between 1954 to 1984 According to an engineering drawing, approximately 30 to 40 gallons per day or 1,000 gallons per month of gasoline were dispensed from this pump

2. Former Executive Gasoline Tank Area a former 2,000-gallon gasoline UST that supplied fuel to a pump outside the executive garage for fueling the executive automobiles The UST was used from 1954 until the facility was closed in 1983 Approximately 7,500 gallons per month were dispensed from this pump

These two areas have been the primary focus of groundwater investigations performed at the Property by FMLDC as required by the RWQCB. In addition, halogenated volatile organic compounds (HVOCs) in groundwater have migrated onto the Property from Jones Chemical, Inc (Jones), a site regulated by the RWQCB, located east of the Property at 985 Montague Expressway Investigative and remedial activities undertaken for groundwater at the Property are summarized below

2.5.1 *Groundwater Investigation*

Groundwater quality data were collected at the Property from 1982 to 1996 The cumulative results of groundwater investigations and monitoring at the Property indicate that petroleum hydrocarbons, *primarily gasoline, have been released to shallow groundwater beneath the* Property The primary on-site source areas of petroleum hydrocarbons to groundwater have been the Former Gasoline Pump No 1 and the Former Executive Gasoline Tank Area. The maximum lateral and vertical extents of the groundwater affected by petroleum hydrocarbons in both areas were defined and were monitored by numerous perimeter wells for several years Data indicated that the extent of the dissolved petroleum hydrocarbon plumes were stable and that petroleum hydrocarbon concentrations within the affected areas were stable or decreasing A detailed description of groundwater investigation and remediation activities performed at the Property is presented in the Groundwater Quality Investigation Report (Geomatrix 1996a)

The groundwater investigations and monitoring performed by Jones also have shown that HVOC releases upgradient of the Property have migrated in groundwater to beneath the eastern, upgradient edge of the Property. Groundwater migrating onto the Property from the east includes the following HVOCs PCE, TCE, 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethene (1,2-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), and 1,2-dichloroethane (1,2-DCA) and vinyl chloride Recent monitoring well data obtained from Jones (October 1996) indicate that total concentrations of HVOCs remaining in groundwater beneath the Property are generally less than 100 micrograms per liter (µg/l) and consist of TCE, PCE, 1,1,1-TCA, 1,1-DCE, and 1,2-DCA.

2.5.2 Groundwater Remediation

This section presents a brief description of the groundwater remediation activities undertaken at the Property

2.5.2.1 Groundwater Extraction Trench System and Treatment Plant - 1989 to 1994

In 1989, a groundwater extraction trench system and air stripping treatment plant were installed by McLaren/Hart to intercept petroleum hydrocarbon-affected groundwater emanating from the Former Gasoline Pump No 1 Area and the Former Executive Gasoline Tank Area. The groundwater extraction trench system consisted of an approximately 2000-foot long extraction trench and groundwater cut-off slurry wall The purpose of the slurry wall was to enhance the extraction system by further preventing flow of groundwater past the trench and to prevent the flow of downgradient groundwater into the extraction trench Extraction of groundwater began on 31 October 1989 and continued until April 1994 Significant concentrations of petroleum hydrocarbon constituents were not detected in samples from the trench over the time-frame it operated, indicating that both groundwater plumes had stabilized prior to reaching the trench, most likely due to in-situ bioremediation As approved by the RWQCB, the groundwater extraction and treatment system was deactivated upon the installation of an enhanced bio-remediation system in 1994 (Section 2 5 2 2)

2.5.2.2 Enhanced In-Situ Bioremediation System - 1994 to 1996

An enhanced in-situ bioremediation system, approved by the RWQCB, was installed by Geraghty & Miller and operated at the Property from 1994 to 1996 The purpose of this system was to enhance the rate of biodegradation of petroleum hydrocarbons in groundwater in both the Former Gasoline Pump No 1 Area and the Former Executive Gasoline Tank Area. The system consisted of an air sparging system in both areas and a vapor extraction system in the Former Gasoline Pump No 1 Area (Geraghty & Miller, 1995) The system was deactivated in December 1996 following RWQCB approval as part of site closure (RWQCB, 1996)

Until 1995, the extracted vapors were passed through granular activated carbon for treatment and discharged to the atmosphere under permit from the Bay Area Air Quality Management District (BAAQMD) In 1995, the BAAQMD eliminated requirements for treatment due to the low concentrations of benzene being discharged, benzene was not detected in any of the samples collected in the latest sampling event conducted in September 1996

2.5.2.3 Jones Chemical Company Groundwater Extraction System - 1994 to Present

The RWQCB, in Order No 90-072 Provisions 2 C and 2 F, required Jones to prevent the continued migration of HVOCs and to implement plume containment Jones designed and installed a groundwater extraction system that included five groundwater extraction wells on the eastern side of the Property to contain the downgradient portion of its plume These wells (JE-19 through JE-23) were installed in September 1993 about 300 feet apart in the eastern portion of the Property (Figure 3) Jones began extraction from the wells on 2 February 1994 (Levine-Fricke, 1996) According to RWQCB Order No 90-072, Jones is required to continue operating this HVOC groundwater extraction system

2 6 CURRENT ENVIRONMENTAL CONDITIONS

Based on the results of the extensive investigative and remedial actions that were performed at the Property, the identified environmental conditions that need to be considered during ongoing operations and maintenance of the Property, the continuing development of the Property, or if the Property use changes, are (1) the presence of residual concentrations of chemicals in shallow soil, (2) the presence of residual petroleum hydrocarbons in shallow groundwater in the Former Gasoline Pump No 1 Area and the Former Executive Gasoline Tank Area, and, (3) the presence of HVOCs from an upgradient source in groundwater beneath the upgradient (eastern) edge of the Property,

3.0 HUMAN HEALTH AND ECOLOGICAL RISK EVALUATION

This section summarizes the results of human health and ecological risk evaluations performed for the Property.

3.1 HUMAN HEALTH RISK

Health risk evaluations were conducted to assess the potential risk to potential future residents and commercial workers at the Property in its current development Health risks associated with residual chemicals in shallow soil were evaluated by McLaren/Hart (McLaren/Hart, 1991) Health risks associated with residual petroleum hydrocarbons in groundwater were evaluated by Geomatrix (Geomatrix, 1996b) These evaluations concluded that soil containing residual chemicals and groundwater containing residual petroleum hydrocarbons at the Property will pose no threat to the health of residents or workers who might come into contact with soil on the Property or potential vapors emanating from groundwater beneath the Property.

3.2 ECOLOGICAL RISK

The Property is currently occupied by a large indoor shopping mall, and is completely covered by the mall structure, concrete and asphalt paving, and limited landscaping As a result, the Property provides no viable habitat to support an urban animal population As discussed in the Site Closure Report (Geomatrix, 1996b), groundwater affected by petroleum hydrocarbons has not migrated beyond the Property's boundaries, the groundwater plumes are considered stable, and chemical concentrations in groundwater generally are decreasing Therefore, the Property does not present unacceptable risk to biota in the environment.

4.0 CLOSURE OF SITE REMEDIATION SYSTEMS

This section describes the decommissioning activities necessary to complete closure of the remediation systems at the Property. It is estimated that these closure activities will be completed by August 1997

4.1 EXTRACTION TRENCH SYSTEM

The groundwater extraction trench system installed by McLaren/Hart consists of a groundwater extraction trench, a groundwater cutoff slurry wall, water conveyance pipelines, and electrical conduits (Figure 3) In conformance with Santa Clara Valley Water District (SCVWD) requirements, decommissioning activities for the extraction trench will include injecting grout into the extraction wells, trench monitoring wells, and trench drain pipes located within the trench, removal and disposal of equipment associated with the extraction trench system, and installation of flow barriers at required intervals along the trench Closure activities for the water conveyance pipeline and electrical conduits, as required by the City of Milpitas, will include removal of pull boxes and electrical and instrumentation cables from conduits, capping of the conduits, and drainage of the groundwater conveyance pipeline There are no closure requirements associated with the groundwater cutoff slurry wall In addition, the SCVWD groundwater production permit that is associated with the groundwater extraction trench system will be closed

4.2 TREATMENT SYSTEM

The groundwater treatment system, installed by McLaren/Hart, includes a granular activated carbon and air stripper unit (Figure 3) Decommissioning activities will include collecting a water sample from the water that has accumulated in the influent surge tank for analysis in accordance with City of Milpitas Fire Department and the National Pollutant Discharge Elimination System (NDDES) permit requirements. If analytical results indicate that organic compounds are present in the water at concentrations exceeding NPDES effluent limits, the water will be treated by the air stripper prior to discharge through the effluent outfall under the existing NPDES permit In conformance with the City of Milpitas Building Department, decommissioning activities will also include dismantling and removal/disposal of treatment system components, including structural concrete within the treatment system compound and the compound security fence The NPDES permit and the BAAQMD operating permit associated with the groundwater treatment system will be closed.

4.3 AIR SPARGING SYSTEM

The air sparging system installed by Geraghty & Miller consists of an air sparging system and vapor extraction system located inside the Great Mall and an air sparging system located outside the Great Mall (Figure 4) Decommissioning activities for the air sparging systems will include destruction of the wells associated with the systems in conformance to the requirements of the SCVWD The vapor extraction system will be converted to a passive venting system by connecting the piping directly to the roof vent Equipment and piping associated with the vapor extraction system and not necessary for passive venting will be removed The BAAQMD permit associated with the air sparging systems will be revised to reflect the change to a passive venting system

4.4 MONITORING WELLS

All remaining monitoring wells at the Property not associated with Jones (i e , extraction wells JE-19 through -23 and monitoring wells JB-83, JB-84, and JB-91) will be destroyed in accordance with the SCVWD requirements (Figure 5). The SCVWD permits associated with the monitoring wells will be closed upon well destruction

5.0 PROPERTY MANAGEMENT MEASURES DURING ONGOING SITE OPERATIONS, MAINTENANCE, AND REDEVELOPMENT

Property management measures to be taken during ongoing operations, maintenance, and redevelopment include the following notification and disclosure requirements, construction safety measures, soil management, and use of groundwater on the Property These measures are discussed below

5.1 *NOTIFICATION AND DISCLOSURE REQUIREMENTS*

The environmental conditions at the Property are summarized in McLaren/Hart's Phase I and II Soil Investigation Report (McLaren/Hart, 1996a) and Soil Remediation Summary Report (McLaren/Hart, 1996b), and Geomatrix's Groundwater Quality Investigation Report (Geomatrix, 1996a) and Site Closure Report (Geomatrix, 1996b), and should be disclosed to all potential buyers, contractors, and interested parties to the extent required by law The disclosure should include information contained in these reports regarding the nature and extent of chemicals in the soil and groundwater and potential human health risks This SMP should be included as part of the disclosure In addition, tenants at the Property are notified of environmental conditions at the Property as part of the lease agreement with Great Mall Management.

5.2 CONSTRUCTION SAFETY MEASURES

Great Mall Management lease provisions currently require that no construction activities can occur without notification to and authorization by Great Mall Management Prior to any significant construction activities at the Property, the contractor should prepare a site-specific health and safety plan (HSP) The HSP should describe the construction activities and address standard safety precautions such as protective measures for workers and soil handling issues, as appropriate In the event that activities performed at the Property will disturb the subsurface in areas where chemicals are known to be present, resulting in additional exposure pathways (such as for maintenance or construction workers), the potential health risks associated with exposure to those residual chemicals in soil and groundwater should be evaluated, and appropriate precautions included in the HSP All applicable state and federal regulations should be adhered to

5.3 SOIL MANAGEMENT

Since some soil at the Property may contain chemical concentrations (below the established site cleanup concentrations), soil excavated during construction activities should be evaluated and/or analyzed for the appropriate chemicals based on the use history of the Property and/or the previous soil investigations performed at the Property (McLaren/Hart, 1996a and 1996b). If soil requires off-site disposal, additional waste characterization may be required by the disposal facility under consideration

5.4 USE OF SHALLOW SITE GROUNDWATER

HVOCs and certain petroleum hydrocarbon constituents are known to be present in shallow groundwater at concentrations that currently exceed objectives for drinking water. However, shallow groundwater is not anticipated to be used as a source of drinking water Therefore, it is anticipated that groundwater will not be used for drinking water or other purposes until such time as the RWQCB and applicable regulatory agencies approve use of groundwater at the Property

6.0 REFERENCES

California Regional Water Quality Control Board, San Francisco Bay Region, 1996, Letter to Jerome S Amber Regarding Site Closure Request, Former Ford Assembly Plant, Milpitas, Santa Clara County, 18 December

Geomatrix Consultants, Inc , 1996a, Groundwater Quality Investigation Report, Former Ford Automobile Assembly Plant, 1100 South Main Street, Milpitas, California, August

Geomatrix Consultants, Inc , 1996b, Site Closure Report, Former Ford Automobile Assembly Plant, 1100 South Main Street, Milpitas, California, November

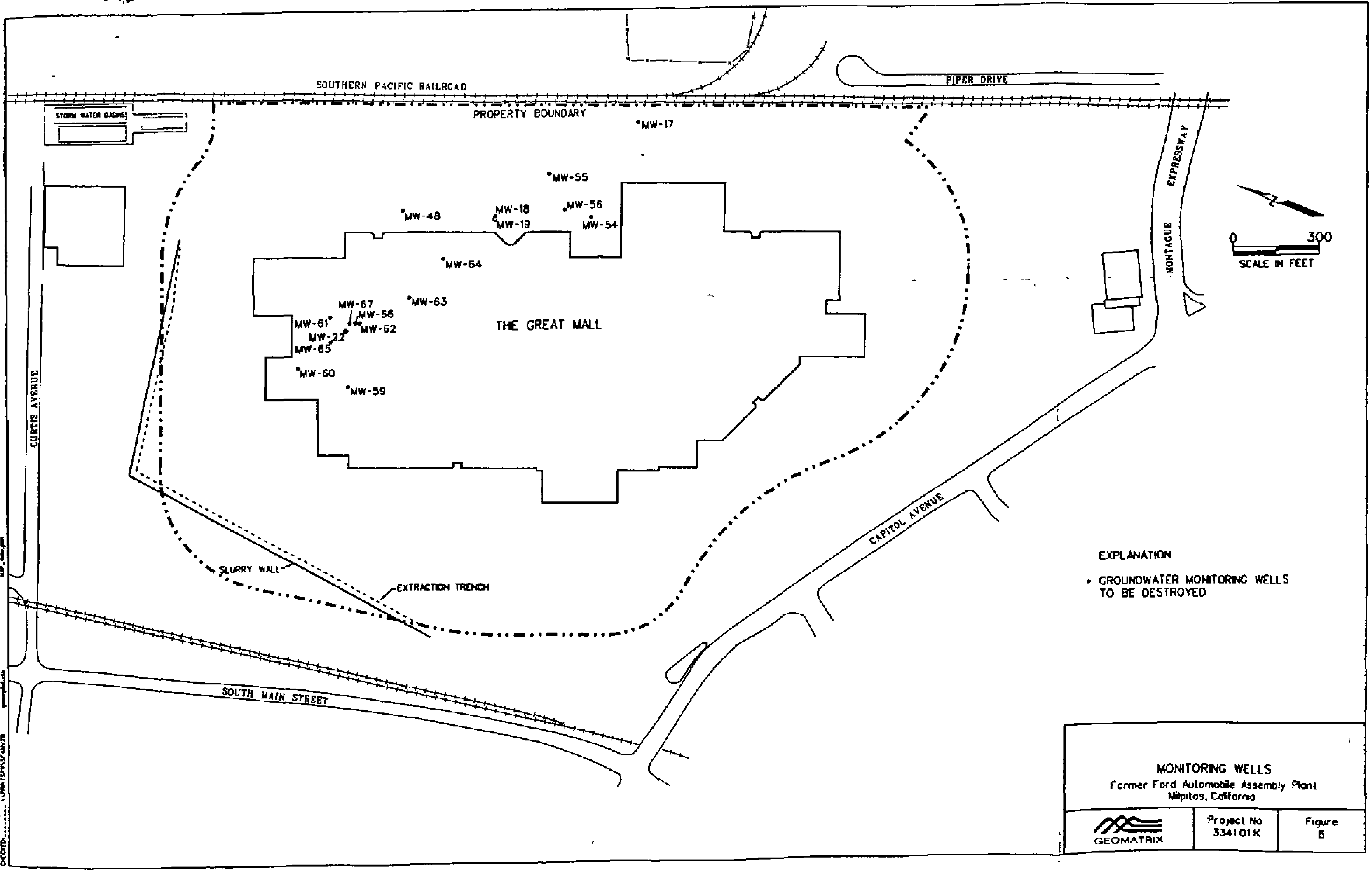
Geraghty & Miller, Inc , 1995, Letter to Mr Hon-Ting Man, Bay Area Air Quality Management District, from Edward H Crump, dated 18 December

McLaren/Hart Environmental Engineering, 1991, Soil Health-Based Cleanup Levels for Ford Motor Company Automobile Assembly Facility in Milpitas, California, 16 December

McLaren/Hart Environmental Engineering, 1992, Site Use History, Former Ford Automobile Assembly Plant, Milpitas, California, 18 December

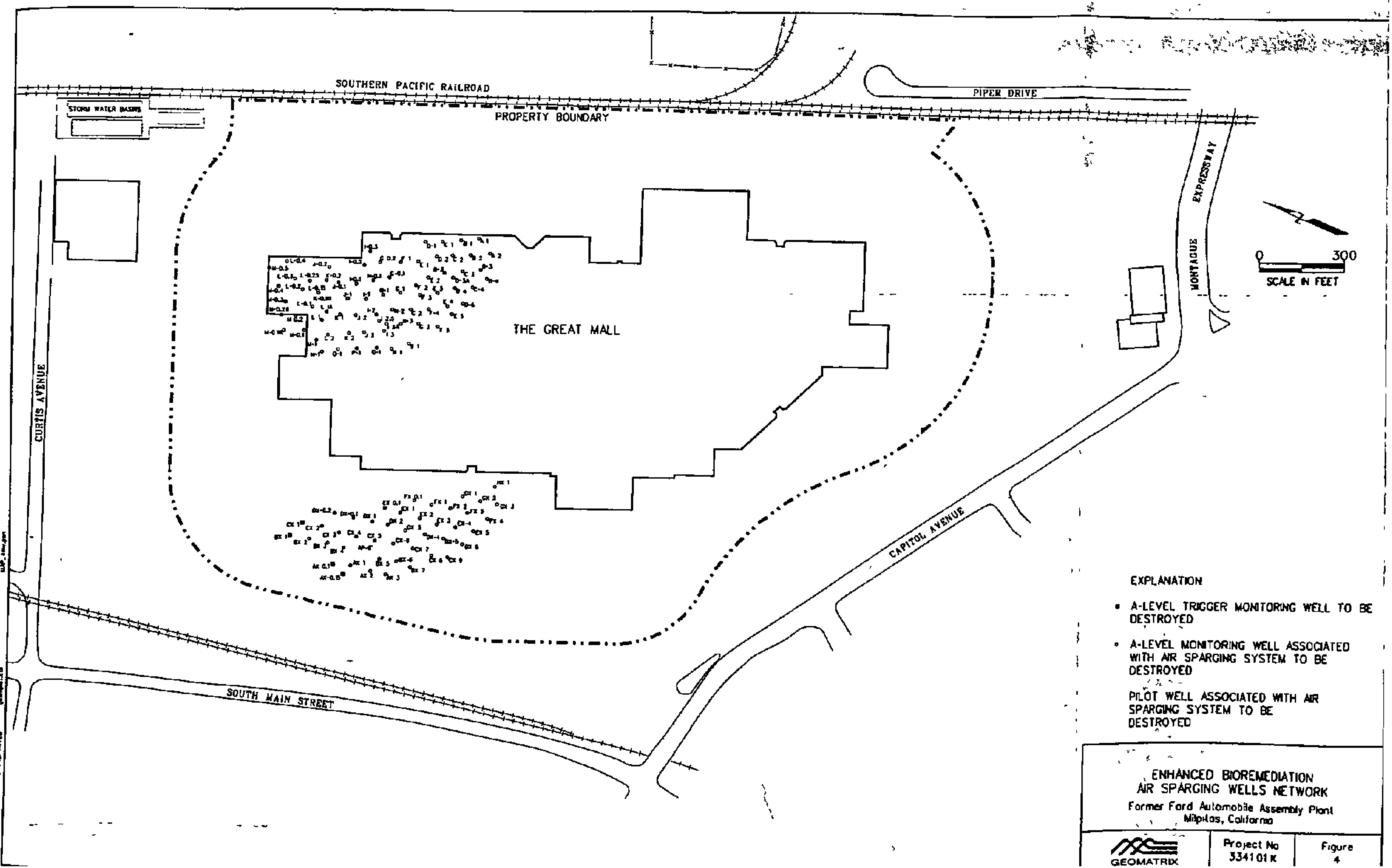
McLaren/Hart Environmental Engineering, 1996a, Phase I and II Soil Investigation Report, Former Ford Automobile Assembly Plant, Milpitas, California, September

McLaren/Hart Environmental Engineering, 1996b, Soil Remediation Summary Report, Former Ford Automobile Assembly Plant, Milpitas, California, September



MONITORING WELLS
Former Ford Automobile Assembly Plant
Milpitas, California

GEOMATRIX	Project No 334101K	Figure 5



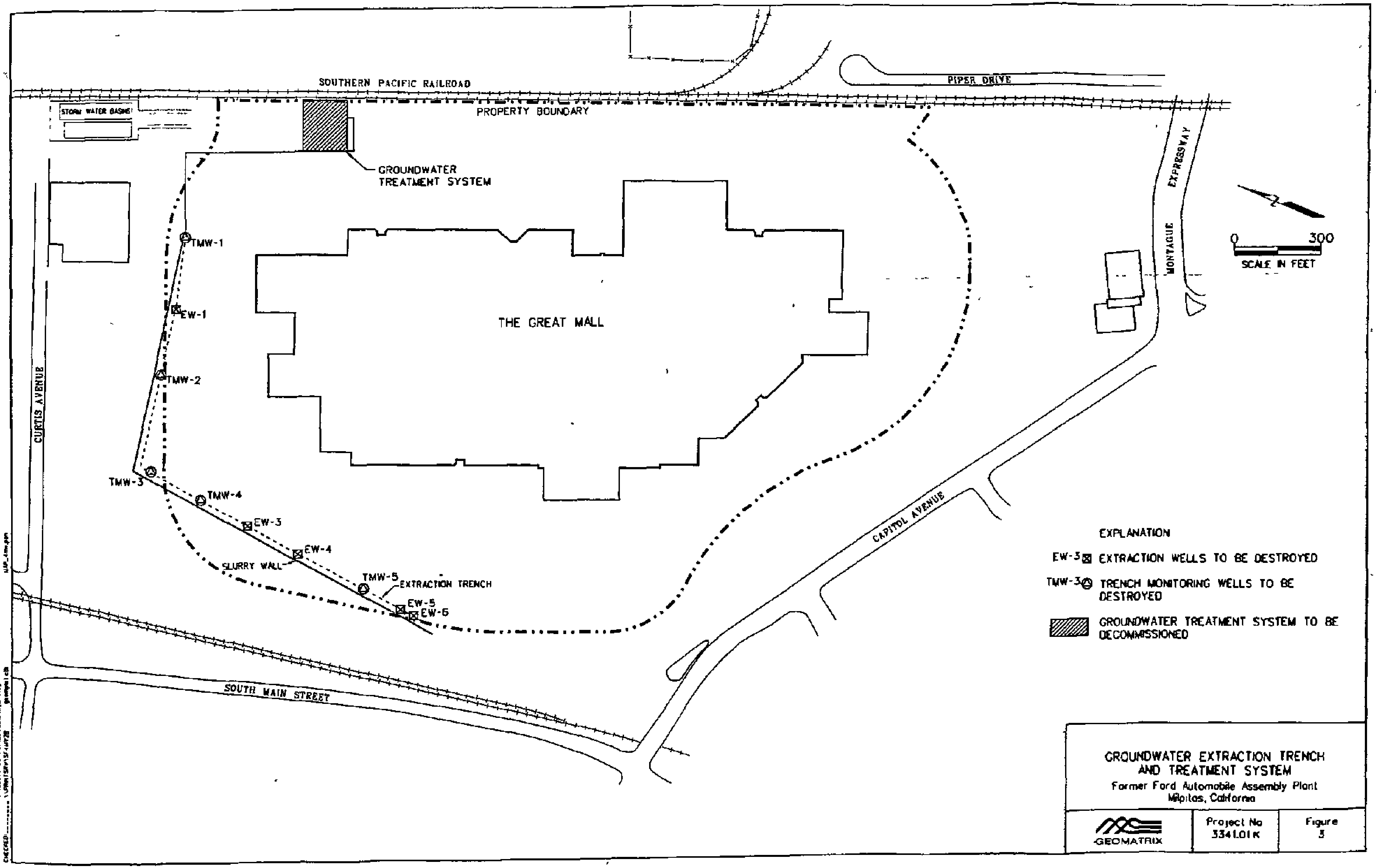
EXPLANATION

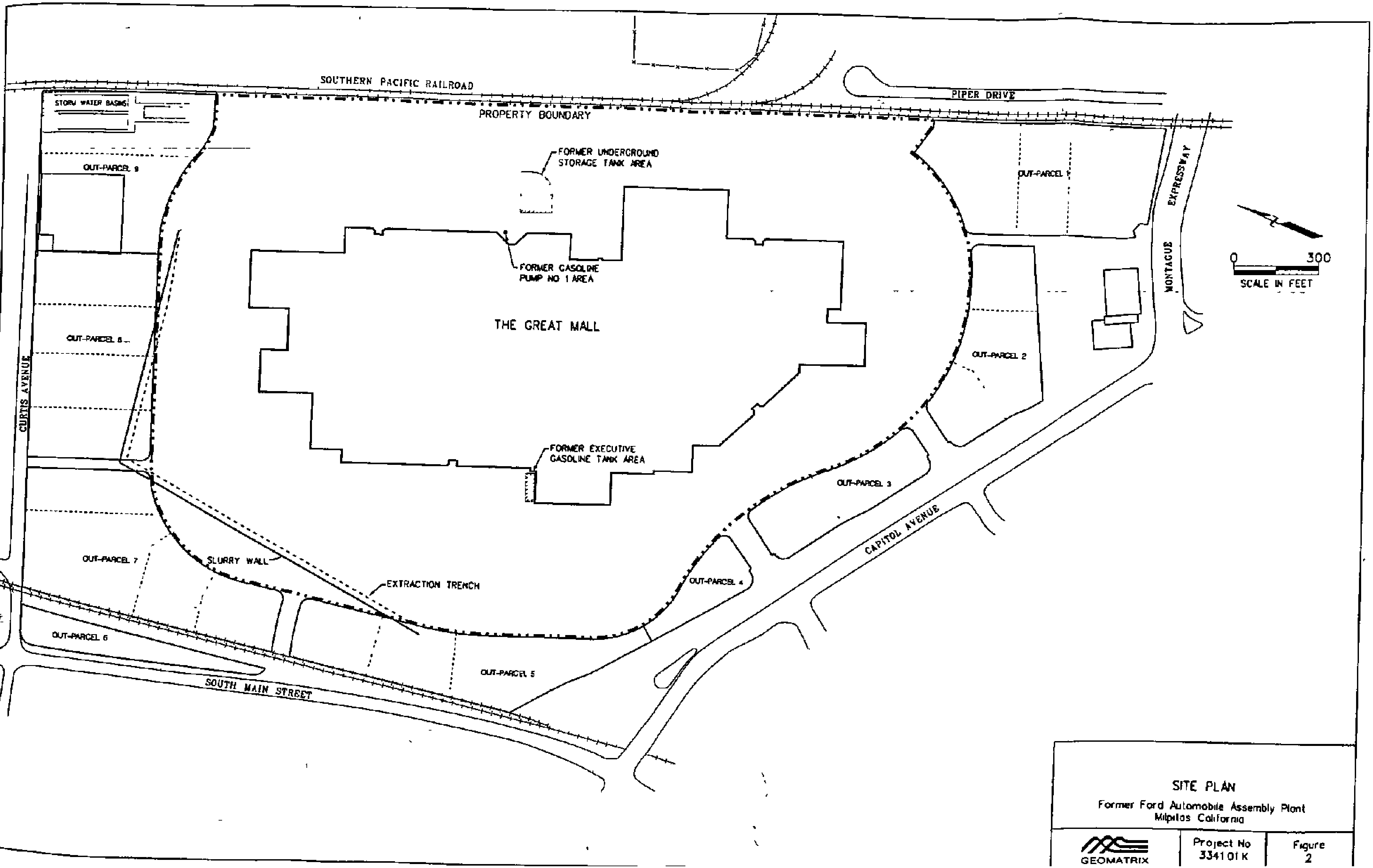
- A-LEVEL TRIGGER MONITORING WELL TO BE DESTROYED
- A-LEVEL MONITORING WELL ASSOCIATED WITH AIR SPARGING SYSTEM TO BE DESTROYED
- PILOT WELL ASSOCIATED WITH AIR SPARGING SYSTEM TO BE DESTROYED

ENHANCED BIOREMEDIATION AIR SPARGING WELLS NETWORK

Former Ford Automobile Assembly Plant
Milpitas, California

GEOMATRIX | Project No 334101K | Figure 4


SOUTHERN PACIFIC RAILROAD
PIPER DRIVE
STORM WATER BASINS
PROPERTY BOUNDARY
GROUNDWATER TREATMENT SYSTEM
MONTAGUE EXPRESSWAY
N
0 300
SCALE IN FEET
TMW-1
EW-1
TMW-2
THE GREAT MALL
CURTIS AVENUE
TMW-3
TMW-4
EW-3
EW-4
SLURRY WALL
TMW-5
EXTRACTION TRENCH
EW-5
EW-6
CAPITOL AVENUE
SOUTH MAIN STREET
EXPLANATION
EW-3 EXTRACTION WELLS TO BE DESTROYED
TMW-3 TRENCH MONITORING WELLS TO BE DESTROYED
GROUNDWATER TREATMENT SYSTEM TO BE DECOMMISSIONED
GROUNDWATER EXTRACTION TRENCH AND TREATMENT SYSTEM
Former Ford Automobile Assembly Plant
Milpitas, California
GEOMATRIX
Project No 3341.01K
Figure 3


SOUTHERN PACIFIC RAILROAD
PIPER DRIVE
PROPERTY BOUNDARY
STORM WATER BASINS
OUT-PARCEL 9
FORMER UNDERGROUND STORAGE TANK AREA
OUT-PARCEL 1
MONTAGUE EXPRESSWAY
0 300
SCALE IN FEET
FORMER GASOLINE PUMP NO 1 AREA
THE GREAT MALL
OUT-PARCEL 8
OUT-PARCEL 2
CURTIS AVENUE
FORMER EXECUTIVE GASOLINE TANK AREA
OUT-PARCEL 3
CAPITOL AVENUE
OUT-PARCEL 7
SLURRY WALL
EXTRACTION TRENCH
OUT-PARCEL 4
OUT-PARCEL 6
OUT-PARCEL 5
SOUTH MAIN STREET
SITE PLAN
Former Ford Automobile Assembly Plant
Milpitas California
GEOMATRIX
Project No
3341 01 K
Figure
2

California Regional Water Quality Control Board
San Francisco Bay Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address http://www.swrcb.ca.gov
1515 Clay Street, Suite 1400 Oakland California 94612
Phone (510) 622-2300 FAX (510) 622-2460

Gray Davis
Governor

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April 16, 2001
File No 43S0153 (MEJ)

Mr Jack Williams
Swerdlow Real Estate Group, Inc
200 South Park Road
Hollywood, FL 33021

Subject Implementation of Site Management Plan, Great Mall of the Bay Area, Former Ford Assembly Plant, Milpitas, California

Dear Mr Williams

Regional Board staff has reviewed previous and ongoing development activities at the Great Mall of the Bay Area (the Property) We would like to take this opportunity to summarize these development activities with respect to the implementation of the March 1997 Site Management Plan (SMP) prepared for the Property The SMP provides recommendations regarding the implementation of Property management measures These measures were developed to address notification and other requirements for the Property that should be considered during ongoing operations and maintenance of the Property, the continuing development of the Property, or a change in Property use Additionally, this letter outlines specific requirements for implementation of the SMP for ongoing and future developments These requirements were discussed in meetings held on February 27, 2001 between Mark Johnson of the Regional Board and representatives of Geomatrix Consultants, Inc (Geomatrix), on behalf of the Swerdlow Real Estate Group, Inc These issues were also discussed with you in a meeting held on March 15, 2001

As you know, in March 1997, Regional Board Order No 97-039 rescinded Site Cleanup requirements for the Property, accepted closure of all areas of concern based on the current land uses, and required implementation of the SMP for any redevelopment activities that intrude into the subsurface Such development activities completed since then include Vans SkatePark, Oshman's Supersports USA (Oshman's), Dave & Buster's, and Century Theaters Ongoing developments include the Home Depot Project and the northeastern parking structure We understand that additional site development activities are planned

In general, previous developments (i e , Vans SkatePark, Oshman's, Dave & Buster's, and Century Theater) have been completed in the southern and western areas of the Property, where

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historic industrial uses were highly defined and well understood Implementation of the SMP during development of these areas was straightforward due to the strength of the data As per the SMP, impacted soil from previously identified and remediated areas (i e , Oshman's loading dock) was segregated, characterized, and handled appropriately However, ongoing development activities, such as the northeastern parking structure, are being performed in areas of the Property where historic industrial uses were significantly more active, and the potential for encountering environmental concerns is greater than in previous developments Additionally, this is the area where the Jones Chemical Company is currently undergoing groundwater extraction and remediation activities Therefore, the following actions will be required for ongoing and future development activities at the Property

1) The Regional Board shall be notified in writing at least 60 days prior to initiating construction activities below grade (e g , drilling, excavation, or grading)

2) Historic documents shall be reviewed to identify areas of potential environmental concern Historic environmental data, if available shall be reviewed for adequacy and compared to the previously developed health-based cleanup levels[1] (HBCLs) This will identify potential environmental data gaps that need to be investigated and considered prior to the proposed development Any additional data will then be collected, as necessary If no data gaps are identified, then the historic environmental data shall be summarized in a project-specific SMP (see item 4) and submitted to the Regional Board

3) A screening level human health risk assessment (HHRA) using the historic and, if applicable, newly collected data will be performed. This would incorporate the comparison of the complete data set with respect to HBCLs or other applicable HHRA screening criteria, to evaluate the need for a project specific HHRA This document shall be submitted to the Regional Board at least 60 days prior to initiation of construction activities

4) A project-specific SMP, Health and Safety Plan, and other documents describing potential risk management measures shall be submitted to the Regional Board 60 days prior to project initiation The SMP will contain an executive summary of environmental conditions as they pertain to each specific development and potential exposure to construction workers The SMP and Health and Safety Plans shall discuss measures to notify and educate all construction workers involved in subsurface work of potential environmental conditions and potential hazards which may be encountered during construction In addition, the project specific SMP and Health and Safety Plan will set forth notification protocols for the construction workers, in the event that previously unidentified environmental issues are encountered during construction

[1] McLaren/Hart, 1991, Soil Health Based Clean-Up Levels for Ford Motor Company Automobile Assembly Facility in Milpitas California

These requirements are not applicable to development of the Out Parcel areas, such as the Home Depot Project As described in our letter of September 11, 2000, the Regional Board has no environmental concerns related to the development of the Out Parcel areas

In accordance with the above requirements, please respond to this letter describing proposed SMP activities for the proposed development of the eastern portion of the Property, including the ongoing development of the northeastern parking structure, by May 10, 2001 For all future developments, please respond to the requirements as set forth in items 1 through 4 above, by submitting the appropriate documentation to the Board, 60 days prior to initiation of construction activities This response is required under the authority of Section 13267 of the California Water Code Failure to respond or a late response may subject you to civil liability imposed by the Board to a maximum amount of $1000 per day Any extension of the time deadline must be confirmed in writing by Board staff

Should you have any questions, please contact Mr Mark Johnson of my Staff at (510) 622-2493, or e-mail him at mej@rb2 swrcb ca gov

Sincerely,

Loretta K. Barsamian
Executive Officer

Stephen A Hill, Chief
Toxic Cleanup Division

cc Lester Feldman, Geomatrix