APPENDIX A

Field Methods and Analytical Results

TABLE OF CONTENTS

Page

1.0 INTRODUCTION A-1

2.0 MOBILIZATION FOR FIELD WORK A-1

3.0 SITE RECONNAISSANCE A-1

4.0 FIELD AND ANALYTICAL METHODS A-2
- 4.1 GEOPHYSICAL SURVEY A-2
- 4.2 2005 DRILLING AND SOIL SAMPLING A-2
  - 4.2.1 Analytical Methods A-3
- 4.3 2009 DRILLING AND SOIL SAMPLING A-4
  - 4.3.1 Analytical Methods A-5

5.0 RESULTS A-6
- 5.1 GEOPHYSICAL SURVEY RESULTS A-6
- 5.2 DATA EVALUATION A-6
- 5.3 2005 PHASE II ANALYTICAL RESULTS A-8
  - 5.3.1 Section I A-8
  - 5.3.2 Section II A-9
  - 5.3.3 Section III A-10
  - 5.3.4 Section IV A-12
- 5.4 2009 PHASE II ANALYTICAL RESULTS A-15
  - 5.4.1 Targeted Sampling A-15
  - 5.4.2 Systematic Sampling A-18
- 5.5 QUALITY ASSURANCE AND QUALITY CONTROL A-20

6.0 REFERENCES A-22

APPENDIX A

FIELD METHODS AND ANALYTICAL RESULTS

Santa Cruz Branch Line
Santa Cruz and Monterey Counties, California

1.0 INTRODUCTION

This appendix documents the field methods and detailed results for the Phase II investigations performed by AMEC Geomatrix, Inc. (AMEC; formerly Geomatrix Consultants, Inc.) from March 2005 through April 2009 along portions of the Santa Cruz Branch Rail Line (the Branch Line) in Santa Cruz County and Monterey Counties, California (the Site; Figure 1). This work was performed on behalf of Santa Cruz County Regional Transportation Commission (SCCRTC) in general accordance with AMEC's March 22, 2000 *Proposal for Phase II Environmental Site Assessment* (Geomatrix, 2000), and February 11, 2004 *Work Plan for Phase II Environmental Site Assessment* (Work Plan; Geomatrix, 2004).

2.0 MOBILIZATION FOR FIELD WORK

Prior to conducting field activities, SCCRTC obtained a right-of-entry agreement from Union Pacific Railroad (UPPR). AMEC marked boring locations and notified Underground Services Alert (USA). In addition, AMEC contracted with Cruz Brothers Locators, Inc., of Scotts Valley, California, to perform an underground utility clearance at each boring location. AMEC notified UPRR's Fiber Optic Hotline of the planned soil borings (clearing of utilities through UPPR is a requirement for all right-of-way work). No permits were required for the work performed due to the shallow nature of the borings.

3.0 SITE RECONNAISSANCE

Due to the length of time between the completion of the 1996 Phase I and the initiation of the Phase II soil investigations, AMEC personnel visited the site on March 17 and 18, 2005 and January 19 and 20, 2009 to observe and document current conditions prior to soil sampling activities. The site reconnaissance consisted of a combination of windshield drive-by surveys and direct on-site observations, as appropriate, depending on the area, the Branch Line traverses. Attention was given to the possibility of both on-site and off-site impacts to the Branch Line. Observations made during the additional site reconnaissance efforts are described in Section 4.1 of the main report.

4.0 FIELD AND ANALYTICAL METHODS

The Phase II field sampling program included a geophysical survey and drilling and soil sampling. Details on data collection methodologies and the laboratory analytical methods are described in the following sections.

4.1 GEOPHYSICAL SURVEY

As discussed in Section 2.4 of the main report, three historical subsurface features were identified during the 1996 Phase I that were believed to be located within the Branch Line right-of-way based on the assumption that the right-of-way was consistently 100 feet wide. These historical features included a potential underground storage tank (UST) at milepost 26.69 (Figure 3, Section I); an in-ground oil reservoir at milepost 19.77 (Section II); and potential in-ground oil tanks at milepost 1.20 (Section IV). During the site reconnaissance, no evidence of these features was observed. AMEC reviewed the Southern Pacific Transportation Company (SPTCo) valuation maps and worked with SCCRTC to re-assess the locations of each of these historical features. Based on the review, the section of right-of-way at milepost 19.77 containing the in-ground oil reservoir is outside of the right-of-way and not owned by UPRR. Additionally, the in-ground oil tanks at milepost 1.20, if they existed, would have been located outside the current width of the right-of-way. Therefore, geophysical surveys at these two locations were removed from the Phase II investigation. No additional investigation was performed at milepost 19.77 since this section of the Branch Line is not owned by UPRR. The potential for on-site environmental impacts resulting from the in-ground oil tanks at milepost 1.20 was evaluated by collecting soil samples within the right-of-way adjacent to these off-site features. The location of the potential UST at milepost 26.69 was determined to be within the right-of-way and a geophysical survey was conducted at this location as described below.

AMEC contracted with Norcal Geophysics (Norcal) of Petaluma, California, to perform a geophysical survey at the presumed location of the potential UST at milepost 26.69. Norcal surveyed an approximately 10,000-square-foot area, using a combination of vertical magnetic gradient (VMG), hand-held metal-detection (MD), and electromagnetic line locating (EMLL) methods. The survey was designed to scan the near surface (0 to 11 feet below ground surface [bgs]) for the presence of metallic features such as pipes, utilities, sumps and dry wells, and USTs. A copy of the geophysical survey report describing field methods and findings is included in Appendix B.

4.2 2005 DRILLING AND SOIL SAMPLING

Fifty-four soil borings were advanced on April 25 through 29, 2005. Fifty of the soil borings (SB-01 through SB-50; Figures 2 through 11a) were advanced along the right-of-way by Precision Sampling, Inc. (Precision), of Richmond, California, a licensed drilling contractor,

under oversight of an AMEC field geologist. The borings were drilled using a hydraulically-driven, direct-push rig. The remaining four soil borings were advanced by AMEC personnel with a hand auger.

Precision advanced 16 soil borings to a total depth of 10 feet below ground surface (bgs) with a drive sampler equipped with a 2.5-inch inside-diameter steel drive casing containing a 1.6-inch inside-diameter core barrel to collect soil samples (Enviro-core® sampling system). Thirty-four soil borings were drilled to a total depth of 3 feet bgs with a drive sampler equipped with a 2.5-inch inside-diameter steel drive casing containing a 1.5-inch inside-diameter core barrel to collect soil samples (Geoprobe® macro-core sampler).

AMEC personnel advanced 4 soil borings to a total depth of 3 feet bgs using a hand auger. Soil samples from the hand auger borings were collected using a slide hammer equipped with 6-inch-long, 2-inch-diameter brass sampling sleeves. Drilling and soil sampling equipment were steam cleaned prior to use at each boring.

At least three soil samples were collected from each of the 54 borings, except boring SB-09 (milepost 26.11). Only two soil samples were collected from boring SB-09 because bedrock was encountered at approximately 2 feet bgs. Soil samples were collected from the 3-foot borings at depths of 0.5, 1.5, and 3.0 feet bgs, and from the 10-foot borings at 1.0, 5.0, and 10 feet bgs. The initially proposed boring depth for SB-45 (Section IV) was 3 feet bgs. However, visually impacted soil was observed in this boring starting at 2.5 feet bgs. Therefore, this boring was advanced beneath the visually impacted soil and a sample was collected to assess the vertical extent of impacted soil.

4.2.1 Analytical Methods

The 2005 Phase II investigation samples were submitted to Test America Laboratories, Inc. of Pleasanton, California, (formally Severn Trent Laboratories, Inc.,) a California-certified analytical laboratory under AMEC chain-of-custody procedures. Copies of the chain-of-custody records are included in Appendix D. Analytical tests were selected for each sampling location based on information gathered during the 1996 Phase I and 2005 site reconnaissance, including: historical/current uses, visual observations, and environmental regulatory file review. Soil samples from most boring locations were analyzed using a phased approach; i.e., shallow samples were analyzed first while deeper samples were placed on hold at the laboratory. If the analytical results for a sample identified the presence of a chemical constituent at a concentration greater than screening criteria, deeper samples were analyzed to evaluate the vertical extent of impacted soil.

The primary screening criteria used to assess whether deeper soil samples should be analyzed were the Environmental Screening Levels (ESLs) developed by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB, 2005), or if no ESL was published for a constituent, the analytical result was compared to Preliminary Remediation Goals (PRGs) for soil, published by the U.S. Environmental Protection Agency (EPA), Region IX (EPA, 2004). It should be noted that these criteria are general and serve as benchmarks to initially evaluate potential constituents of concern and locations that may be environmentally impacted along the right-of-way.

Soil samples were analyzed according to the sample collection and analysis summary presented in Table 1 of the main report for the following constituents:

- total petroleum hydrocarbons (TPH) quantified as diesel (TPHd) using EPA Method 8015M;
- TPH quantified as motor oil (TPHmo) using EPA Method 8015M;
- TPH quantified as gasoline (TPHg) using EPA Method 8015M;
- volatile organic compounds (VOCs) using EPA Method 8260B;
- polynuclear aromatic hydrocarbons (PAHs) using EPA Method 8270 with selective ion monitoring (SIM);
- California Title 22 metals (full suite or select metals) using EPA Method 6000/7000 series; and
- organochlorine pesticides using EPA Method 8081A.

4.3 2009 DRILLING AND SOIL SAMPLING

Forty-nine (49) soil borings were advanced on February 9 to 12, 2009 and on April 13, 2009 (SB-55 through SB-103). The soil borings were advanced along the right-of-way by RSI Drilling Inc. (RSI), of Woodland, California, a licensed drilling contractor, under oversight of an AMEC field geologist. Forty-seven borings were drilled using a hydraulically driven, direct-push rig. The remaining two soil borings (SB-95 and SB-96) were advanced by RSI personnel with a hand auger and slide-hammer.

The forty-seven borings advanced with the drill rig were advanced to depths ranging from 4 to 20 feet bgs using either a 2.0-inch outside-diameter dual wall sampling system containing a 1.1-inch inside-diameter butyrate core barrel or a 1.5-inch outside-diameter macro-core sampler to collect soil samples (Geoprobe® dual wall and Geoprobe® Macro-core sampling systems). RSI advanced the remaining two soil borings (SB-95 and SB-96) to a total depth of 1.5 feet bgs using a hand auger and slide hammer. The slide hammer was equipped with 6-

inch long, 2-inch-diameter brass sampling sleeves to collect soil samples. Drilling equipment and hand augers were steam cleaned prior to use. The slide hammer was decontaminated with a 3-stage Alconox ® soap and distilled water rinse.

At least three soil samples were collected from borings SB-55 through SB-94 and SB-97 through SB-103 and two soil samples were collected borings SB-95 and SB-96 (near Gino-Rinaldi, Inc. property). Proposed sample depths for borings SB-55 through SB-94 and SB-97 through SB-103 were 0.5, 1.5, and 3.0 bgs, however due to limited recovery of soil in the sample barrels, soil sample depths were adjusted to as close to the original proposed sample depths as possible.

For the 2005 and 2009 investigations, a nearly-continuous soil core was generated from each boring and logged by an AMEC geologist using the visual-manual procedures of ASTM Standard D-2488-00 for guidance (based on the Unified Soil Classification System) and using Munsell Soil Color Chart designations. At the 2005 investigation sample locations and the 2009 investigation sample locations analyzed for constituents other than arsenic and select metals, recovered soil was screened using an organic vapor meter equipped with a photoionization detector (PID). Boring logs are included in Appendix C.

Soil samples were collected in clean butyrate liners or brass sleeves, sealed with Teflon™ sheets, plastic end caps, and silicon tape. Soil samples were labeled, sealed in plastic bags, and stored in an ice-cooled chest. Soil cuttings and rinsate water were placed in steel 55-gallon drums that were labeled and temporarily stored in a fenced area at Santa Cruz Junction (approximate milepost 20.20, Section II) pending disposal by SCCRTC. Following collection of the soil samples, the boreholes were backfilled with cement grout or granular bentonite placed from the total depth of the boring to ground surface with a tremie pipe.

4.3.1 Analytical Methods

The 2009 Phase II investigation samples were submitted to Test America Laboratories, Inc. of Pleasanton, California, a California-certified analytical laboratory under AMEC chain-of-custody procedures. Copies of the chain-of-custody records and laboratory analytical reports are included in Appendix D. Soil samples from systematic sampling locations were analyzed at all depths. At targeted locations, the majority of soil samples were analyzed using a phased approach; i.e., shallow samples were analyzed first while deeper samples were placed on hold at the laboratory. If the analytical results for a sample identified the presence of a chemical constituent at a concentration greater than screening criteria, deeper samples were analyzed to evaluate the vertical extent of impacted soil.

Soil samples were analyzed according to the sample collection and analysis summary presented in Table 2 of the main report for the following constituents:

- TPHd and TPHmo using EPA Method 8015M;
- PAHs using EPA Method 8270 with selective ion monitoring (SIM);
- Select metals including arsenic, cadmium, lead, nickel, and zinc using EPA Method 6010 and chromium by EPA Method 7470/7471 (LUFT 5 metals).

5.0 RESULTS

The following sections present the results of the 2005 and 2009 Phase II investigations. The Norcal geophysical survey report is included as Appendix B. Soil boring logs are included as Appendix C. Copies of the chain-of-custody records and laboratory analytical reports are inclu2ded in Appendix D, which has been provided on a compact disk (CD). AMEC performed a quality assurance/quality control assessment of the analytical data; the results of the assessment are summarized below and discussed in detail in Appendices F and G.

5.1 GEOPHYSICAL SURVEY RESULTS

On April 26, 2005, Norcal performed a geophysical survey at the presumed location of the potential UST at milepost 26.69 (Figure 3). As described in Section 4.1, Norcal surveyed an approximately 10,000-square-foot area using a combination of VMG, hand-held MD, and EMLL methods. A figure generated by Norcal that presents detected anomalies within the survey area is included in Appendix B as Plate 1. According to Norcal's report, the magnetic range and magnitude of the anomalies indicate the presence of ferrous material not typically associated with the presence of a UST. Additionally, Norcal's report indicates the possibility of an abandoned 25-foot-long section of utility line, a rectangular reinforced concrete pad, and reinforced concrete footings or cut-off fence posts, within the area of investigation. Because the presence of the UST could not be confirmed by the geophysical survey, soil samples were collected within this area to evaluate potential environmental impacts from this historical feature.

5.2 DATA EVALUATION

Analytical data generated during the 2005 Phase II soil investigations were compared to health-based risk screening criteria, and were used to assess whether additional investigation was warranted. For the purpose of evaluating data it was assumed that the future use of the railroad corridor would be for transit or recreation. As such, analytical results from soil borings were compared to the human health direct exposure ESLs for industrial/commercial shallow soil, or industrial PRGs for soil if no ESL was published. It should be noted that the 2005 Phase II soil investigation results were compared to ESLs published in 2005 and that ESL

values were updated in May 2008 (RWQCB, 2008). AMEC subsequently evaluated the results of the 2005 Phase II data relative to the updated May 2008 ESLs; the results of the review did not alter the sampling plan implemented for the 2009 Phase II investigation.

Concentrations of metals in samples that were above screening criteria also were evaluated to ascertain whether the detected metal concentrations likely represent background concentrations or are the result of impacts from railroad operations. Metals in soil are naturally-occurring, and their presence is not necessarily the result of anthropogenic impacts. Chromium and cobalt were detected in some soil samples collected during the 2005 investigation at concentrations greater than their respective 2005 industrial ESLs; however, upon evaluation, the data for these metals indicated they were present at concentrations within the natural background concentrations for soil in this area. [1,2]

During the 2005 Phase II investigation, arsenic was detected at concentrations above its industrial ESL. It should be noted that naturally-occurring arsenic concentrations typically are present at concentrations greater than risk-based screening criteria. As such, the ESLs are not directly applicable, and it is appropriate to evaluate the presence of arsenic based on its background concentration. Therefore, as part of the 2009 Phase II investigation, additional samples were collected to develop a sufficiently large data set of arsenic concentrations in soil along the Branch Line to calculate a site-specific background concentration. The site-specific background concentration of arsenic that was used to evaluate the results of the soil samples along the Branch Line was calculated to be 14.4 mg/kg. The methods used to calculate the site-specific background concentration of arsenic are presented in Appendix E.

AMEC also evaluated data with regard to waste classification criteria in the event that soil potentially could be excavated and require off-site disposal. Total threshold limit concentrations (TTLC) and soluble threshold limit concentrations (STLCs) are used to classify material as hazardous or non-hazardous for disposal purposes in the State of California. TTLCs and STLCs for metals and pesticides are codified in the California Code of Regulations (CCR), Title 22, Section 66216.24. These criteria are not strictly applicable to in-place soil; however, they are used as a tool to assess whether additional evaluation may be warranted. For screening purposes, a value of 10 times the constituent's respective STLC was used to provide an initial evaluation of whether a soil could be classified as a California hazardous waste (analytical testing is required to ascertain the actual soil classification for disposal). In

1. Metals were considered to be at background concentrations if sufficient data were available to demonstrate that the lateral and vertical distribution of metals concentrations across the site was similar.
2. The 2008 ESLs were updated in May 2008 (RWQCB, 2008) such that no concentrations of chromium and cobalt exceeded their respective ESLs.

addition to the California waste criteria, the federal Toxicity Characteristic (TC) was used to evaluate the possibility that on-site soil could contain metals at concentrations that would classify the soil as a federal Resource Conservation and Recovery Act [RCRA]) waste. For screening purposes, a value of 20 times the metal's respective TC was used to provide an initial evaluation of whether a soil could be classified as a federal RCRA hazardous waste, should the soil be disposed off-site.

Screening criteria are presented with the analytical results in Tables 3 through 9.

5.3 2005 PHASE II ANALYTICAL RESULTS

This section presents the analytical results from the 2005 Phase II soil investigation. The analytical results for soil samples are summarized in Tables 3 through 6, with the exception of TPHg and VOCs, which were not detected in any of the samples analyzed. Boring locations are presented on Figures 2 through 11a.

5.3.1 Section I

Targeted Sampling

Targeted soil samples were collected from a total of five borings at three locations in Section I of the Branch Line.

- Davenport Drainage Tunnel (SB-01) – Samples were analyzed for TPHg, TPHd, PAHs, Title 22 metals, VOCs, and pH. TPHg, PAHs, and VOCs were not detected in any of the samples analyzed. TPHd and Title 22 metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations. The pH for the sample analyzed was within the normal range (7.8).

- Davenport Loading Shed and Freight Depot (SB-02 and SB-03) – Samples were analyzed for TPHg, TPHd, PAHs, Title 22 metals, VOCs, and pesticides. TPHg and VOCs were not detected in any of the samples analyzed. TPHd, PAHs, metals, and pesticides were detected at concentrations below their respective industrial ESLs or applicable background concentrations.

- Potential UST & Engine House (SB-04 and SB-05) – Samples were analyzed for TPHg, TPHd, PAHs, Title 22 metals, and VOCs. TPHg and VOCs were not detected in any of the samples analyzed. TPHd, PAHs, and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations.

Pesticides were not detected above the waste classification screening criteria (TTLC, 10 times STLC, or 20 times TC) in the targeted soil samples collected from Section I. Additionally, metals were not detected at concentrations above the waste classification screening criteria; except for one sample collected at boring SB-2 at 1 foot bgs contained lead at a concentration greater than the 10 times STLC screening criterion. However, the two deeper samples (5 and

10 feet bgs) collected from boring SB-2 contained concentrations of lead below the 10 times STLC screening criterion.

Systematic Sampling (Agricultural North)

Systematic soil samples were collected from four boring locations (SB-06, SB-07, SB-08, and SB-09) along a 1-mile section of the Branch Line primarily surrounded by agricultural fields in Section I. Samples were analyzed for TPHd, TPHmo, PAHs, select metals, arsenic, and pesticides.

- TPHd, TPHmo, PAHs, metals and pesticides were not detected at concentrations above their respective industrial ESLs, industrial PRGs, or applicable background concentrations.

Pesticides were not detected above the waste classification screening criteria in the systematic soil samples collected from Section I. Metals were not detected above the waste classification screening criteria; however, one of the four soil samples analyzed for metals contained lead at a concentration greater than the 10 times STLC screening criterion (SB-8 at 0.5 foot bgs).

5.3.2 Section II

Targeted Sampling

Targeted soil samples were collected from a total of six borings at six locations in Section II of the Branch Line.

- Miscellaneous Dumping (SB-10) – Samples were analyzed for TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, and metals were detected at concentrations below their respective industrial ESLs or background concentrations. Select PAHs, including benzo(a)pyrene, were detected above industrial ESLs in the shallow soil sample (0.5 foot bgs); however, concentrations were not detected in the deeper sample (1.5 feet bgs).

- Soil Staining (SB-11) - Samples were analyzed for TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. PAHs and VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above the site-specific background concentration in the shallow sample collected at 0.5 foot bgs. However, the deeper sample collected at 1.5 feet bgs had a concentration of arsenic below the site-specific background concentration of 14.4 mg/kg.

- Tool House (SB-12) - Samples were analyzed for TPHg, TPHd, PAHs, Title 22 metals, and VOCs. TPHg, PAHs, and VOCs were not detected in any of the

samples analyzed. TPHd and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations.

- Motorcar House (SB-13) - Samples were analyzed for TPHg, TPHd, PAHs, Title 22 metals, and VOCs. TPHg and VOCs were not detected in any of the samples analyzed. TPHd, PAHs, and Title 22 metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations.

- Freight House (SB-14) - Samples were analyzed for TPHg, TPHd, PAHs, Title 22 metals, and VOCs. TPHg and VOCs were not detected in any of the samples analyzed. TPHd and select PAHs and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above the site-specific background concentration in the shallow sample collected at 1 foot bgs. However, the deeper sample collected at 5 feet bgs at this location had a concentration of arsenic below the site-specific background concentration of 14.4 mg/kg.

- Seabright Station (SB-15) - Samples were analyzed for TPHg, TPHd, PAHs, Title 22 metals, and VOCs. TPHg, TPHd, PAHs, and VOCs were not detected in any of the samples analyzed. Metals were not detected above their respective industrial ESLs or applicable background concentrations.

Metals were not detected above the waste classification screening criteria; however, one of the samples analyzed for metals contained lead at a concentration greater than the 10 times STLC and 20 times TC screening criteria (SB-14 at 1 foot bgs).

Systematic Sampling

No systematic sampling was performed within Section II.

Railroad Tie Sampling

Two samples (SB-51 and SB-54) were collected in Section II for the purpose of assessing the potential for treated railroad ties to impact shallow soil on the Branch Line. Samples were analyzed for PAHs, Title 22 metals, and VOCs. VOCs were not detected in any of the samples analyzed. PAHs and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations at both sampling locations. Metals were not detected above the waste classification screening criteria in the soil samples collected near the railroad ties from Section II.

5.3.3 Section III

Targeted Sampling

Targeted soil samples were collected from a total of four borings at two locations in Section III of the Branch Line.

- Lumber Yard, Paint Shop, and Boat Repair Facility (SB-16 and SB-17) - Samples were analyzed for TPHg, TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. TPHg and VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, PAHs, and metals were detected at concentrations below their respective industrial ESLs or background concentrations.

- Former Freight House (SB-22 and SB-23) - Samples were analyzed for TPHg, TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. TPHg and VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, and one PAH were detected at concentrations below their respective industrial ESLs. Select metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above the site-specific background concentration in the sample from SB-23 at 1 foot bgs. The deeper sample collected at 5 feet bgs at this location had a concentration of arsenic below the site-specific background concentration of 14.4 mg/kg.

Metals were not detected above the waste classification screening criteria; however, one of the twelve soil samples analyzed for metals contained arsenic at a concentration greater than the 10 times STLC screening criterion (SB-23 at 1 foot bgs).

Systematic Sampling (Residential)

Systematic soil samples were collected from four boring locations (SB-18, SB-19, SB-20, and SB-21) along a 1-mile section of the Branch Line in a residential area of Section III. Samples were analyzed for TPHd, TPHmo, PAHs, and select metals.

- TPHd, TPHmo, PAHs, and metals (excluding arsenic) were not detected above their respective industrial ESLs in any of the samples.

- Arsenic was detected in shallow soil samples (0.5 foot bgs) above the site-specific background concentration at two locations (SB-20 and SB-21).

Metals were not detected above the waste classification screening criteria in the systematic soil samples collected from Section III.

Railroad Tie Sampling

One location (SB-52) was sampled in Section III for the purpose of assessing the potential for treated railroad ties to impact shallow soil on the Branch Line. Samples were analyzed for PAHs, Title 22 metals, and VOCs. VOCs were not detected in any of the samples analyzed. PAHs, including benzo(a)pyrene, were detected above industrial ESLs in the shallow soil sample (0.5 foot bgs); however, PAHs were not detected in the deeper samples (1.5 and 3 feet bgs). Metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above the site-specific background concentration in the two shallow samples (0.5 and 1.5 feet bgs). The

deeper sample collected at 3 feet bgs at this location had a concentration of arsenic below the calculated site-specific background concentration of 14.4 mg/kg.

Metals were not detected above waste classification screening criteria except for arsenic. Two samples contained arsenic at concentrations greater than 10 times STLC; one of these concentrations also was greater than 20 times TC.

5.3.4 Section IV

Targeted Sampling

Targeted soil samples were collected from a total of eleven borings at six locations in Section IV of the Branch Line.

- Surface Staining (SB-32 and SB-33) - Samples were analyzed for TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, PAHs, and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above the site-specific background concentration in the sample collected from SB-32 at 0.5 foot bgs. The deeper sample collected at 1.5 feet bgs at this location had a concentration of arsenic below the site-specific background concentration of 14.4 mg/kg.

- Former Fueling Station (SB-42) - Samples were analyzed for TPHg, TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. TPHg and VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, one PAH, and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations.

- Surface Staining at Drisco Pipe (SB-43 and SB-44) - Samples were analyzed for TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. PAHs and VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations.

- Surface Staining at Granite Construction Company (SB-45 and SB-46) - Samples were analyzed for TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. VOCs were not detected in any of the samples analyzed. TPHmo, PAHs, and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above the site specific background concentration in the sample collected from SB-46 at 1.5 feet bgs. The deeper sample collected at 3 feet bgs at this location had a concentration of arsenic below the site-specific background concentration of 14.4 mg/kg. TPHd was detected above the industrial ESL in the 0.5 and 3 feet bgs samples from boring SB-45; however, TPHd was detected below the industrial ESL in the sample from 10 feet bgs. TPHd was detected at concentrations below the industrial ESL in the soil samples from boring SB-46.

- Surface Staining (SB-47 and SB-48) - Samples were analyzed for TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, PAHs, and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above site-specific background concentration in shallow samples collected at SB-47 and SB-48 at 0.5 foot bgs and at SB-48 at 1.5 feet bgs. The deeper samples collected at 3 feet bgs at each of these locations had concentrations of arsenic that are below the site-specific background concentration of 14.4 mg/kg.

- In-ground Oil Tanks (SB-49 and SB-50) - Samples were analyzed for TPHg, TPHd, TPHmo, PAHs, Title 22 metals, and VOCs. TPHg and VOCs were not detected in any of the samples analyzed. TPHd, TPHmo, PAHs, and metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations.

Metals were not detected above the TTLC waste classification screening criteria; however, seven soil samples analyzed for metals contained lead at a concentration greater than the 10 times STLC screening criterion (0.5 foot bgs from borings SB-32, SB-33, SB-43, SB-45, SB-46, SB-47, and SB-48). Additionally, one soil sample contained arsenic (SB-47 at 0.5 foot bgs) and four soil samples contained chromium (SB-42 at 10 feet bgs, SB-44 at 0.5 foot bgs, SB-45 at 3 feet bgs, and SB-49 at 10 feet bgs) at concentrations greater than the 10 times STLC screening criteria. Additionally, two samples (SB-32 at 5 feet bgs and SB-43 at 0.5 foot bgs) contained lead at a concentration greater than 20 times TC.

Systematic Sampling (Undeveloped, Agricultural South, and Industrial)

Systematic soil samples were collected from a total of sixteen boring locations along three separate one-mile sections of the Branch Line in Section IV. Four borings were advanced in each of the undeveloped and agricultural sections, and eight borings were advanced in the industrial section. Samples were analyzed for TPHd, TPHmo, PAHs, and select metals. Samples from the agricultural section also were analyzed for pesticides.

Undeveloped (SB-24, SB-25, SB-26, and SB-27)

- TPHd, TPHmo, and PAHs were not detected at concentrations above their respective industrial ESLs.

- Metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations, with the exception that arsenic was detected above the site-specific background concentration in samples collected at 0.5 foot bgs at three sampling locations (SB-24, SB-25, and SB-27). The deeper samples at these locations were not analyzed for arsenic.

Metals were not detected above the waste classification screening criteria; except for one soil sample analyzed for metals, which contained lead at a concentration greater than the 10 times STLC screening criterion (SB-24 at 0.5 foot bgs).

Agricultural South (SB-28, SB-29, SB-30, and SB-31)

- TPHd and TPHmo were not detected at concentrations above their respective industrial ESLs.
- PAHs were detected at concentrations below their respective industrial ESLs, with the exception of one PAH in the shallow sample (0.5 foot bgs) collected from boring SB-30.
- Metals were detected at concentrations below their respective industrial ESLs or applicable background concentrations.
- Two pesticides, dieldrin and toxaphene, were detected above their respective industrial ESLs. Dieldrin was detected in the shallow samples (0.5 foot bgs) collected from borings SB-28 and SB-29. Toxaphene was detected in the shallow samples (0.5 foot bgs) collected from borings SB-28, SB-29, and SB-31. However, dieldrin and toxaphene were not detected in the deeper samples (1.5 and 3 feet bgs) analyzed at these locations. For those pesticides for which no ESLs have been published, results were compared to industrial PRGs; none of these pesticides were detected above their respective PRGs.

Metals were not detected above the waste classification screening criteria in the agricultural systematic soil samples collected from Section IV, except for chromium, which was detected at the 10 times STLC criterion in the shallow sample (0.5 foot bgs) from boring SB-28. Some pesticides (endrin, 4,4`-DDE, 4,4`-DDT, and toxaphene) were detected above the TTLC, 10 times the STLC, and 20 times TC waste classification screening criteria in the agricultural systematic soil samples.

Industrial (SB-34, SB-35, SB-36, SB-37, SB-38, SB-39, SB-40, SB-41)

- TPHd and TPHmo were not detected above their respective industrial ESLs in any of the samples collected in this area.
- PAHs were not detected above their respective industrial ESLs, except for benzo(a)pyrene in the shallow soil sample (0.5 foot bgs) collected from boring SB-41. However, benzo(a)pyrene was not detected above its industrial ESL in the deeper sample (1.5 feet bgs) collected at this location.
- Metals were detected at concentrations below their respective industrial ESLs or background concentrations, with the exception that arsenic was detected above the site-specific background concentration in samples collected at 0.5 foot bgs at six sampling locations (SB-34, SB-35, SB-36, SB-37, SB-39, and SB-40). One deeper

sample was analyzed for arsenic at location SB-35 at 1.5 feet and had a concentration of arsenic below the site-specific background concentration of 14.4 mg/kg.

Metals were not detected above the TTLC waste classification screening criteria; however, six soil samples analyzed for metals contained lead at a concentration greater than the 10 times STLC screening criterion (0.5 foot bgs from borings SB-34, SB-35, SB-36, SB-38, SB-40, and SB-41); the soil sample from 0.5 foot at SB-35 also contained lead at a concentration greater than 20 times TC. Additionally, three soil samples contained arsenic at concentrations greater than the 10 times STLC screening criterion (0.5 foot bgs from borings SB-34, SB-39 and SB-40); the concentration of arsenic in the 0.5 foot bgs sample from SB-39 also was greater than 20 times the TC.

Railroad Tie Sampling

One location (SB-53) was sampled within Section IV for the purpose of assessing the potential for treated railroad ties to impact shallow soil on the Branch Line. Samples were analyzed for PAHs, Title 22 metals, and VOCs. VOCs were not detected in any of the samples analyzed. PAHs were detected at concentrations below their respective industrial ESLs.

Metals were detected at concentrations below their respective industrial ESLs or background concentrations, with the exception that arsenic was detected above the site-specific background concentration in the two shallow samples (0.5 and 1.5 feet bgs). The deeper sample collected at 3 feet bgs at this location had a concentration of arsenic below the site-specific background concentration of 14.4 mg/kg. Metals were not detected above the waste classification screening criteria in the soil samples collected from SB-53.

5.4 2009 PHASE II ANALYTICAL RESULTS

This section presents the analytical results from the 2009 Phase II soil investigation. The analytical results are summarized in Tables 7 through 9 of the main report and boring locations are presented on Figures 2 through 12. A summary of the targeted sampling and systematic sampling analytical results are discussed below.

5.4.1 Targeted Sampling

Additional targeted soil samples were collected during the 2009 Phase II investigation near previous boring locations SB-10, SB-23, and SB-45.

Samples Collected Near Previous Location SB-10

Six soil borings (SB-77 through SB-82) were advanced around previous boring location SB-10 (approximate milepost 21.70) to evaluate the lateral extents of elevated PAHs previously

detected at this location (Figure 4). This sampling location was initially targeted to address miscellaneous debris that had been deposited on the Branch Line right-of-way.

A total of eighteen soil samples were collected from borings SB-77 through SB-82 between depths of 0.5 and 4.5 feet bgs and analyzed for PAHs and arsenic. PAHs were detected at concentrations below their respective industrial ESLs in samples collected at 0.5 foot bgs at locations SB-78, SB-79, SB-80, and SB-82 and in one sample collected at 1.5 feet bgs at location SB-81. PAHs were not detected in any other sample deeper than 0.5 foot bgs collected in this area.

Arsenic was detected in 3 of the 18 samples at concentrations that were above the site-specific background concentration of 14.4 mg/kg (SB-79-4.5, SB-80-0.5, and SB-81-1.5). The deeper samples collected at SB-80 and SB-81 at 4.5 feet bgs had concentrations of arsenic that were below the site-specific background concentration. A deeper sample was not collected at location SB-79.

Arsenic was not detected above the TTLC or 20 times TC waste classification screening criteria; however, two of the six sample locations had a sample that contained arsenic at concentrations at or greater than the 10 times STLC screening criterion (SB-80 at 0.5 foot bgs and SB-81 at 1.5 feet bgs).

Samples Collected Near Previous Location SB-23

Three soil borings (SB-74 through SB-76) were advanced around previous boring location SB-23 (approximate milepost 16.39) to delineate the extent of elevated arsenic concentrations previously detected at this location (Figure 6). Boring SB-23 was originally advanced to evaluate the potential impact of a former freight house at approximate milepost 16.40. Nine soil samples were collected from borings SB-74 through SB-76 between depths of 0.5 foot and 4.5 feet bgs and analyzed for arsenic. Arsenic was detected in 3 of the 9 samples at concentrations that were above the site-specific background concentration of 14.4 mg/kg (SB-74-0.5, SB-74-1.5, and SB-76-0.5). Boring SB-74 and SB-76 were each located approximately 10 feet north of the centerline of the rail-line). Step-out boring SB-75 was located approximately 20 feet north of the railroad centerline and had concentrations of arsenic below the site-specific background concentration. Concentrations of arsenic in the deeper samples collected at 3 and 4.5 feet bgs at each of these locations were below the background concentration.

Arsenic was not detected above the waste classification screening criteria in any of the samples collected.

Samples Collected Near Previous Location SB-45

Six soil borings (SB-97 through SB-102) were advanced in the vicinity of previous boring location SB-45 (approximate milepost 2.32) to depths ranging from 12 to 20 feet bgs. The borings were advanced along the drainage ditch adjacent to the Granite Construction Company facility to delineate the lateral and vertical extents of petroleum hydrocarbon impacted soil in this area (Figures 11 and 11a). SB-45 was originally advanced to evaluate visible surface soil staining at the outfall of a drainage pipe that appears to originate from Granite Construction facility. During the 2009 fieldwork, surface soil staining was not observed at this location or along the drainage ditch.

Fifteen soil samples were collected from borings SB-97 through SB-102 at depths ranging from 0.5 foot to 20.0 feet bgs and analyzed for TPHd and TPHmo. Apparent petroleum staining was observed in the soil cores to depths up to approximately 16 feet bgs (SB-101 and SB-102) and “black viscous globules” were noted in the soil core from SB-100 at approximately 4 feet bgs. Groundwater was encountered in soil borings SB-101 and SB-102 at depths of approximately 16.2 and 16.5 feet bgs, respectively.

TPHmo was detected at a concentration greater than the industrial ESL in one sample collected at SB-101 at 4.5 feet bgs. TPHmo was either not detected or detected at concentrations below the industrial ESL in the remainder of the samples.

TPHd was detected above the industrial ESL at four of the six boring locations (SB-98, SB-99, SB-101, and SB-102) in samples collected between depths of 0.5 foot to 12 feet bgs. Samples collected at 20 feet bgs at two locations (SB-101 and SB-102) had concentrations of TPHd below the industrial ESL.

Samples Collected Near Gino Rinaldi, Inc. Property

Two soil borings (SB-95 and SB-96) were advanced along the Branch Line right-of-way adjacent to Gino Rinaldi, Inc., property (approximate milepost 0.7) to evaluate potential impacts from runoff water discharge on to the right-of-way. Two soil samples were collected from each boring location and analyzed by a phased approach for TPHd, TPHmo, select metals, and PAHs.

TPHd and TPHmo were detected in the samples collected from SB-95 and SB-96 at 0.5 foot bgs at concentrations below the industrial ESL. Based on these results the 1.5 ft bgs samples were not analyzed for TPHd and TPHmo.

PAHs were detected in the samples collected from SB-95 and SB-96 at 0.5 foot bgs at concentrations below their respective industrial ESLs. PAHs were not detected above

laboratory reporting limits in the deeper sample collected at SB-96 at 1.5 feet bgs. The deeper sample collected at SB-95 at 1.5 feet bgs was not analyzed for PAHs.

Cadmium, chromium, lead, nickel, and zinc were either not detected or detected at concentrations below their respective industrial ESLs in the samples collected at 0.5 foot bgs. Based on these results the 1.5 ft bgs were not analyzed for these metals. Arsenic was detected in only one sample (SB-95 at 1.5 ft bgs) at a concentration above the site-specific background concentration of 14.4 mg/kg. A deeper sample was not collected at this location during the investigation.

Arsenic was not detected above the TTLC or 20 times TC waste classification screening criteria; however, one sample locations (SB-95 at 1.5 feet bgs) had arsenic at a concentration greater than the 10 times STLC screening criterion.

5.4.2 Systematic Sampling

Systematic soil samples were collected within the residential, undeveloped, agricultural-south and the additional 1-mile residential section between Seascape and Capitola. The analytical results for samples collected within each of these areas are discussed below.

Residential (SB-83 through SB-94)

Systematic soil samples were collected from twelve boring locations (SB-83 through SB-94) along the same 1-mile residential section of the Branch Line (Section III) as the 2005 Phase II investigation (Figure 5a). A total of 36 soil samples were collected and analyzed for arsenic.

Eight of the twelve sampling locations had one to two soil samples with arsenic concentrations that were greater than the site-specific background concentration of 14.4 mg/kg (SB-83 through SB-86, SB-89, SB-90, SB-92, and SB-93). The samples that contained arsenic concentrations that were greater than the background concentration occurred in the samples collected from 0.5 foot and 1.5 feet bgs. Samples collected at depths greater than 1.5 feet bgs had concentrations of arsenic that were below the calculated site-specific background concentration.

Arsenic was not detected above the TTLC waste classification screening criterion; however, soil samples from five of the twelve sample locations contained arsenic at concentrations greater than the 10 times STLC screening criterion (SB-83, SB-84, SB-89, SB-92, and SB-93). The samples that contained arsenic concentrations greater than 10 times STLC screening criteria occurred at depths of 1.5 feet bgs and shallower. The arsenic concentration in three soil samples (SB-83-1.5, SB-84-0.5, and SB-84.1.5) was greater than 20 times the TC screening criterion.

Undeveloped (SB-59 through SB-70)

Systematic soil samples were collected from twelve boring locations (SB-59 through SB-70) along the same 1-mile section of the Branch Line (Section IV) as the 2005 Phase II investigation (Figure 9). A total of 36 soil samples were collected and analyzed for arsenic.

Arsenic was detected at 10 of the 12 sampling locations at concentrations that were greater than the site-specific background concentration of 14.4 mg/kg (SB-59 through SB-68). The samples that contained arsenic concentrations that were greater than the background concentration generally occurred in the samples collected from the 0.5 and 1.5 feet bgs. Samples collected at depths greater than 1.5 feet bgs had concentrations of arsenic that were below the calculated site-specific background concentration with the exception of two samples (SB-62 and SB-63 at 4.5 feet bgs).

Arsenic was not detected above the TTLC waste classification screening criterion; however, samples from five of the twelve sample locations contained arsenic at concentrations greater than the 10 times STLC screening criterion (SB-60, SB-61, SB-62, SB-65, and SB-66). The samples that contained arsenic concentrations greater than 10 times STLC screening criteria occurred at depths of 1.5 feet bgs and shallower. Additionally, three soil samples (SB-60-1.5, SB-61-0.5, and SB-62-1.5) contained arsenic at concentrations greater than 20 times the TC screening criterion.

Agricultural South (SB-55 through SB-58)

Systematic soil samples were collected from four boring locations (SB-55 through SB-58) along the same 1-mile section of the Branch Line (Section IV) as the 2005 Phase II investigation (Figure 10). A total of twelve soil samples were collected and analyzed for arsenic.

Arsenic was detected at each of the four sampling locations at concentrations that were greater than the site-specific background concentration of 14.4 mg/kg (SB-55 through SB-58). At SB-55 and SB-57 the samples that contained arsenic concentrations greater than the background concentration occurred in the samples collected from 0.5 foot and 1.5 feet bgs. At SB-56 and SB-58 the deeper samples collected at 4.5 and 3.5 ft bgs, respectively, also contained arsenic concentrations greater than background concentrations.

Arsenic was not detected above the TTLC waste classification screening criterion; however, samples from three of the five sample locations contained arsenic at concentrations greater than the 10 times STLC screening criterion (SB-56 through SB-58). The samples that contained arsenic concentrations greater than 10 times STLC screening criteria occurred at

depths of 1.5 feet bgs and shallower. Only one soil sample, SB-58-1.5, contained an arsenic concentration greater that 20 times the TC screening criterion.

Residential - Seascape to Capitola

Systematic soil samples were collected from four boring locations (SB-71 through SB-73 and SB-103) along a 1-mile section of the Branch Line (Section III and IV) between the Seascape and Capitola areas (Figure 7). A total of twelve soil samples were collected and analyzed by a phased approach for TPHd, TPHmo, PAHs, and LUFT 5 metals (as described in Section 4.3).

TPHmo and/or TPHd were detected in the samples collected at 0.5 foot bgs at concentrations below the residential ESL. Based on these results the deeper samples were not analyzed for TPHd and TPHmo.

Benzo(a)pyrene was detected in one sample (SB-71 at 0.5 foot bgs) at a concentration greater than the residential ESL; however, benzo(a)pyrene was not detected in the deeper sample collected at this location at 1.5 feet bgs. PAHs were either not detected or detected at concentrations below respective residential ESLs in the other samples collected and analyzed in this area.

Cadmium, chromium, lead, nickel, and zinc were either not detected or detected at concentrations below residential ESLs in the samples collected at 0.5 foot bgs at. Based on these results the deeper samples were not analyzed for these metals.

Soil samples from three of the four sampling locations had arsenic concentrations that were greater than the site-specific background concentration of 14.4 mg/kg (SB-71, SB-72, and SB-103). At SB-71 and SB-72 the samples that contained arsenic concentrations greater than the background concentration occurred in the samples collected from 0.5 foot and 1.5 feet bgs. At boring location SB-103, the deeper sample collected at 4.5 ft bgs also contained arsenic at a concentration greater than background.

Arsenic was not detected above the TTLC or 20 times TC waste classification screening criterion; however, a sample from one of the four sample locations contained arsenic at a concentration greater than the 10 times STLC screening criterion (SB-72 at 0.5 foot bgs).

5.5 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance/quality control (QA/QC) samples are analyzed to assess the accuracy, precision, and completeness of the data. During the Phase II sampling events, QA/QC samples consisted of laboratory-analyzed method blanks, laboratory control sample/laboratory control sample duplicate (LCS/LCSD), and matrix spike/matrix spike duplicate (MS/MSD)

samples to provide internal quality control. Equipment blank samples were collected and analyzed to provide field quality control. AMEC performed a QA/QC evaluation of the analytical results. Based on our evaluation, the data is considered acceptable for analysis of general environmental conditions along the right of way. A detailed description of the 2005 and 2009 QA/QC evaluations are presented in Appendices E and F, respectively.

6.0 REFERENCES

Geomatrix, 1997, *Preliminary Site Assessment, Davenport and Santa Cruz Branch Lines*, Santa Cruz and Monterey Counties, California, March.

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